M U N D A R I J A

1 -Bob

1.1 Natural va butun sonlar

1. $a+(-b)=a-b$
2. $-(-a)=a$
3. $(a+b)+c=a+(b+c)$
4. $-(a+b-c)=-a-b+c$
5. $a\cdot(-b)=(-a)\cdot b=-ab$
6. $(ab)\cdot c=a\cdot(bc)=b\cdot(ac)$

1.1.1 Boshlang'ich tushunchalar. Hisoblashga oid misollar.

(96-7-1) Hisoblang:
$21\cdot 18-19\cdot 18+18\cdot 17-17\cdot 16+16\cdot 15-15\cdot 14$
A) 50 B) 100 C) 98 D) 24 E) 110

Yechish: Umumiy ko'paytuvchini qavsdan tashqariga chiqarish yordamida hisoblaymiz:

$21\cdot 18-19\cdot 18+18\cdot 17-17\cdot 16+16\cdot 15-15\cdot 14=$
$=18(21-19)+17(18-16)+15(16-14)=$
$=18\cdot 2+17\cdot 2+15\cdot 2=2(18+17+15)=100$
Javob: 100 (B).

1. (96-1-1) Ifodaning qiymatini toping:
$26\cdot 25-25\cdot 24+24\cdot 23-23\cdot 22-12\cdot 8$
A)106 B)1 C)54 D)8 E)0

2. (96-3-1) Ifodaning qiymatini toping:
$12-6:3+2\cdot 4$
A)16 B)10 C)18 D)48 E)$4\frac{2}{3}$

3. (96-9-52) Ifodaning qiymatini toping:
$18\cdot 36-16\cdot 36+24\cdot 27-25\cdot 24-21\cdot 5$
A)45 B)1 C)0 D)15 E)115

4. (96-10-1) Ifodaning qiymatini toping:
$21\cdot 13+24\cdot 13+45\cdot 12+25\cdot 44-89\cdot 24$
A)79 B)126 C)89 D)0 E)1

5. (96-11-1) Ifodaning qiymatini toping:
$15-9:3+4\cdot 3$
A)24 B)18 C)48 D)6 E)$7\frac{1}{3}$

6. (96-12-1) Ifodaning qiymatini toping:
$18-12:2+5\cdot 3$
A)$15\frac{1}{2}$ B)51 C)24 D)54 E)27

7. (97-3-1) Hisoblang:
$21\cdot 17-18\cdot 17+17\cdot 15-15\cdot 14+18\cdot 13-15\cdot 13$
A)125 B)135 C)205 D)180 E)165

8. (97-7-1) Hisoblang:
$36\cdot 24-33\cdot 24+17\cdot 11-14\cdot 11+18\cdot 16-15\cdot 16$
A)166 B)155 C)180 D)235 E)153

9. (97-10-1) Hisoblang:
$27\cdot 23-24\cdot 23+21\cdot 19-18\cdot 19+17\cdot 11-14\cdot 11$
A)165 B)159 C)143 D)203 E)189

10. (98-3-9) Hisoblang:
$27048\cdot 27044-27047\cdot 27043$
A)60491 B)58051 C)57091 D)54091 E)56091

11. (98-10-57) Hisoblang:
$45815\cdot 45818-45814\cdot 45816$
A)137446 B)137447 C)241584 D)241586 E)241585

12. (00-5-4) Hisoblang:
$139\cdot 15+18\cdot 139+15\cdot 261+18\cdot 261$
A)13200 B)14500 C)15100 D)16200 E)17500

13. (98-10-50) 6 ni berilgan songa ko'paytirganda, hosil bo'lgan son ...44 ko'rinishida bo'lsa, berilgan son quyidagilardan qaysi biri ko'rinishida bo'lishi mumkin?
A)...24 B)...19 C)...79 D)...14 E)...34

14. (99-8-6) 3680 va 5060 sonlarini ayni bir songa bo'lganda, birinchisida bo'linma 32 ga teng bolsa, ikkinchisida nechaga teng bo'ladi?
A)44 B)38 C)48 D)52 E)46

15. (98-5-8) 50 dan kichik tub sonlar nechta?
A)10 B)15 C)17 D)9 E)16

16. (97-9-61) n raqamining qanday qiymatlarida $50+n$ soni eng kam tub ko'paytuvchilarga ajraladi?
A)3 B)5 C)3;9 D)1;9 E)9

17. (00-5-6) 48 sonining barcha natural bo'luvchilari yig'indisini toping.
A)123 B)100 C)108 D)124 E)128

18. (96-3-80)* Ushbu 31323334...7980 sonning raqamlari yig'indisini toping.
A)473 B)480 C)460 D)490 E)453

19. (96-9-21)* Ushbu 1234567891011...4950 sonning raqamlari yig'indisini toping.
A)335 B)330 C)320 D)315 E)310

20. (96-12-78)* Ushbu 21222324...6970 sonning raqamlari yig'indisini toping.
A)400 B)430 C)410 D)420 E)440

21. (96-13-21)* Ushbu 11121314...5960 sonning raqamlari yig'indisini toping.
A)380 B)370 C)360 D)400 E)390

22. (00-9-15)* $\overline{ABC}+\overline{MN}=\overline{FEDP}$. ($\overline{MN}$- ikki xonali, $\overline{ABC}$ - uch xonali, $\overline{FEDP}$ - to'rt xonali son). $F^{M+N}+A^F$ ni hisoblang.
A) aniqlab bo'lmaydi B)1 C)2 D)9 E)10

23. (99-5-6)* $\overline{abc}+\overline{dec}=\overline{fkmc}$. ($\overline{abc}$ va $\overline{dec}$ - uch xonali, $\overline{fkmc}$ - to'rt xonali sonlar). $f^{a+d}+(b+d)^c$ ni hisoblang.
A) aniqlab bo'lmaydi B)1 C)2 D)3 E)4

24. (01-2-3) 999^2 ni hisoblang.
A) 997991 B)998001 C)999001 D)998991 E)997001

25. (02-5-4) 1; 2; 3; 15; 17; 23; 24; 169; 289; 361 sonlar ketma-ketligida nechta tub son bor?
A) 3 B) 4 C) 5 D) 7 E) 8

26. (02-12-31) 7 ga karrali ikki xonali natural sonlar nechta?
A) 14 B) 12 C) 15 D) 11 E)13

27. (02-12-33) $249 \cdot 250 - 250 \cdot 251 + 251 \cdot 252 - 252 \cdot 253 + 253 \cdot 254 - 254 \cdot 255$ ni hisoblang.
A) -1514 B) -1516 C) -1512 D) -1518 E) -1510

28. (03-8-30) $4^{12}+4^{12}+4^{12}+4^{12}$ yig'indining yarmini hisoblang.
A) 2^{25} B) 2^{24} C) 4^{48} D) $2 \cdot 4^{16}$ E) 4^{25}

29. (03-10-1) $2001 \cdot 2004 - 2002 \cdot 2003$ ni hisoblang.
A) -2 B) 2 C) 0 D) 2000 E) 4

30. (03-10-16) Dastlabki 100 ta natural sonlarni yozganda, 7 raqami necha marta takrorlanadi?
A) 10 B) 20 C) 19 D) 18 E) 17

1.1.2 Bo'linish belgilari.

1. Oxirgi raqami 0,2,4,6,8 lar bilan tugaydigan sonlar 2 ga bo'linadi.

2. Oxirgi ikki raqami 0 bilan tugasa yoki 4 ga bo'linsa, bunday sonlar 4 ga bo'linadi.

3. Oxirgi uchta raqami 0 bilan tugasa yoki 8 ga bo'linsa, bunday sonlar 8 ga bo'linadi.

4. Oxirgi raqami 0 yoki 5 bilan tugaydigan sonlar 5 ga bo'linadi.

5. Raqamlar yig'indisi 3 ga bo'linadigan sonlar 3 ga bo'linadi.

6. Raqamlar yig'indisi 9 ga bo'linadigan sonlar 9 ga bo'linadi.

7. Agar sonning juft o'rinda turgan raqamlar yig'indisi bilan toq o'rinda turgan raqalar yig'indisining ayirmasi 11 ga bo'linsa, bunday sonlar 11 ga bo'linadi.

(98-10-2) Quyidagi sonlardan qaysi biri 36 ga qoldiqsiz bo'linmaydi?
A)2016 B)3924 C)1782 D)8244 E)2484

Yechish: Biror son 36 ga qoldiqsiz bo'linishi uchun 4 ga ham 9 ga ham bo'linishi kerak. 1782 soni esa 4 ga bo'linmaydi. Shuning uchun u son 36 ga ham bo'linmaydi. J: 1782 (C).

1. (97-4-2) 17827516 quyidagi sonlardan qaysi biriga qoldiqsiz bo'linadi?
A)3 B)10 C)4 D)5 E)9

2. (97-4-12) n raqamining qanday qiymatlarida $6134n$ soni 3 ga qoldiqsiz bo'linadi?
A)1 B)4 C)2 D)4; 2 E)1; 4; 7

3. (97-9-62) 41582637 quyidagi sonlardan qaysi biriga qoldiqsiz bo'linadi?
A)4 B)9 C)5 D)10 E)6

4. (97-9-72) n raqamining qanday qiymatlarida $7851n$ soni 9 ga qoldiqsiz bo'linadi?
A)2 B)4 C)6 D)9 E)2; 6

5. (98-7-4) x raqamining qanday eng kichik qiymatida $(147 + \overline{3x2})$ son 3 ga qoldiqsiz bo'linadi?
A)5 B)0 C)4 D)7 E)1

6. (98-10-51) Berilgan $p = 10189144, q = 396715256$ va $r = 78901644$ sonlardan qaysilari 8 ga qoldiqsiz bo'linadi?
A)hech qaysisi B)p va q C)p va r D)p E)r

7. (98-12-4) x raqamining qanday eng katta qiymatida $(147 + \overline{3x2})$ son 3 ga qoldiqsiz bo'linadi?
A)7 B)8 C)9 D)4 E)5

8. (98-12-70)* Agar a toq son bo'lsa, quyidagi sonlardan qaysi biri albatta toq son bo'ladi?
A) $a^2 + 27$ B) $5(a + 13)$ C) a^8
D) $\frac{a(a+3)}{2}$ E) $\frac{(a+1)(a+2)}{2}$

9. (99-3-7) Quyidagi sonli ketma-ketliklardan qaysilari tub sonlardan iborat?
1) 0; 3; 5; 7; 11; 2) 1; 3; 5; 7; 13; 3) 3; 5; 7; 9; 11; 4) 2; 3; 5; 7; 17; 5) 3; 5; 17; 19; 381
A) 1; 2 B)2; 4 C)5 D)3 E)4

10. (99-7-10) 30 dan kichik tub sonlar nechta?
A)11 B)9 C)10 D)12 E)8

11. (96-7-2) Berilgan sonlardan qaysilari 15 ga qoldiqsiz bo'linadi?
$x = 220350$, $y = 3,21 \cdot 10^6$, $z = 1024145$.
A) faqat x B) faqat z C) y va z
D) x va y E) x va z

12. (97-3-2) $x = 30112$, $y = 3,3 \cdot 10^5$ va $z = 102588$ sonlardan qaysilari 12 ga qoldiqsiz bo'linadi?
A) faqat y B) faqat x C) x va z
D) faqat z E) y va z

13. (97-7-2) Quyidagi sonlardan qaysilari 18 ga qoldiqsiz bo'linadi?
$x = 10842$, $y = 5,49 \cdot 10^4$, $z = 306198$
A) faqat x B) faqat y C) x va y
D) faqat z E) y va z

14. (97-10-2) Quyidagi sonlardan qaysilari 6 ga qoldiqsiz bo'linadi?
$x = 123386$, $y = 402108$, $z = 2,61 \cdot 10^5$
A) faqat x B) faqat y C) faqat$z$
D) y va z E) x va z

15. (97-2-5) Natural sonlar uchun quyidagi mulohazalardan qaysi biri noto'g'ri?
A) Berilgan sonlar bo'linadigan sonlarning eng kattasi ularning eng katta umumiy bo'luvchisi bo'ladi
B) Agar ikki qo'shiluvchidan biri 11 ga bo'linib, ikkinchisi 11 ga bo'linmasa, ularning yig'indisi 11 ga bo'linmaydi
C) 3 ga bo'lingan son 9 ga ham bo'linadi
D) 3 ga va 5 ga bo'linadigan son 15 ga bo'linadi
E) Raqamlarning yig'indisi 3 ga bo'linadigan juft son 6 ga bo'linadi

16. (98-2-3) Quyidagi sonlardan qaysi biri 15 ga qoldiqsiz bo'linmaydi?
A) 6525 B) 3105 C)4620 D) 6145 E)1245

17. (98-3-3) Berilgan $p = 1018978560$, $q = 8976119441$ va $r = 987610734$ sonlardan qaysilari 16 ga qoldiqsiz bo'linadi?
A) Hech qaysi B) p C) q D) r E) p va q

18. (98-9-4) Quyidagi sonlardan qaysi biri 12 ga qoldiqsiz bo'linmaydi?
A) 9216 B) 13626 C)12024 D) 18312 E) 52308

19. (99-2-2) 821 ga qanday eng kichik musbat sonni qo'shganda, yig'indi 6 ga qoldiqsiz bo'linadi?
A) 4 B) 1 C)5 D) 7 E) 9

20. (99-2-3) $3p-3 \in N$ ga tegishli son 1; 2; 3; 6; 9 va 18 ga qoldiqsiz bo'linadi. p ning eng kichik natural qiymatini toping.
A) 14 B) 21 C)7 D) 5 E) 24

21. (00-7-3) 752 sonining o'ng tomoniga qanday raqam yozilsa, hosil bo'lgan son 36 ga qoldiqsiz bo'linadi?
A) 0 B) 2 C) 6 D) 7 E) 4

22. (00-8-3) $3 * 470$ yozuvdagi yulduzchani shunday raqam bilan almashtiringki, hosil bo'lgan son 45 ga qoldiqsiz bo'linsin.
A) 4 B) 5 C) 0 D) 6 E) 8

23. (96-6-5) Natural sonlarga nisbatan quyidagi mulohazalarning qaysi biri noto'g'ri?
A) berilgan sonlarga bo'linadigan sonlarning eng kichigi bu sonlarning eng kichik karralisi bo'ladi
B) agar qo'shiluvchilarning har biri 13 ga bo'linsa, u holda ularning yig'indisi ham 13 ga bo'linadi
C) agar biror sonning raqamlar yig'indisi 9 ga bo'linsa, u holda 9 ga bo'linadi
D) oxirgi raqami 4 ga bo'lingan son 4 ga bo'linadi
E) 3 ga hamda 2 ga bo'lingan sonlarning barchasi 6 ga ham bo'linadi.

24. (01-2-2) n ning qanday eng kichik natural qiymatida 2^n+1 soni 33 ga qoldiqsiz bo'linadi?
A) 7 B) 3 C)6 D) 4 E) 5

25. (01-11-2) Quyidagi sonlardan qaysi biri 45 ga qoldiqsiz bo'linadi?
A) $42 \cdot 85$ B) $35 \cdot 61$ C) $80 \cdot 123$ D) $36 \cdot 20$
E) $143 \cdot 30$

26. (02-4-28) 246*013579 soni 9 ga bo'linishi uchun yulduzchaning o'rniga qanday raqam qo'yilishi kerak?
A) 0 B) 4 C) 7 D) 8 E) 9

27. (02-12-21) Quyidagi ko'paytmalardan qaysi biri 45 ga qoldiqsiz bo'linadi?
A) $42 \cdot 85$ B) $35 \cdot 61$ C) $80 \cdot 123$ D) $39 \cdot 18$
E) $243 \cdot 80$

28. (03-2-69)* Agar $m \in N$ bo'lsa, quyidagi keltirilganlardan qaysi biri doimo juft bo'ladi?
A) $m(m+6)$ B) m^2+18m C) $\frac{m^2-16}{m+4}$
D) m^5+13m E) m^4+8

29. (03-6-37) 3, 6, 7 va 9 raqamlaridan ularni takrorlamasdan mumkin bo'lgan barcha 4 xonali sonlar tuzilgan. Bu sonlar ichida nechtasi 4 ga qoldiqsiz bo'linadi?
A) 2 B) 4 C) 6 D) 8 E) 12

1.1.3 Qoldiqli bo'lish.

a-bo'linuvchi, b-bo'luvchi, n-bo'linma, r-qoldiq.

1. $a = b \cdot n + r, \quad 0 \le r < b$

(98-6-7) 3^{20} ni 7 ga bo'lgandagi qoldiqni toping.
A) 6 B) 3 C)1 D) 2 E) 4

Yechish: $(mk+r)^n$ sonni k ga bo'lgandagi qoldiq r^n ni k ga bo'lgandagi qoldiqqa teng, ya'ni $(mk+r)^n = m_1k+r^n \quad (m_1-bo'linma)$ bo'lgani uchun $9^{10} = (7+2)^{10} = 7n+2^{10} = 7n+32^2 = 7n+(4\cdot7+4)^2 = 7n+7n_1+4^2 = 7(n+n_1)+16 = 7(n+n_1+2)+2$ ekanini hosil qilamiz. Demak qoldiq 2 ga teng ekan. J:2 (D).

1. (96-6-2) 243 ni qandaydir songa bo'lganda bo'linma 15 ga, qoldiq 3 ga teng chiqdi. Bo'luvchi nechaga teng?
A) 17 B) 16 C) 18 D) 19 E) 21

2. (97-2-2) 215 ni 19 ga bo'lganda, qoldiq 6 bo'ladi. Bo'linma nechaga teng?
A) 13 B) 12 C) 9 D) 11 E) 14

3. (97-8-2) 358 ni qanday songa bo'lganda bo'linma 17 va qoldiq 1 bo'ladi?
A) 19 B) 21 C) 22 D) 20 E) 23

4. (97-12-2) Natural sonni 18 ga bo'lganda, bo'linma 15 ga, qoldiq 3 ga teng bo'ldi. Bo'linuvchini toping.
A) 173 B) 243 C) 253 D) 273 E) 263

5. (98-6-1) Qandaydir sonni 1995 ga bo'lganda, qoldiq 1994 ga teng bo'lsa, shu sonni 5 ga bo'lgandagi qoldiqni toping?
A) 4 B) 3 C) 2 D) 1 E) 0

6. (98-7-3) Qaysi tenglik qoldiqli bo'lishni ifodalaydi?
1) $43 = 9\cdot5-2$ 2) $43 = 8\cdot5+3$ 3) $43 = 7\cdot5+8$
4) $43 = 21 \cdot 2 + 1$
A) 1; 2; 4 B) 2; 3; 4 C) 2; 4 D) 3; 4
E) hammasi

7. (98-11-51) Qandaydir sonni 289 ga bo'lganda, qoldiq 287 ga teng bo'lsa, shu sonni 17 ga bo'lgandagi qoldiqni toping?
A) 15 B) 2 C) 5 D) 16 E) 0

8. (98-11-57) 9^{10} ni 7 ga bo'lgandagi qoldiqni toping.
A) 1 B) 3 C) 2 D) 6 E) 4

9. (98-12-3) Qaysi tenglik qoldiqli bo'lishni ifodalaydi?
1) $47 = 4\cdot11+3$ 2) $47 = 6\cdot6+11$ 3) $47 = 9\cdot5+2$
4) $47 = 7 \cdot 7 - 2$
A) 1; 3 B) 1; 2; 3 C) 1; 4 D) 2; 3
E) hammasi

10. (99-1-3) Ifodani 6 ga bo'lgandagi qoldig'ini toping.
$7 + 69 + 671 + 6673 + 66675$
A) 1 B) 4 C) 3 D) 5 E) 2

11. (99-3-5) 36455478354 ni 2.4.5.9.10 va 25 ga bo'lganda hosil bo'ladigan qoldiqlar yig'indisini toping?
A) 18 B) 16 C) 15 D) 14 E) 12

12. (99-3-6) 4^{12} ni 9 ga bo'lganda qoldiq necha bo'ladi?
A) 1 B) 2 C) 4 D) 7 E) 8

13. (99-8-25)* Ikkita natural sonni 5 ga bo'lganda, mos ravishda 1 va 3 qoldiq hosil bo'ladi. Bu sonlar kvadratlarining yig'indisini 5 ga bo'lganda, qoldiq nechaga teng bo'ladi?
A) 4 B) 1 C) 2 D) 3 E) 0

14. (99-8-26) n sonini 7 ga bo'lganda, qoldiq 5 ga, m sonini 7 ga bo'lganda, qoldiq 6 ga teng. mn ko'paytmani 7 ga bo'lganda, qoldiq nechaga teng bo'ladi?
A) 4 B) 0 C) 1 D) 2 E) 3

15. (00-2-10) 3 ga bo'linmaydigan natural sonning kubini 9 ga bo'lganda, qoldiq qanday sonlar bo'lishi mumkin?
A) 1 yoki 8 B) 0 yoki 1 C) 0 yoki 8
D) 3 yoki 6 E) 0; 1 yoki 8

16. (00-5-5) 35 ta natural sonni ketma-ket yozish natijasida hosil bo'lgan 123...3435 sonini 25 ga bo'lish natijasida hosil bo'lgan qoldiq nechaga teng?
A) 15 B) 20 C) 5 D) 10 E) 0

17. (00-7-4) 624 ni qanday songa bo'lganda bo'linma 41 ga qoldiq esa 9 ga teng bo'ladi?
A) 16 B) 17 C) 13 D) 15 E) 12

18. (01-6-2) Barcha uch xonali sonlar ichida 45 ga qoldiqsiz bo'linadiganlari nechta?
A) 19 B) 20 C) 18 D) 21 E) 17

19. (01-7-8)* 2146, 1991 va 1805 sonlarining har birini qanday natural songa bo'lganda, qoldiqlari bir xil chiqadi?
A) 7 B) 13 C) 21 D) 31 E) 37

20. (02-3-12) Quyidagi tasdiqlardan qaysi biri hamma vaqt to'g'ri?
A) Har bir qo'shiluvchi 11 ga bo'linsa, yig'indi ham 11 ga bo'linadi
B) Birorta ham qo'shiluvchi 11 ga bo'linmasa, yig'indi ham 11 ga bo'linmaydi
C) Qo'shiluvchilardan kamida bittasi 11 ga bo'linsa, yig'indi ham 11 ga bo'linadi
D) Yig'indi 11 ga bo'linsa, har bir qo'shiluvchi ham 11 ga bo'linadi
E) Yig'indi 11 ga bo'linmasa, birorta ham qo'shiluvchi 11 ga bo'linmaydi

21. (03-4-5) Nechta ikki xonali son 15 ga qoldiqsiz bo'linadi?
A) 4 B) 5 C) 7 D) 6 E) 8

22. (03-7-7) 2002^{2002} sonini 5 ga bo'lganda qoldiq nimaga teng?
A) 0 B) 1 C) 2 D) 3 E) 4

1.1.4 Umumiy bo'luvchi va umumiy karrali. EKUB va EKUK.

(96-9-1) 594 va 378 ning umumiy bo'luvchilari nechta?
A) 8 B) 7 C) 9 D) 5 E) 6

Yechish: Ikki sonning umumiy bo'luvchilari soni ularning eng katta umumiy bo'luvchisining umumiy bo'luvchilari soniga teng:

$$594 = 2 \cdot 3^3 \cdot 11, \quad 378 = 2 \cdot 3^3 \cdot 7$$

bo'lgani uchun 594 va 378 sonlarining eng katta umumiy bo'luvchisi $2^1 \cdot 3^3$ ga teng. 2,3, ..., p tub sonlar darajalarining $l = 2^m \cdot 3^n \cdots p^k$ ko'paytmasi shaklida yozilgan l sonining bo'luvchilari soni $(m+1)(n+1)\cdots(k+1)$ ga teng bo'lgani uchun berilgan sonlarning umumiy bo'luvchilari soni $n = (1+1)(3+1) = 8$ ga teng. **J:** 8 (A).

1. (96-3-2) 8 va 6 sonlarining eng kichik umumiy karralisini toping.
A) 16 B) 24 C) 12 D) 8 E) 48

2. (96-3-61) 630 va 198 ning umumiy bo'luvchilari nechta?
A) 5 B) 6 C) 4 D) 7 E) 8

3. (96-11-2) 10 va 8 sonlarining eng kichik umumiy karralisini toping.
A) 80 B) 10 C) 18 D) 40 E) 24

4. (96-12-2) 6 va 4 sonlarining eng kichik umumiy karralisini toping.
A) 6 B) 14 C) 24 D) 28 E) 12

5. (96-12-59) 840 va 264 ning umumiy bo'luvchilari nechta?
A) 9 B) 4 C) 6 D) 8 E) 7

6. (96-13-1) 420 va 156 ning umumiy bo'luvchilari nechta?
A) 7 B) 5 C) 6 D) 4 E) 8

7. (97-4-1) n raqamining qanday qiymatlarida $10+n$ va 10 sonlarining eng kichik umumiy karralisi 60 bo'ladi?
A) 2 B) 0 C) 5;2 D) 2;0 E) 5

8. (97-5-10) Qaysi juftlik o'zaro tub sonlardan iborat?
A) (8; 14) B) (11; 22) C) (12; 35)
D) (12; 34) E) (10; 26)

9. (97-8-5) Quyidagi mulohazalarning qaysi biri natural sonlarga nisbatan noto'g'ri?
A) berilgan sonlarga bo'linadigan sonlarning eng kichigi bu sonlarning eng kichik umumiy karralisi bo'ladi.
B) 3 hamda 4 ga bo'lingan son, 12 ga ham bo'linadi.
C) oxirgi raqami 0 yoki 4 bo'lgan son 4 ga bo'linadi.
D) oxirgi raqami 0 yoki 5 bo'lgan son 5 ga bo'linadi.
E) faqat o'ziga va birga bo'lingan 1 dan katta son tub son bo'ladi.

10. (97-9-10) Qaysi juftlik o'zaro tub sonlardan iborat?
A) (21; 14) B) (21; 10) C) (12; 15)
D) (10; 15) E) (8; 14)

11. (98-2-2) 8 va 12 sonlari eng kichik umumiy karralisining natural bo'luvchilari nechta?
A) 6 B) 7 C) 8 D) 9 E) 10

12. (98-5-1) 312 va 12 sonlarining umumiy bo'luvchilari nechta?
A) 2 B) 4 C) 3 D) 6 E) 1

13. (98-9-2) 15 va 25 sonlari eng kichik umumiy karralisining natural bo'luvchilari nechta?
A) 5 B) 4 C) 6 D) 7 E) 8

14. (98-10-1) 21 va 35 sonlarining eng kichik umumiy karralisi bilan eng katta umumiy bo'luvchisining yig'indisini toping.
A) 108 B) 110 C) 112 D) 109 E) 114

15. (98-11-2) 270 va 300 sonlari eng kichik umumiy karralisining 4 va 6 sonlarining eng kichik umumiy karralisiga nisbatini toping.
A) 25 B) 45 C) 225 D) 95 E) 125

16. (99-2-4) 24, 18 va 30 sonlari eng kichik umumiy karralisining eng katta umumiy bo'luvchisiga nisbatini toping.
A) 90 B) 72 C) 48 D) 30 E) 60

17. (99-7-1) 56 va 16 sonlarining umumiy bo'luvchilari nechta?
A) 4 B) 3 C) 2 D) 5 E) 6

18. (00-3-3) Quyidagi tasdiqlarning qaysilari to'g'ri?
1) Toq va juft sonlar doimo o'zaro tub;
2) Ikkita juft son o'zaro tub bo'la olmaydi;
3) Ikkita turli tub sonlar doim o'zaro tub;
4) Ikkita ketma-ket natural sonlar doim o'zaro tub;
5) 39 va 91 sonlari o'zaro tub.
A) 1; 3; 5 B) 4; 5 C) 2; 3; 5
D) 2; 3; 4 E) 3; 4

19. (00-3-5) 76 va 96 sonlarining eng kichik umumiy karralisining eng katta umumiy bo'luvchisiga nisbatini toping?
A) 10 B) 0,1 C) 9 D) 12 E) $\frac{1}{12}$

20. (00-7-2) 18 va 12 sonlari eng kichik umumiy karralisining eng katta umumiy bo'luvchisiga ko'paytmasini toping?
A) 220 B) 218 C) 214 D) 216 E) 212

21. (00-7-7) 9, 10, 22 va 25 sonlari orasida nechta o'zaro tub sonlar jufti bor?
A) 4 B) 3 C) 2 D) 6 E) 5

22. (00-10-2) 108 va 135 sonlarining eng kichik umumiy karralisini 12 va 54 sonlari eng kichik umumiy karralisiga nisbatini toping?
A) 8 B) 5 C) 12 D) 6 E) 10

23. (99-8-19) Ikki sonning ko'paytmasi 294 ga, ularning eng katta umumiy bo'luvchisi 7 ga teng. Bu sonlarning eng kichik umumiy karralisini toping.
A) 42 B) 52 C) 56 D) 49 E) 70

24. (01-12-1) Dastlabki 30 ta natural sonlar ichida 6 soni bilan o'zaro tub bo'lgan sonlar nechta?
A) 7 B) 8 C) 9 D) 10 E) 11

25. (02-5-5) 36 ning natural bo'luvchilari nechta?
A) 5 B) 7 C) 8 D) 9 E) 4

26. (03-4-3) [4; 8] kesmada nechta o'zaro tub sonlar jufti bor?
A) 5 B) 6 C) 4 D) 7 E) 8

27. (03-10-11) $8^{n+2} \cdot 12^{n-3}$ ko'paytmaning natural bo'luvchilari soni 42 ga teng bo'lsa, n nechaga teng bo'ladi?
A) 4 B) 3 C) 2 D) 5 E) 6

1.1.5 Oxirgi raqam.

(96-13-11) 2^{100} ning oxirgi raqamini toping?
A) 2 B) 0 C) 4 D) 6 E) 8

Yechish: 2 soni darajalarining oxirgi raqamlari har 4-darajadan keyin takrorlanib kelishini kuzatish mumkin:

$$2^1 = 2; \quad 2^2 = 4; \quad 2^3 = 8; \quad 2^4 = 16; \quad 2^5 = 32;$$
$$2^6 = ...4; \quad 2^7 = ...8; \quad 2^8 = ...6; \ ...$$

2 ning daraja ko'rsatkichi 4 ga bo'linsa, u son 6 bilan tugar ekan. **J:** 6 (D).

1. (96-3-71) 8^{99} ning oxirgi raqamini toping.
A) 0 B) 2 C) 4 D) 6 E) 8

2. (96-9-11) 7^{100} ning oxirgi raqamini toping.
A) 3 B) 5 C) 7 D) 9 E) 1

3. (96-12-69) 3^{101} ning oxirgi raqamini toping.
A) 3 B) 1 C) 7 D) 9 E) 5

4. (97-1-2) Ayirma qanday raqam bilan tugaydi?

$$17 \cdot 28 \cdot 41 \cdot 35 - 24 \cdot 12 \cdot 87$$

A) 0 B) 2 C) 4 D) 6 E) 8

5. (97-5-13) 6^{1971} ning oxirgi raqamini toping.
A) 2 B) 6 C) 8 D) 4 E) 1

6. (97-6-2) Yig'indining oxirgi raqamini toping.

$$16 \cdot 27 \cdot 38 \cdot 19 + 22 \cdot 43 \cdot 98$$

A) 8 B) 6 C) 4 D) 2 E) 0

7. (97-9-13) 2^{1971} ning oxirgi raqamini toping.
A) 2 B) 6 C) 4 D) 8 E) 0

8. (97-11-2) Yig'indining oxirgi raqamini toping.

$$15 \cdot 25 \cdot 37 \cdot 43 + 34 \cdot 48 \cdot 77$$

A) 4 B) 9 C) 0 D) 5 E) 7

9. (99-1-2) Ayirmaning oxirgi raqamini toping.

$$9^{20} - 7^{20}$$

A) 0 B) 7 C) 1 D) 3 E) 2

10. (99-6-7) Ifodaning qiymati qanday raqam bilan tugaydi?

$$11^6 + 14^6 - 13^3 - 8$$

A) 1 B) 2 C) 3 D) 4 E) 6

11. (99-6-11) Yig'indi qanday raqam bilan tugaydi?

$$9^{1996} + 9^{1997}$$

A) 0 B) 1 C) 2 D) 3 E) 5

12. (99-8-8) Oxirgi raqami 3 ga teng bo'lgan 13 ta ko'paytuvchining ko'paytmasi qanday raqam bilan tugaydi.
A) 3 B) 1 C) 9 D) 7 E) 6

13. (00-1-2)* 1 dan 50 gacha bo'lgan sonlarning ko'paytmasi nechta nol bilan tugaydi?
A) 14 B) 10 C) 13 D) 11 E) 12

14. (00-2-9) Ushbu $1 \cdot 2 \cdot 3 \cdot ... \cdot 50$ ko'paytma nechta nol bilan tugaydi.
A) 8 B) 10 C) 9 D) 14 E) 12

15. (00-3-8) Ayirmaning oxirgi raqamini toping.
$1 \cdot 2 \cdot 3 \cdot 4 \cdot ... \cdot 26 \cdot 27 - 1 \cdot 3 \cdot 5 \cdot 7 \cdot ... \cdot 25 \cdot 27$
A) 4 B) 3 C) 5 D) 6 E) 8

16. (00-5-2) 3^{2000} soni qanday raqam bilan tugaydi?
A) 0 B) 1 C) 2 D) 3 E) 7

17. (00-6-1)* 10 dan boshlab 75 dan katta bo'lmagan barcha natural sonlarni ko'paytirish natijasida hosil bo'lgan sonning oxirida nechta nol qatnashadi?
A) 15 B) 16 C) 17 D) 18 E) 14

18. (01-2-4) Ushbu $43^{43} - 17^{17}$ ayirmani 10 ga bo'lganda hosil bo'ladigan qoldiqni toping.
A) 5 B) 2 C) 1 D) 0 E) 7

19. (02-9-7) $1998^{2002} + 1997^{2001}$
yig'indining oxirgi raqamini toping.
A) 7 B) 5 C) 3 D) 1 E) 9

1.1.6 Butun sonlar.

(97-12-7) Quyidagi ifodalarning qaysi biri 1 ga teng?
A) $(-(-1)^2)^3$ B) $((-1)^3)^3$ C) $(-(-1)^4)^5$
D) $((-1)^5)^3$ E) $((-1)^3)^4$

Yechish: -1 ning juft darajasi 1 ga teng bo'lgani uchun $((-1)^3)^4 = (-1)^4 = 1$. **Javob:** (E).

1. (96-3-6) Hisoblang.

$$-8 + 6 : (-2) - 2 : (-11)$$

A) 23 B) 11 C) -11 D) -10 E) 143

2. (96-6-9) Quyidagi ifodalardan qaysi biri -1 ga teng?
A) $((-1)^2)^3$ B) $(-(-1)^2)^3$ C) $((-1)^3)^2$
D) $(-(-1)^3)^3$ E) $-((-1)^5)^3$

3. (96-11-6) Hisoblang.

$$-8 - 6 : (-2) - 2 : (-11)$$

A) 17 B) -55 C) 55 D) 77 E) -77

4. (96-12-6) Hisoblang.

$$8 + 6 : (-2) - 2 \cdot (-11)$$

A) 99 B) 15 C) 33 D) -52 E) 27

5. (97-2-9) Quyidagi ifodalardan qaysi biri 1 ga teng?
A) $(-(-1)^2)^3$ B) $((-1)^3)^5$ C) $-((-1)^5)^4$
D) $((-1)^3)^4$ E) $-((-1)^2)^3$

6. (97-8-9) Quyidagilardan qaysi biri -1 ga teng?
A) $((-1)^3)^2$ B) $(-(-1)^3)^6$ C) $(-(-1)^2)^4$
D) $-((-1)^3)^4$ E) $((-1)^2)^4$

7. (99-3-2)* Hisoblang.

$$1 - 3 + 5 - 7 + 9 - 11 + ... + 97 - 99$$

A) -46 B) -48 C) -50 D) -52 E) -54

8. (01-1-2)* Yig'indini hisoblang.

$$4 - 7 + 8 - 11 + 12 - 15 + ... + 96 - 99$$

A) -75 B) -80 C) -72 D) -63 E) -60

1.2 Kasrlar.

1.2.1 Oddiy kasrlar.

1. $\frac{-a}{-b} = \frac{a}{b}$
2. $\frac{a+b-c}{m} = \frac{a}{m} + \frac{b}{m} - \frac{c}{m}$
3. $\frac{ab}{c} = \frac{a}{c} \cdot b = \frac{b}{c} \cdot a$
4. $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$
5. $\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$
6. $\frac{-a}{b} = \frac{a}{-b} = -\frac{a}{b}$
7. $c \cdot \frac{a}{b} = \frac{ca}{b}$
8. $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$
9. $\frac{a}{b} : \frac{c}{d} = \frac{ad}{bc}$
10. $c : \frac{a}{b} = \frac{cb}{a}$
11. $\frac{a}{b} = \frac{ac}{bc} = \frac{a:c}{b:c}$
12. $\frac{a}{b} : c = \frac{a}{bc}$

(00-6-16) Hisoblang.

$$\frac{1}{2 \cdot 5} + \frac{1}{5 \cdot 8} + \frac{1}{8 \cdot 11} + \frac{1}{11 \cdot 14} + \frac{1}{14 \cdot 17}$$

A) $\frac{15}{34}$ B) $\frac{5}{17}$ C) $\frac{5}{34}$ D) $\frac{16}{173}$ E) $\frac{15}{136}$

Yechish: Har bir maxrajdagi ko'paytuvchilar 3 ga farq qiladi. Ixtiyoriy n natural son uchun

$\frac{1}{n(n+3)} = \frac{1}{3}\cdot(\frac{1}{n} - \frac{1}{n+3})$ ekanligidan

$$\frac{1}{3}\cdot(\frac{1}{2}-\frac{1}{5})+\frac{1}{3}\cdot(\frac{1}{5}-\frac{1}{8})+\frac{1}{3}\cdot(\frac{1}{8}-\frac{1}{11})+\frac{1}{3}\cdot(\frac{1}{11}-\frac{1}{14})+$$
$$+\frac{1}{3}\cdot(\frac{1}{14}-\frac{1}{17}) = \frac{1}{3}\cdot(\frac{1}{2}-\frac{1}{5}+\frac{1}{5}-\frac{1}{8}+\frac{1}{8}-\frac{1}{11}+\frac{1}{11}-$$
$$-\frac{1}{14}+\frac{1}{14}-\frac{1}{17}) = = \frac{1}{3}(\frac{1}{2}-\frac{1}{17}) = \frac{5}{34}$$

ni hosil qilamiz. J: $\frac{5}{34}$ (C).

1. (96-1-8) $\frac{9}{11}$ va 1 sonlari orasida maxraji 33 ga teng bo'lgan nechta kasr son bor?
   A) 2 B) 1 C) 5 D) 6 E) 4

2. (96-3-12) Hisoblang.
$$-\frac{1}{2}-\frac{1}{3}$$
   A) $\frac{5}{6}$ B) $-\frac{2}{5}$ C) $\frac{2}{5}$ D) $-\frac{5}{6}$ E) $\frac{1}{5}$

3. (96-3-13) Ayirmani toping.
$$\frac{1}{2}-\frac{2}{3}$$
   A) $\frac{1}{6}$ B) 1 C) $-\frac{1}{3}$ D) -1 E) $-\frac{1}{6}$

4. (96-11-13) Hisoblang.
$$-\frac{1}{4}-\frac{1}{5}$$
   A) $-\frac{9}{20}$ B) $-\frac{2}{9}$ C) $-\frac{1}{10}$ D) $\frac{9}{20}$ E) $\frac{2}{9}$

5. (96-11-14) Ayirmani toping.
$$\frac{1}{4}-\frac{4}{5}$$
   A) $-\frac{11}{20}$ B) -1 C) $-\frac{7}{20}$ D) $\frac{13}{20}$ E) $\frac{3}{20}$

6. (96-12-13) Hisoblang.
$$-\frac{1}{3}-\frac{1}{4}$$
   A) $-\frac{2}{7}$ B) $-\frac{7}{12}$ C) $\frac{1}{6}$ D) $-\frac{1}{6}$ E) $\frac{7}{12}$

7. (96-12-14) Ayirmani toping.
$$\frac{1}{3}-\frac{3}{4}$$
   A) $-\frac{1}{6}$ B) $-\frac{5}{12}$ C) $\frac{1}{6}$ D) $\frac{5}{12}$ E) -1

8. (98-7-5) Hisoblang.
$$243 : (9 : 11)$$
   A) 27 B) $2\frac{5}{11}$ C) $\frac{11}{27}$ D) $198\frac{9}{11}$ E) 297

9. (98-10-8) Kasrning qiymati 40 dan qanchaga kam?
$$\frac{(20-48)(-5-20)}{-5}$$
   A) 160 B) 140 C) 180 D) 200 E) 120

10. (00-5-9) Ko'paytmani hisoblang.
$$\left(1-\frac{1}{2}\right)\cdot\left(1-\frac{1}{3}\right)\cdot\left(1-\frac{1}{4}\right)\cdot\left(1-\frac{1}{5}\right)\cdot\left(1-\frac{1}{6}\right)$$
    A) $\frac{1}{3}$ B) $\frac{1}{4}$ C) $\frac{1}{5}$ D) $\frac{1}{6}$ E) $\frac{1}{7}$

11. (96-3-9) Ifodaning qiymatini toping.
$$-\frac{3}{15}+\frac{1}{5}-\frac{1}{3}$$
    A) $-\frac{19}{30}$ B) $-\frac{1}{3}$ C) $\frac{19}{30}$ D) $\frac{1}{3}$ E) $\frac{3}{13}$

12. (96-3-10) Ifodaning hisoblang.
$$\frac{1}{3}\cdot\left(-\frac{2}{7}\right):\left(-\frac{5}{42}\right)$$
    A) $-\frac{4}{5}$ B) $\frac{5}{441}$ C) $\frac{10}{882}$ D) $-\frac{5}{441}$ E) $\frac{4}{5}$

13. (96-11-9) Ifodaning qiymatini toping.
$$-\frac{3}{15}+\frac{1}{5}+\frac{1}{3}$$
    A) $-\frac{1}{3}$ B) $\frac{2}{15}$ C) $\frac{7}{15}$ D) $\frac{1}{3}$ E) $\frac{4}{15}$

14. (96-11-11) Hisoblang.
$$\left(-\frac{1}{3}\right)\cdot\frac{2}{7}:\frac{5}{42}$$
    A) $\frac{4}{5}$ B) $\frac{5}{441}$ C) $-\frac{4}{5}$ D) $\frac{10}{882}$ E) $-\frac{5}{441}$

15. (96-12-9) Ifodaning qiymatini toping.
$$\frac{3}{15}-\frac{1}{5}-\frac{1}{3}$$
    A) $\frac{1}{3}$ B) $-\frac{3}{10}$ C) $\frac{3}{10}$ D) $\frac{1}{7}$ E) $-\frac{1}{3}$

16. (96-12-10) Hisoblang.
$$-\frac{1}{3}\cdot\left(-\frac{2}{7}\right):\frac{5}{42}$$
    A) $\frac{5}{441}$ B) $\frac{4}{5}$ C) $-\frac{5}{441}$ D) $-\frac{4}{5}$ E) $\frac{10}{882}$

17. (97-7-11) Hisoblang.
$$2\cdot 4^{-2}+\left(\frac{2}{3}\right)^{-3}-\left(\frac{1}{5}\right)^{0}$$
    A) $3\frac{1}{2}$ B) $4\frac{2}{3}$ C) 2 D) 2,5 E) 0

18. (97-10-11) Hisoblang.
$$12\cdot 3^{-3}+\left(\frac{3}{5}\right)^{-2}-\left(\frac{1}{2}\right)^{0}$$
    A) 2 B) $2\frac{2}{9}$ C) $4\frac{1}{3}$ D) $3\frac{2}{9}$ E) 0

19. (00-8-51) Hisoblang.
$$\frac{3375-1331}{4}:511-1$$
    A) -1 B) 0 C) 1 D) 25 E) -25

20. (96-1-24) Hisoblang.

$$\frac{9^2 \cdot 3^5}{81^2}$$

A) 1 B) 3 C) $\frac{1}{81}$ D) 9 E) 27

21. (96-9-65) Hisoblang.

$$\frac{27^3}{3^4 \cdot 9^2}$$

A) 3 B) $\frac{1}{3}$ C) 1 D) 9 E) $\frac{1}{9}$

22. (98-5-12) Hisoblang.

$$\frac{1}{1-\frac{1}{1-2^{-1}}} + \frac{1}{1+\frac{1}{1+2^{-1}}}$$

A) $\frac{2}{5}$ B) $\frac{2}{3}$ C) $-\frac{2}{5}$ D) $\frac{1}{2}$ E) $-\frac{4}{5}$

23. (98-7-2) Hisoblang.

$$\frac{488 \cdot 475 - 462}{244 + 475 \cdot 243}$$

A) 3 B) 1 C) $\frac{1}{2}$ D) 2 E) $1\frac{1}{2}$

24. (98-7-24) Hisoblang.

$$\frac{5(3 \cdot 7^{15} - 19 \cdot 7^{14})}{7^{16} + 3 \cdot 7^{15}}$$

A) 7 B) 49 C) $\frac{1}{7}$ D) $\frac{1}{49}$ E) 3

25. (98-12-2) Hisoblang.

$$\frac{244 \cdot 395 - 151}{244 + 395 \cdot 243}$$

A) 1 B) 2 C) 3 D) $1\frac{1}{2}$ E) $\frac{1}{2}$

26. (98-12-23) Hisoblang.

$$\frac{5 \cdot 2^{32} - 4 \cdot 2^{30}}{4^{16}}$$

A) 4 B) 2 C) 5 D) 16 E) $\frac{1}{4}$

27. (99-6-1) Hisoblang.

$$\frac{10^9 \cdot 3^5}{3^3 \cdot 10^{11}}$$

A) $0,09$ B) $0,9$ C) 9 D) $0,03$ E) $0,3$

28. (99-7-14) Hisoblang.

$$\frac{2}{1+\frac{1}{1+2^{-1}}} - \frac{2}{1+\frac{1}{1-2^{-1}}}$$

A) $\frac{7}{15}$ B) $\frac{1}{2}$ C) $\frac{11}{18}$ D) $\frac{8}{15}$ E) $\frac{1}{3}$

29. (97-4-18) Hisoblang.

$$\frac{110^6 \cdot 77^4}{55^8 \cdot 154^2}$$

A) 30 B) $30\frac{9}{25}$ C) $31\frac{1}{25}$ D) $31\frac{9}{25}$ E) 31

30. (97-9-78) Hisoblang.

$$\frac{72^6 \cdot 24^4}{36^8 \cdot 8^3}$$

A) 24 B) 32 C) 16 D) 36 E) 28

31. (98-5-5) Hisoblang.

$$\frac{1000^{10}}{(700-200)^{12}} \cdot 500^2$$

A) 512 B) 1000 C) 2048 D) 1024 E) 500

32. (99-7-7) Hisoblang.

$$\frac{100^5}{(80+20)^{10}} \cdot 50^5$$

A) $\frac{1}{32}$ B) 16 C) 8 D) $\frac{1}{64}$ E) $\frac{1}{128}$

33. (96-9-58) $\frac{3}{4}$ va $\frac{8}{9}$ sonlari orasida maxraji 36 ga teng bo'lgan nechta kasr son bor?
A) 1 B) 2 C) 3 D) 4 E) 5

34. (96-10-8) $\frac{2}{3}$ dan katta va $\frac{5}{6}$ dan kichik bo'lgan, maxraji 30 ga teng bo'lgan nechta kasr mavjud?
A) 1 B) 2 C) 4 D) 5 E) 3

35. (98-7-15) Ushbu $m = \frac{119}{120}$, $n = \frac{240}{242}$; sonlar uchun quyidagi munosabatlardan qaysi biri to'gri?
A) $n > m$ B) $n < m$ C) $n = m$
D) $n - 1 = m$ E) $n = \frac{2m+2}{242}$

36. (98-3-5) Agar $a = \frac{5}{11}$, $b = \frac{3}{7}$ $c = \frac{6}{13}$; bo'lsa a, b va c ni o'sish tartibida joylashtring.
A) $a; b; c$ B) $b; a; c$ C) $b; c; a$ D) $c; b; a$ E) $c; a; b$

37. (98-10-7) Sonlarni o'sish tartibida joylashtiring?

$$a = \frac{49}{150}; \quad b = \frac{102}{300}; \quad c = \frac{22}{75}$$

A) $a < c < b$ B) $b < c < a$ C) $c < a < b$
D) $b < c < a$ E) $a < b < c$

38. (98-10-53) Sonlarni o'sish tartibida jolashtiring?

$$a = \frac{5}{11}; \quad b = \frac{6}{13}; \quad c = \frac{7}{15}$$

A) $a < b < c$ B) $b < a < c$ C) $b < c < a$
D) $c < b < a$ E) $c < a < b$

39. (98-12-14)* $m = \frac{1107}{1109}$, $n = \frac{2216}{2220}$ sonlar uchun quyidagi munosabatlardan qaysi biri to'gri?
A) $m < n$ B) $m > n$ C) $m = n$
D) $n = m + 1$ E) $n = \frac{2m+2}{2220}$

40. (99-4-10) Sonlarni kamayish tartibida joylashtiring?

$$a = \frac{7}{36}; \quad b = \frac{11}{34}; \quad c = \frac{7}{32}; \quad d = \frac{9}{25}$$

A) $a > b > c > d$ B) $b > a > d > c$
C) $d > a > b > c$ D) $a > c > b > d$
E) $d > b > c > a$

41. (00-5-7) $\frac{1}{30}$ va $\frac{1}{45}$ kasr umumiy maxrajining barcha natural bo'luvchilari soni nechta?
A) 11 B) 7 C) 12 D) 13 E)8

42. (98-12-62)* Hisoblang.

$$\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\frac{1}{3\cdot 4}+...+\frac{1}{999\cdot 1000}$$

A) $0,750$ B) $1,125$ C) $0,998$
D) $1,450$ E) $0,999$

43. (00-2-4)* Hisoblang.

$$\frac{1}{15}+\frac{1}{35}+\frac{1}{63}+\frac{1}{99}+\frac{1}{143}+\frac{1}{195}$$

A) $\frac{4}{15}$ B) $\frac{7}{15}$ C) $\frac{17}{45}$ D) $\frac{11}{15}$ E) $\frac{2}{15}$

44. (00-3-15)* Hisoblang.

$$\frac{1}{1\cdot 3}+\frac{1}{3\cdot 5}+\frac{1}{5\cdot 7}+...+\frac{1}{13\cdot 15}$$

A) $\frac{11}{15}$ B) $\frac{7}{30}$ C) $\frac{8}{15}$ D) $\frac{7}{15}$ E) $\frac{2}{5}$

45. (00-8-57)* Yig'indini hisoblang.

$$\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\frac{1}{3\cdot 4}+...+\frac{1}{99\cdot 100}$$

A) $\frac{1}{9}$ B) $\frac{1}{10}$ C) $\frac{1}{100}$ D) $\frac{1}{99}$ E) $\frac{99}{100}$

46. (00-9-10)* Hisoblang.

$$\frac{1}{15}+\frac{1}{35}+\frac{1}{63}+\frac{1}{99}+...+\frac{1}{255}$$

A) $\frac{7}{51}$ B) $\frac{2}{15}$ C) $\frac{2}{25}$ D) $\frac{3}{35}$ E) $\frac{7}{40}$

47. (99-5-1)* Hisoblang.

$$\frac{1}{12}+\frac{1}{20}+\frac{1}{30}+\frac{1}{42}+...+\frac{1}{182}$$

A) $\frac{11}{42}$ B) $\frac{10}{33}$ C) $\frac{1}{4}$ D) $\frac{12}{35}$ E) $\frac{15}{56}$

48. (01-5-2) Hisoblang.

$$\frac{2^{-2}\cdot 5^3\cdot 10^{-4}}{2^{-3}\cdot 5^2\cdot 10^{-5}}$$

A) 100 B) $0,01$ C) 2 D) 5 E) 10

49. (01-7-5) Maxraji 27 ga teng, $\frac{2}{3}$ dan katta va 1 dan kichik, qisqarmas kasrlar nechta?
A) 4 B) 5 C) 6 D) 7 E) 8

50. (02-1-3)

$$\frac{(-2)\cdot(-3)^{17}-(-3)^{16}}{9^7\cdot 15}$$

sonning uchdan bir qismini toping.
A) 1 B) 3 C) 2 D) 9 E) 6

51. (02-3-3) $\frac{3}{7}$, $\frac{4}{17}$, $\frac{21}{23}$ sonlariga bo'lganda, butun son chiqadigan eng kichik natural sonni toping.
A) 84 B) 36 C) 42 D) 63 E) 34

52. (02-7-55) Hisoblang?

$$\frac{1}{2+\frac{1}{3+\frac{1}{1+\frac{1}{2}}}}$$

ni qiymatini toping.
A) $\frac{11}{25}$ B) $\frac{17}{25}$ C) $\frac{1}{4}$ D) $\frac{3}{4}$ E) $\frac{13}{25}$

53. (03-1-9)* Yig'indini hisoblang.

$$\frac{1}{8}+\frac{1}{24}+\frac{1}{48}+\frac{1}{80}$$

A) $0,1$ B) $0,2$ C) $0,4$ D) $0,6$ E) $0,8$

54. (03-5-3) $\frac{3}{17}$, $\frac{8}{13}$, $\frac{16}{19}$ sonlarga bo'linganda, bo'linma butun son chiqadigan eng kichik natural son nechaga teng?
A) 48 B) 24 C) 36 D) 60 E) 96

55. (03-6-4) $\frac{2}{7}$, $\frac{4}{11}$, $\frac{6}{13}$ va $\frac{8}{19}$ sonlariga bo'linganda, bo'linma butun son chiqadigan eng kichik natural sonni toping.
A) 6 B) 12 C) 18 D) 24 E) 48

56. (03-6-5) Agar $\frac{29}{31}+\frac{38}{41}+\frac{47}{51}=a$ bo'lsa, $\frac{2}{31}+\frac{3}{41}+\frac{4}{51}$ quyidagilardan qaysi biriga teng?
A) $3-a$ B) $4-a$ C) $5-a$ D) $3-\frac{a}{2}$ E) $4-\frac{a}{2}$

57. (03-6-53)

$$\left((-17)^{-4}\right)^{-6}:\left((-17)^{-13}\right)^{-2}-\left(\frac{1}{17}\right)^2$$

ni hisoblang.
A) $\frac{1}{289}$ B) $\frac{1}{17}$ C) 1 D) 0 E) $\frac{16}{17}$

58. (03-7-6) $\frac{2}{7}$, $\frac{4}{11}$, $\frac{6}{13}$ sonlariga bo'linganda, bo'linma butun son chiqadigan eng kichik natural sonni toping.
A) 6 B) 12 C) 18 D) 24 E) 48

59. (03-7-8) Agar $\frac{29}{31}+\frac{38}{41}+\frac{47}{51}+\frac{56}{61}=a$ bo'lsa, $\frac{2}{31}+\frac{3}{41}+\frac{4}{51}+\frac{5}{61}$ quyidagilardan qaysi biriga teng?
A) $3-a$ B) $4-a$ C) $5-a$ D) $3-\frac{a}{2}$ E) $4-\frac{a}{2}$

60. (03-7-43)* Hisoblang.

$$\frac{2}{5\cdot 7}+\frac{2}{7\cdot 9}+\frac{2}{9\cdot 11}+...+\frac{2}{73\cdot 75}$$

A) $\frac{16}{75}$ B) $\frac{28}{75}$ C) $\frac{1}{5}$ D) $\frac{14}{75}$ E) $\frac{2}{5}$

61. (03-7-65) Hisoblang.

$$\frac{2^{19}\cdot 27^3+15\cdot 4^9\cdot 9^4}{6^9\cdot 2^{10}+12^{10}}$$

A) 1 B) 2 C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) $\frac{1}{2}$

62. (03-8-29)* Hisoblang.

$$1+\frac{1}{10\cdot 11}+\frac{1}{11\cdot 12}+\frac{1}{12\cdot 13}+\frac{1}{13\cdot 14}+\frac{1}{14\cdot 15}+\frac{1}{15\cdot 16}$$

A) $1\frac{3}{80}$ B) $1,16$ C) $1\frac{3}{40}$ D) $1\frac{7}{80}$ E) $1\frac{13}{80}$

1.2.2 Butun va kasr qismli sonlar.

(97-10-6) Hisoblang.

$$1\frac{8}{17}\cdot 3\frac{2}{5}:\frac{11}{12}\cdot 2\frac{1}{5}:\frac{4}{9}$$

A) $2,7$ B) $24\frac{3}{17}$ C) 27 D) $29\frac{1}{9}$ E) $7\frac{1}{3}$

Yechish: Avval kasrlarni noto'g'ri kasrga keltiramiz so'ngra ularning surat va maxrajlarini qisqartiramiz:

$$1\frac{8}{17}\cdot 3\frac{2}{5}:\frac{11}{12}\cdot 2\frac{1}{5}:\frac{4}{9}=\frac{25}{17}\cdot\frac{17}{5}\cdot\frac{12}{11}\cdot\frac{11}{5}\cdot\frac{9}{4}=27$$

Javob: 27 (C)

1. (96-3-14) Ushbu $\left(-2\frac{1}{2}\right)^3$ ifodani hisoblang.
   A) $8\frac{1}{8}$ B) $2\frac{1}{8}$ C) $31\frac{1}{4}$ D) $-8\frac{1}{8}$ E) $-15\frac{5}{8}$

2. (96-12-15) Hisoblang.
$$\left(-1\frac{1}{2}\right)^3$$
   A) $6\frac{3}{4}$ B) $1\frac{1}{8}$ C) $-3\frac{3}{8}$ D) $-1\frac{1}{8}$ E) $-2\frac{1}{4}$

3. (97-5-9) Amalni bajaring.
$$1\frac{3}{5}-3\frac{1}{5}$$
   A) $-1\frac{2}{5}$ B) $1\frac{2}{5}$ C) $1\frac{3}{5}$ D) $2\frac{2}{5}$ E) $-1\frac{3}{5}$

4. (97-9-9) Amalni bajaring.
$$3\frac{4}{7}-5\frac{2}{7}$$
   A) $-1\frac{5}{7}$ B) $1\frac{4}{7}$ C) $1\frac{5}{7}$ D) $-\frac{4}{7}$ E) $1\frac{2}{7}$

5. (96-7-6) Hisoblang.
$$5\frac{5}{7}:2\frac{2}{5}\cdot 5\frac{1}{4}:1\frac{1}{6}\cdot\frac{2}{3}$$
   A) $7\frac{1}{7}$ B) $8\frac{1}{7}$ C) $6\frac{6}{7}$ D) $5\frac{5}{7}$ E) $4\frac{5}{6}$

6. (96-7-9) Hisoblang.
$$\left(7\frac{1}{3}-6\frac{7}{8}\right):\frac{3}{4}+8\frac{8}{9}\cdot 2\frac{1}{80}$$
   A) $17\frac{2}{3}$ B) $18\frac{1}{2}$ C) $21\frac{1}{2}$ D) $16\frac{1}{3}$ E) $17\frac{1}{2}$

7. (96-7-11) Hisoblang.
$$\left(\frac{1}{7}\right)^0+6\cdot 2^{-3}+\left(\frac{2}{5}\right)^{-2}$$
   A) 8 B) $7\frac{1}{7}$ C) 7 D) $-4\frac{4}{25}$ E) -7

8. (96-11-15) Hisoblang. $\left(-1\frac{1}{3}\right)^3$
   A) $-2\frac{10}{27}$ B) $2\frac{10}{27}$ C) $1\frac{1}{27}$
   D) $-\frac{1}{27}$ E) $-1\frac{1}{27}$

9. (97-1-3) Hisoblang.
$$1\frac{1}{4}+\frac{5}{12}:(\frac{1}{3}\cdot 2\frac{1}{2}-\frac{7}{8})$$
   A) $11\frac{1}{4}$ B) $-1\frac{1}{4}$ C) $9\frac{1}{4}$ D) $-8\frac{3}{4}$ E) $-9\frac{1}{4}$

10. (97-3-6) Hisoblang.
$$\frac{3}{4}\cdot 1\frac{1}{7}:\frac{2}{15}\cdot 12\frac{1}{4}:7\frac{1}{2}$$
   A) $10\frac{1}{2}$ B) 11 C) $9\frac{1}{4}$ D) $7\frac{1}{2}$ E) $5\frac{1}{7}$

11. (97-3-9) Hisoblang.
$$\left(5\frac{3}{4}-4\frac{8}{9}\right)\cdot 2+67\frac{1}{2}:2\frac{1}{7}$$
   A) $24\frac{1}{3}$ B) $33\frac{2}{9}$ C) $36\frac{1}{9}$ D) $31\frac{1}{3}$ E) $28\frac{2}{3}$

12. (97-3-11) Hisoblang.
$$4\frac{1}{2}\cdot 6^{-2}+\left(\frac{2}{5}\right)^{-3}-\left(\frac{2}{5}\right)^{0}$$
   A) $15\frac{3}{4}$ B) $15\frac{1}{8}$ C) $11\frac{3}{5}$ D) $6\frac{3}{8}$ E) $14\frac{3}{4}$

13. (97-6-3) Hisoblang.
$$\left(\frac{5}{9}-1\frac{1}{6}\cdot\frac{1}{2}\right):\frac{5}{9}+\frac{1}{3}$$
   A) $\frac{3}{20}$ B) $\frac{17}{60}$ C) $\frac{7}{30}$ D) $-\frac{7}{60}$ E) $-\frac{11}{30}$

14. (97-7-6) Hisoblang.
$$\frac{42}{95}\cdot 1\frac{3}{14}:\frac{3}{5}:2\cdot 4\frac{3}{4}$$
   A) $\frac{13}{8}$ B) $1\frac{3}{8}$ C) $2\frac{1}{8}$ D) $1\frac{5}{7}$ E) $2\frac{3}{5}$

15. (97-7-9) Hisoblang.
$$\left(4\frac{1}{10}-3\frac{4}{15}\right)\cdot\frac{5}{6}+4\frac{1}{10}:1\frac{1}{5}$$
   A) $3\frac{5}{9}$ B) $4\frac{1}{9}$ C) $5\frac{2}{3}$ D) $2\frac{3}{5}$ E) $3\frac{7}{9}$

16. (97-10-9) Hisoblang.
$$\left(12\frac{1}{9}-10\frac{2}{5}\right):38\frac{1}{2}+2\frac{8}{9}\cdot 18$$
   A) $24\frac{1}{15}$ B) $32\frac{7}{45}$ C) $38\frac{3}{5}$ D) 47 E) $52\frac{2}{45}$

17. (97-11-3) Hisoblang.
$$\left(3\frac{17}{36}-5\frac{7}{12}\right):\frac{2}{9}-\frac{3}{26}\cdot 4\frac{1}{3}$$
   A) -9 B) $8\frac{1}{2}$ C) 9 D) -10 E) $-9\frac{1}{2}$

18. (98-3-8) Hisoblang.
$$3\frac{1}{3}\cdot 2\frac{1}{4}\cdot\left(-\frac{1}{2}\right)\cdot\frac{4}{5}$$
   A) 3 B) -3 C) $2,5$ D) $-2,5$ E) -4

19. (98-6-8) Hisoblang.
$$\left(1992\frac{3}{5}-1990\frac{2}{3}\right)\cdot 1\frac{1}{29}$$
   A) $-2\frac{14}{435}$ B) $\frac{14}{435}$ C) 2 D) -2 E) $2\frac{1}{29}$

20. (98-10-9) Hisoblang.

$$\left(4\frac{5}{8}\cdot 4\frac{1}{5}\cdot\frac{8}{37}-3\frac{3}{5}\right)^{-1}$$

A) $1\frac{3}{5}$ B) $1\frac{2}{5}$ C) $1\frac{3}{4}$ D) $1\frac{2}{3}$ E) $1\frac{1}{3}$

21. (98-10-55) $5\frac{7}{12}$ son $11\frac{1}{6}$ ga ko'paygan bo'lsa, u necha marta ko'paygan?
A) 3 B) 2 C) 2,5 D) 3,5 E) 1,75

22. (98-10-56) Hisoblang.

$$2\frac{2}{3}:1\frac{1}{7}\cdot 3\frac{3}{7}\cdot\left(-\frac{1}{4}\right)$$

A) 4 B) 3 C) -2 D) $\frac{2}{7}$ E) $\frac{7}{4}$

23. (98-11-58) Hisoblang.

$$\left(1997\frac{3}{5}-1996\frac{1}{6}\right)\cdot 1\frac{1}{29}$$

A) $\frac{13}{29}$ B) $2\frac{1}{29}$ C) $1\frac{13}{29}$ D) $3\frac{1}{29}$ E) $1\frac{14}{29}$

24. (98-12-11) Hisoblang.

$$\left(2\frac{1}{2}-1\frac{3}{8}\right)\cdot\left(3\frac{1}{2}-\frac{3}{6}\right)\cdot 1\frac{1}{3}$$

A) 4 B) 8 C) $4\frac{1}{2}$ D) 12 E) 3

25. (99-4-2) Hisoblang.

$$6\frac{3}{4}\cdot 5\frac{1}{4}-4\frac{5}{8}\cdot 5\frac{3}{8}$$

A) $10\frac{19}{64}$ B) $11\frac{27}{64}$ C) $11\frac{9}{64}$ D) $10\frac{39}{64}$ E) $10\frac{37}{64}$

26. (99-4-11) Hisoblang.

$$7\frac{5}{13}\cdot 2-1\frac{2}{5}\cdot 6+4\cdot 2\frac{4}{13}-3\cdot 1\frac{1}{5}$$

A) $11\frac{2}{5}$ B) 12 C) 13,5 D) $11\frac{8}{13}$ E) 14

27. (00-2-6) $\frac{11}{25}$ va $4\frac{6}{11}$ sonlariga teskari sonlar ko'paytmasi nechaga teng?
A) $\frac{1}{2}$ B) 1 C) $\frac{3}{4}$ D) 2 E) $\frac{1}{3}$

28. (01-8-3) Hisoblang.

$$5\frac{4}{19}\cdot 3\frac{4}{7}+1\frac{15}{19}:\frac{7}{25}-1\frac{2}{3}$$

A) $23\frac{2}{3}$ B) $23\frac{1}{3}$ C) $22\frac{2}{3}$ D) $24\frac{1}{3}$ E) $22\frac{1}{3}$

29. (03-11-54) Hisoblang.

$$\left(6\frac{1}{2}-8\frac{3}{4}\right):\frac{1}{8}+11\frac{3}{7}$$

A) $-7\frac{3}{7}$ B) $6\frac{3}{7}$ C) $-6\frac{4}{7}$ D) $-7\frac{5}{7}$ E) $-6\frac{5}{7}$

30. (03-11-59) Hisoblang.

$$10-2\frac{1}{2}:3\frac{3}{4}+\left(2\frac{1}{2}-1\frac{1}{3}\right)\cdot 6$$

A) $16\frac{2}{3}$ B) $17\frac{1}{3}$ C) $15\frac{2}{3}$ D) $16\frac{1}{3}$ E) 17

1.2.3 O'nli kasrlar.

(98-12-8) Hisoblang.

$$\frac{3,21\cdot 5,95-4,44}{2,21\cdot 5,95+1,51}$$

A) 1 B) 2 C) $\frac{1}{2}$ D) $1\frac{1}{2}$ E) $\frac{61}{186}$
Yechish:

$$3,21\cdot 5,95-4,44=(2,21+1)\cdot 5,95-4,44=$$

$$=2,21\cdot 5,95+5,95-4,44=2,21\cdot 5,95+1,51$$

ekanida

$$\frac{3,21\cdot 5,95-4,44}{2,21\cdot 5,95+1,51}=$$

$$=\frac{2,21\cdot 5,95+1,51}{2,21\cdot 5,95+1,51}=1$$

ni hosil qilamiz J: 1 (A)

1. (96-1-7) 0,6 ga teskari sonni toping.
A) $-0,6$ B) $1\frac{2}{3}$ C) 0,4 D) -6 E) $\frac{3}{6}$

2. (96-9-57) 0,8 songa teskari sonni toping.
A) $-0,8$ B) 8 C) $-\frac{5}{4}$ D) 1,25 E) 0,2

3. (96-10-7) $-1,5$ soniga teskari sonni toping.
A) 1,5 B) $-0,75$ C) $-\frac{2}{3}$ D) $\frac{2}{3}$ E) -3

4. (98-3-4) $0,0015\cdot 0,016$ ko'paytma quyidagi sonlardan qaysi biriga teng emas?
A) $2,4\cdot 10^{-5}$ B) $240\cdot 10^{-7}$ C) $24\cdot 10^{-6}$
D) $0,24\cdot 10^{-4}$ E) $0,0024\cdot 10^{-3}$

5. (98-10-4) Hisoblang.

$$2,014:0,19-2,5\cdot 0,3$$

A) 20,85 B) 1,85 C) 8,85 D) 7,85 E) 9,85

6. (98-10-52) $0,0025\cdot 0,026$ ko'paytma quyidagi sonlardan qaysi biriga teng emas?
A) $6,5\cdot 10^{-5}$ B) $650\cdot 10^{-7}$ C) $65\cdot 10^{-6}$
D) $0,65\cdot 10^{-4}$ E) $0,0065\cdot 10^{-3}$

7. (99-4-7) $2,5-4,3$ ga teskari sonni toping.
A) 0,8 B) 1,8 C) $-\frac{5}{9}$ D) $-1\frac{1}{4}$ E) $\frac{5}{9}$

8. (00-5-13) Ifodani hisoblang.

$$3,8\cdot(2,01-3,81)$$

A) 6,84 B) 5,82 C) $-6,84$ D) $-5,82$ E) 5,84

9. (01-8-17) Hisoblang.

$$0,21:(0,05+\frac{3}{20})-2,5\cdot 1,4$$

A) $-2,45$ B) $-2,55$ C) -2 D) $-3,35$ E) $-2,35$

10. (01-2-11) Hisoblang.

$$4-3,3:\left(2\frac{1}{7}-1\frac{1}{5}\right)$$

A) 3,5 B)2,5 C) $-1,5$ D) $-2,5$ E) 0,5

11. (00-5-17) Ifodaning qiymatini toping.

$$-2,4+3\frac{1}{3}-(-2,6)$$

A) $-10,6$ B)$12,5$ C) $3\frac{8}{15}$ D) $-12,5$ E) $-3\frac{8}{15}$

12. (00-5-18) Hisoblang.

$$\left(-\frac{3}{8}\right)\cdot(-32)+0,5\cdot(-8)$$

A) 8 B)4 C) 6 D) 7 E) 10

13. (00-5-28) $0,0000087$ sonini standart ko'rinishida yozing.
A) $8,7\cdot10^{-5}$ B) $8,7\cdot10^{7}$ C) $8,7\cdot10^{-6}$
D) $8,7\cdot10^{-7}$ E) $8,7\cdot10^{-4}$

14. (98-5-6) $-5,2$ bilan $10,4$ orasida nechta butun son bor?
A) 16 B) 10 C) 15 D) 12 E) 11

15. (98-7-11) Son o'qida -4 dan $2,3$ birlik masofada joylashgan sonlarni aniqlang.
A) $-6,3$ B) $-6,3$ va $1,7$ C) $6,3$ va $1,7$
D) $-6,3$ va $-1,7$ E) $-1,7$

16. (98-12-10) Son o'qida -2 dan $4,7$ birlik masofada joylashgan sonlarni aniqlang.
A) $-6,7;2,7$ B) $-6,7;-2,7$ C) $6,7;2,7$
D) $-6,7$ E) $-2,7$

17. (99-7-8) Koordinatalari $-3,2$ va $4,2$ bo'lgan sonlar orasida nechta butun son bor?
A) 7 B) 6 C) 9 D) 8 E) 10

18. (96-1-5) Hisoblang.

$$\left(2,5-2\frac{1}{3}\right)\cdot5,2:2\frac{3}{5}$$

A) $\frac{2}{3}$ B)$\frac{1}{3}$ C) 3 D) $\frac{3}{7}$ E) $2\frac{1}{3}$

19. (96-3-64) Ushbu

$$2,701\cdot10^{-4}+3,205\cdot10^{-3}$$

yig'indi quyidagi sonlarning qaysi biriga teng?
A) $5,906\cdot10^{-3}$ B)$5,906\cdot10^{-4}$ C) $3,4751\cdot10^{-3}$
D) $3,0215\cdot10^{-4}$ E) $5,906\cdot10^{-7}$

20. (96-6-1) Hisoblang.

$$1,75-\left(-1\frac{2}{7}\right)\cdot6,5\cdot\frac{7}{9}$$

A) $-4,75$ B)$2,15$ C) $8,25$ D) $4,75$ E) $7,55$

21. (96-9-4) $1,011\cdot10^{-3}+2,1\cdot10^{-4}$ yig'indi quyidagi sonlarning qaysi biriga teng?
A) $3,111\cdot10^{-3}$ B) $3,111\cdot10^{-4}$ C) $3,111\cdot10^{-7}$
D) $1,221\cdot10^{-3}$ E) $1,221\cdot10^{-4}$

22. (96-9-56) Hisoblang.

$$6\frac{3}{8}-\left(2,5-2\frac{1}{3}\right):1\frac{1}{3}$$

A) $5\frac{2}{3}$ B)$6\frac{1}{4}$ C) $4\frac{1}{3}$ D) $2\frac{1}{3}$ E) $5\frac{1}{4}$

23. (96-10-25) Hisoblang.

$$\frac{0,5^5\cdot32^2}{4^3}$$

A) 2 B)$\frac{1}{2}$ C) 4 D) $\frac{1}{4}$ E) 8

24. (96-12-62) Yig'indi quyidagi sonlarning qaysi biriga teng?

$$1,015\cdot10^{-4}+3,14\cdot10^{-5}$$

A) $4,155\cdot10^{-4}$ B) $4,155\cdot10^{-5}$ C) $4,155\cdot10^{-9}$
D) $1,329\cdot10^{-4}$ E) $1,329\cdot10^{-5}$

25. (96-13-4) Ushbu

$$3,104\cdot10^{-2}+1,81\cdot10^{-3}$$

yig'indi quyidagi sonlarning qaysi biriga teng?
A) $3,285\cdot10^{-3}$ B) $3,285\cdot10^{-2}$ C) $4,914\cdot10^{-2}$
D) $4,914\cdot10^{-3}$ E) $4,914\cdot10^{-5}$

26. (97-1-7) Hisoblang.

$$\left(\frac{1}{6}-1\frac{1}{15}+\frac{1}{10}\right):0,6+0,4$$

A) $1\frac{11}{15}$ B)$0,88$ C) $-1\frac{1}{3}$ D) $-\frac{14}{15}$ E) $-0,08$

27. (97-2-1) Hisoblang.

$$-1\frac{3}{4}\cdot6,5\cdot\left(-\frac{4}{7}\right)-3,75$$

A) $-2,75$ B)$-10,25$ C) $2,75$ D) $10,25$ E) $3,75$

28. (97-6-7) Hisoblang.

$$0,8+0,2:\left(\frac{7}{15}-1\frac{1}{6}+\frac{9}{20}\right)$$

A) 0 B)1 C) $1,6$ D) $-0,6$ E) -1

29. (97-8-1) Hisoblang.

$$5,8-\frac{3}{7}\cdot2,2\cdot\left(-2\frac{1}{3}\right)$$

A) $3,6$ B)-8 C) 8 D) $-3,6$ E) 6

30. (97-11-7) Hisoblang.

$$0,2+1,8\cdot\left(\frac{4}{9}-1\frac{1}{2}+\frac{1}{6}\right)$$

A) $-1,4$ B)$1,8$ C) $0,04$ D) $-0,36$ E) -2

31. (97-12-1) Hisoblang.

$$-\frac{8}{9}\cdot12,25\cdot1\frac{1}{8}-(-2,25)$$

A) 10 B)$-14,5$ C) -10 D) $14,5$ E) $-10,25$

32. (98-1-3) Hisoblang.

$$19,9\cdot18-19,9\cdot16+30,1\cdot18-30,1\cdot16$$

A) 98 B)100 C) 10 D) 110 E) 102

33. (98-1-5) Hisoblang.

$$1\frac{1}{6}+1\frac{5}{6}\cdot(1,854:1,8-1,5\cdot 2,02)$$

A) -4 B)$-2\frac{5}{6}$ C) $-2\frac{1}{2}$ D) 4 E) $2\frac{1}{3}$

34. (98-1-7) Hisoblang.

$$(\frac{2}{3}:3-1)\cdot 1,5^2-0,25$$

A) $1,5$ B)-2 C) -5 D) $-0,2$ E) $-1,5$

35. (98-1-13) Hisoblang.

$$\frac{5}{6}+2\cdot(0,63:0,6-1,6)$$

A) $\frac{19}{30}$ B)$-1\frac{1}{6}$ C) $-\frac{4}{15}$ D) $-1\frac{4}{15}$ E) $\frac{8}{15}$

36. (98-8-3) Hisoblang.

$$109\cdot 9,17-5,37\cdot 72-37\cdot 9,17+1,2\cdot 72$$

A) 360 B)350 C) 290 D) 380 E) 310

37. (98-8-5) Hisoblang.

$$\frac{3}{16}+\frac{1}{16}\cdot(0,312:0,3-3,15\cdot 1,6)$$

A) $\frac{1}{4}$ B)$\frac{3}{16}$ C) $-\frac{1}{16}$ D) $-\frac{1}{8}$ E) $-\frac{5}{8}$

38. (98-8-7) Hisoblang.

$$\left(\frac{5}{6}\cdot 5-5\right):\frac{2}{3}-0,5^2$$

A) 1 B)-1 C) $0,5$ D) $-1,75$ E) $-1,5$

39. (98-8-13) Hisoblang.

$$(0,98-0,312:0,3)\cdot 25+\frac{1}{9}$$

A) $15\frac{1}{9}$ B)$-14\frac{8}{9}$ C) $-10\frac{7}{18}$ D) $-1\frac{7}{18}$ E) $1\frac{11}{18}$

40. (98-11-1) Hisoblang.

$$\left(-\frac{2}{3}\right)^2\cdot(-0,75)^3\cdot(1,5)^4\cdot\left(-\frac{4}{3}\right)^3$$

A) $1,75$ B)$2,75$ C) $2,5$ D) $2,25$ E) $1,5$

41. (98-12-60) Hisoblang.

$$\left(1\frac{1}{9}\cdot 0,27-3\frac{1}{3}\cdot 0,15\right)-1500\cdot(-0,1)^3$$

A) $1,3$ B)$1,4$ C) $1,5$ D) $1,6$ E) $1,7$

42. (98-12-68) Hisoblang.

$$(0,3)^{-3}+\left(\frac{3}{7}\right)^{-1}+(-0,5)^{-2}\cdot\frac{3}{4}+(-1)^{-8}\cdot 6$$

A) $51\frac{5}{9}$ B)$42\frac{4}{9}$ C) $34\frac{2}{3}$ D) $48\frac{10}{27}$ E) $52\frac{2}{27}$

43. (99-4-4) Hisoblang.

$$2.8\cdot\left(2\frac{1}{3}:2,8-1\right)+2\frac{4}{5}$$

A) $5,6$ B)$2\frac{2}{3}$ C) $2\frac{1}{5}$ D) $2,8$ E) $3\frac{1}{5}$

44. (99-6-2) Hisoblang.

$$13,5\cdot 5,8-8,3\cdot 4,2-5,8\cdot 8,3+4,2\cdot 13,5$$

A) 42 B)52 C) 50 D) 48 E) 54

45. (99-8-7) Ifodaning qiymatini toping.

$$79,9-79,8+79,7-79,6+79,5-79,4+...+$$
$$+60,3-60,2+60,1-60$$

A) 100 B)20 C) 10 D) $18,8$ E) $9,9$

46. (00-2-1) Ifodaning qiymatini toping.

$$12,7\cdot 64+173\cdot 3,6+12,7\cdot 36+17,3\cdot 64$$

A) 3000 B)1800 C) 2000 D) 3600 E) 2200

47. (00-6-2) Hisoblang.

$$(0,2\cdot 0,1-0,1):0,25+0,75$$

A) $1,07$ B)$-2,45$ C) $3,95$ D) $0,43$ E) $0,97$

48. (00-6-3) Ifodaning qiymatini toping.

$$(1\frac{2}{3}\cdot 2,2+1):2\frac{1}{5}-\frac{5}{11}$$

A) 1 B)$1,6$ C) $2\frac{1}{3}$ D) $0,6$ E) $1\frac{2}{3}$

49. (00-8-52) Hisoblang.

$$\left(-\frac{4}{6}\right)\cdot\left(\frac{8}{6}\right)^3\cdot\left(-\frac{3}{2}\right)^2\cdot(0,75)^3$$

A) $1,5$ B)$1,75$ C) $2,75$ D) 2 E) $-1,5$

50. (96-1-3) Ifodaning qiymatini toping.

$$\frac{6,8\cdot 0,04\cdot 1,65}{3,3\cdot 5,1\cdot 0,16}$$

A) 6 B)$\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{1}{6}$ E) $\frac{5}{12}$

51. (96-9-54) Ifodaning qiymatini toping.

$$\frac{0,7\cdot 1,8\cdot 2,6}{7,2\cdot 7,8\cdot 1,4}$$

A) $\frac{1}{24}$ B)$\frac{2}{5}$ C) $0,04$ D) $\frac{1}{12}$ E) $\frac{2}{3}$

52. (96-10-3) Ifodaning qiymati nechaga teng?

$$\frac{0,15\cdot 1,6\cdot 4,6}{9,2\cdot 0,03\cdot 6,4}$$

A) $\frac{5}{8}$ B)$\frac{2}{5}$ C) 2 D) $0,2$ E) $\frac{5}{4}$

53. (96-10-5) Hisoblang.

$$(5\frac{1}{3}-3,2):2\frac{2}{3}+1\frac{2}{5}$$

A) $2\frac{1}{2}$ B)$2,2$ C) $3,2$ D) 2 E) $1,8$

54. (97-1-1) Hisoblang.

$$\frac{0,215-1,6\cdot 0,215}{3,45-3\frac{3}{4}}$$

A) $-0,43$ B) $0,43$ C) $4,3$ D) $-4,2$ E) $0,45$

55. (97-6-1) Hisoblang.

$$\frac{0,15-0,15\cdot 6,4}{0,175-\frac{3}{8}}$$

A) $4,05$ B) $40,5$ C) $-0,405$ D) $2,1$ E) $-0,21$

56. (97-11-1) Hisoblang.

$$\frac{0,64\cdot 0,45-0,45}{1,05-1\frac{1}{2}}$$

A) $-3,6$ B) $0,36$ C) $0,64$ D) $-0,36$ E) $0,19$

57. (98-2-1) Hisoblang.

$$\frac{1,8}{(4\frac{2}{5}\cdot 6\frac{1}{3}-2\frac{1}{3}\cdot 4,4)\cdot\frac{5}{22}}$$

A) $0,4$ B) $4,5$ C) $4,2$ D) $4,4$ E) $0,45$

58. (98-4-1) Hisoblang.

$$(1,6^2-2,2\cdot\frac{3}{11}):1,4$$

A) $1,4$ B) $1,2$ C) $1,5$ D) $1,6$ E) $1,8$

59. (98-6-4) Hisoblang.

$$\frac{[(1,2:36)+0,3]\cdot 9}{0,2}$$

A) $148,5$ B) $1,5$ C) 150 D) 15 E) 16

60. (98-7-9) Hisoblang.

$$\frac{2,21\cdot 5,95+1,51}{6,42\cdot 5,95-8,88}$$

A) 1 B) $\frac{1}{2}$ C) $1\frac{1}{2}$ D) $-\frac{62}{41}$ E) $\frac{62}{41}$

61. (01-5-1) Ifodaning qiymatini hisoblang.

$$\frac{(6\frac{3}{5}-3\frac{3}{14})\cdot 5\frac{5}{6}}{(21-1,25):2,5}$$

A) $2,5$ B) 3 C) $-2,5$ D) 4 E) 5

62. (01-6-1) Hisoblang.

$$\frac{400-21,5\cdot 18,5}{1,5\cdot 2\frac{1}{5}+2,8\cdot 1\frac{1}{2}}$$

A) $\frac{2}{7}$ B) $\frac{3}{5}$ C) $\frac{3}{7}$ D) $\frac{5}{7}$ E) $\frac{3}{10}$

63. (01-8-9) Hisoblang.

$$\frac{(\frac{3}{2})^{-3}\cdot(3,375)^{-1}}{(2,25)^{-2}\cdot(\frac{2}{3})^{-1}}$$

A) $2\frac{1}{4}$ B) $\frac{4}{9}$ C) $\frac{8}{27}$ D) $3\frac{3}{8}$ E) $1\frac{1}{2}$

64. (98-9-1) Hisoblang.

$$\frac{\frac{5}{19}\cdot(3\frac{4}{5}\cdot 5\frac{1}{3}+4\frac{2}{3}\cdot 3,8)}{0,005}$$

A) 2010 B) 1800 C) 2120 D) 2000 E) 2200

65. (98-11-54) Hisoblang.

$$\frac{0,202-0,004}{\frac{8}{9}\cdot 18\cdot 0,125}$$

A) $0,099$ B) $0,99$ C) $0,0099$ D) 1 E) $1,98$

66. (99-2-1) Hisoblang.

$$\frac{7,4+\frac{13}{17}\cdot 0,15\cdot 1\frac{4}{13}\cdot 6\frac{2}{3}}{0,2\cdot 5-0,16}$$

A) 10 B) 8 C) 12 D) 6 E) 11

67. (99-4-3) Ifodaning qiymatini toping.

$$\frac{3,2\cdot 0,027\cdot 0,005}{0,09\cdot 0,0025\cdot 0,64}$$

A) 3 B) $0,3$ C) 30 D) 2 E) $0,6$

68. (99-9-1) Hisoblang.

$$\frac{1,28\cdot 6,4\cdot 0,32}{0,512}-1\frac{1}{5}$$

A) $4,92$ B) $4,9$ C) $3,92$ D) $3,82$ E) $4,82$

69. (00-1-1) Hisoblang.

$$\frac{\frac{5}{11}\cdot 0,006\cdot 2\frac{1}{5}+1\frac{1}{8}\cdot 0,004\cdot\frac{8}{9}}{0,5\cdot 0,0009+0,0001\cdot 0,5}$$

A) 10 B) $0,4$ C) 20 D) 2 E) $0,2$

70. (00-4-6) Hisoblang.

$$\frac{3\frac{1}{3}\cdot 1,9+19,5:4\frac{1}{2}}{\frac{62}{75}-0,16}$$

A) $4\frac{1}{2}$ B) 16 C) $7,45$ D) 12 E) $9\frac{3}{4}$

71. (00-6-8) Hisoblang.

$$\frac{0,04^{-2}\cdot 125^4\cdot 0,2^{-1}}{4\cdot 25^8}$$

A) $0,5$ B) $1,25$ C) $\frac{1}{4}$ D) $0,2$ E) $1\frac{1}{2}$

72. (02-1-4) 13 ni 6 ga bo'lgandagi 7-xonadagi raqam bilan 11 ni 9 ga bo'lgandagi 15-xonadagi raqamlarning o'rta geometrigini toping.
A) $3\sqrt{2}$ B) $2\sqrt{3}$ C) $3\sqrt{5}$ D) 2 E) 3

73. (02-2-1)

$$5,25^2+4,75\cdot 18,9-4,75\cdot 13,65$$

ni hisoblang.
A) $52,5$ B) $62,5$ C) $42,7$ D) $47,5$ E) $6,75$

74. (02-3-1)

$$7,352^2+52,96-2,648^2$$

ni hisoblang.
A) 100 B) 110 C) 90 D) 65 E) 102

75. (02-3-13)

$$\left[\left(\frac{1}{81}\right)^{-\frac{1}{2}}\cdot(0,1)^{-2}+(0,01)^{-1}\right]^{-\frac{1}{3}}$$

ni hisoblang.
A) $0,1$ B) 10 C) 1 D) 2 E) $0,01$

76. (02-4-1)

$$\left(2\frac{3}{4}-0,25\right)\cdot 0,8-1\frac{2}{3}\cdot 1,8$$

ni hisoblang.
A) 1 B) $1,5$ C) -1 D) $-1,5$ E) $1,3$

77. (02-6-1)

$$32\cdot 0,99\cdot 25\cdot 1,25+411+57\cdot 5\cdot 0,4\cdot 25\cdot\frac{4}{19}$$

ni hisoblang.
A) 2001 B) 2000 C) 1999 D) 2002 E) 1998

78. (02-9-3)

$$\left(\frac{1}{6}-1\frac{2}{3}\cdot 0,2\right):\frac{3}{20}+\frac{1}{5}$$

ni hisoblang.
A) $-\frac{41}{45}$ B) $\frac{59}{45}$ C) $\frac{41}{45}$ D) $\frac{109}{45}$ E) $-\frac{59}{45}$

79. (02-9-5)

$$3\frac{1}{5}\cdot\left(2\frac{1}{3}:3,2-3\right)+9,6$$

ni hisoblang.
A) $1\frac{2}{3}$ B) $2\frac{1}{3}$ C) $1\frac{1}{3}$ D) $2\frac{1}{15}$ E) $3\frac{2}{3}$

80. (02-10-1)

$$\left(\frac{810}{162}+\frac{675}{225}\right)\cdot\left(\frac{810}{162}-\frac{675}{225}\right)+$$
$$+\frac{1,11+0,19-1,3\cdot 2}{2,06+0,54}$$

ni hisoblang.
A) $15,5$ B) 15 C) $14,5$ D) 16 E) $16,5$

81. (02-10-2)

$$\frac{(9,126:0,65+0,46)\cdot 7,18+1,45\cdot 28,2}{3,45^2-0,55^2}$$

ni hisoblang.
A) $12,5$ B) 12 C) $11,5$ D) 13 E) $13,5$

82. (02-11-1)

$$\left(5\frac{4}{45}-4\frac{1}{15}\right)\cdot 22,5-\frac{4,25:0,85+0,5}{(5,56-4,06):3}$$

ni hisoblang.
A) $10,5$ B) 12 C) $13,5$ D) 16 E) 18

83. (03-1-56) $0,8$ ga teskari bo'lgan songa qarama-qarshi sonni toping.
A) $-0,8$ B) $1,25$ C) $-1,25$ D) $-1,2$ E) $1,2$

84. (03-5-1)

$$\frac{0,13}{0,00013}+\frac{0,02}{0,0005}-\frac{0,7}{0,0014}$$

ni hisoblang.
A) 540 B) 580 C) 620 D) 1400 E) 740

85. (03-6-44) $3602,1$ sonini standart shaklda yozing.
A) $3,6\cdot 10^3$ B) $0,36\cdot 10^4$ C) $36,02\cdot 10^2$
D) $3,6021\cdot 10^3$ E) $3\cdot 10^3$

86. (03-3-4)

$$\frac{12\frac{4}{5}\cdot 3,75-4\frac{4}{11}\cdot 4,125}{2\frac{2}{7}:\frac{4}{35}}$$

ni hisoblang.
A) $0,5$ B) $1,5$ C) $0,6$ D) $0,3$ E) $0,2$

87. (03-8-20) Amallarni bajaring:

$$\left(1,75:\frac{2}{3}-1\frac{3}{4}\cdot 1\frac{1}{8}\right):\frac{7}{12}$$

A) $1,125$ B) $1,2$ C) $1,5$ D) $0,75$ E) $1\frac{1}{9}$

88. (03-10-3)

$$\frac{0,07}{0,21}+\frac{0,4}{0,06}+\frac{0,9}{0,05}$$

ifodaning qiymatini toping.
A) 25 B) 20 C) 15 D) 30 E) 16

1.2.4 Cheksiz davriy o'nli kasrlar.

1. (96-1-12) Quyidagi sonlardan qaysi biri $0,(2)$ ga teng?
A) $\frac{1}{9}$ B) $\frac{4}{18}$ C) $\frac{2}{3}$ D) $0,22$ E) $\frac{2}{10}$

2. (96-9-62) Quyidagi sonlardan qaysi biri $0,(5)$ ga teng?
A) $\frac{1}{2}$ B) $\frac{10}{18}$ C) $0,555$ D) $\frac{1}{5}$ E) $\frac{4}{7}$

3. (96-10-12) Quyidagi sonlardan qaysi biri $0,(7)$ ga teng?
A) $\frac{7}{10}$ B) $0,777$ C) $\frac{14}{18}$ D) $\frac{1}{7}$ E) $\frac{5}{7}$

4. (97-4-11) $5,(8)$ ni oddiy kasr ko'rinishida yozing.
A) $5\frac{8}{10}$ B) $5\frac{3}{5}$ C) $5\frac{888}{1000}$ D) $5\frac{8}{9}$ E) $5\frac{88}{100}$

5. (97-5-4) $3,4(3)$ davriy kasr qaysi oddiy kasrga teng?
A) $3\frac{13}{33}$ B) $3\frac{3}{11}$ C) $3\frac{2}{45}$ D) $3\frac{1}{30}$ E) $3\frac{13}{30}$

6. (97-9-4) $3,7(3)$ davriy kasr qaysi oddiy kasrga teng?
A) $3\frac{1}{3}$ B) $3\frac{67}{99}$ C) $3\frac{11}{15}$ D) $3\frac{73}{90}$ E) $3\frac{7}{9}$

7. (97-9-71) $8,(5)$ ni oddiy kasrga aylantiring.
A) $8\frac{4}{9}$ B) $8\frac{5}{8}$ C) $8\frac{7}{8}$ D) $8\frac{5}{9}$ E) $8\frac{5}{10}$

8. (98-5-4) Hisoblang.

$$0,(8)+0,(7)$$

A) $\frac{3}{5}$ B) $1\frac{2}{3}$ C) $1\frac{1}{7}$ D) $1,(5)$ E) $1\frac{1}{5}$

9. (99-4-27) $0,5(6)$ son quyidagilardan qaysi biriga teng?
A) $\frac{56}{99}$ B) $\frac{1}{18}$ C) $\frac{34}{60}$ D) $\frac{28}{45}$ E) $\frac{17}{33}$

10. (99-7-6) Hisoblang.
$$0,(5)+0,(1)$$
A) $\frac{2}{3}$ B) $\frac{1}{3}$ C) $1,5$ D) $\frac{1}{4}$ E) $\frac{1}{9}$

11. (01-9-27) Hisoblang.
$$\big(0,(6)-0,(45)\big)\cdot 0,(33)$$
A) $0,(7)$ B) $\frac{7}{9}$ C) $0,(07)$ D) $0,(007)$ E) $\frac{70}{99}$

12. (01-6-22) $0,2(3)$ ni oddiy kasrga aylantiring.
A) $\frac{7}{30}$ B) $\frac{4}{15}$ C) $\frac{3}{8}$ D) $\frac{2}{7}$ E) $\frac{2}{9}$

13. (01-3-39) Ifodaning qiymatini toping.
$$0,(8)+0,(3)$$
A) $1\frac{1}{9}$ B) $1\frac{2}{9}$ C) $0,(11)$ D) $1,(1)$ E) $1\frac{1}{3}$

14. (01-1-3) Hisoblang.
$$3,2(62)-1,(15)$$
A) $2,2(47)$ B) $2,247$ C) $2,(12)$ D) $2,(1)$ E) $2,01$

15. (96-3-68) Ushbu $a=0,5(3)$, $b=\frac{47}{90}$, $c=1-0,48(1)$ sonlar uchun quyidagi munosabatlardan qaysi biri o'rinli?
A) $a<b<c$ B) $b<c<a$ C) $c<b<a$
D) $b<a<c$ E) $a<c<b$

16. (96-9-8) Ushbu $a=1-0,3(5)$, $b=\frac{2}{3}$, $c=0,6(5)$ sonlar uchun quyidagi munosabatlardan qaysi biri o'rinli?
A) $c<a<b$ B) $a<c<b$ C) $a<b<c$
D) $b<a<c$ E) $b<c<a$

17. (96-12-66) a, b va c sonlar uchun quyidagi munosabatlardan qaysi biri o'rinli?
$$a=0,6(4),\quad b=\frac{59}{90},\quad c=1-0,36(9)$$
A) $a<c<b$ B) $a<b<c$ C) $b<a<c$
D) $b<c<a$ E) $c<a<b$

18. (96-13-8) Ushbu $a=0,7(2)$, $b=\frac{11}{15}$, $c=1-0,2(8)$ sonlar uchun quyidagi munosabatlardan qaysi biri o'rinli?
A) $c<a<b$ B) $a<c<b$ C) $a<b<c$
D) $b<a<c$ E) $b<c<a$

19. (98-1-10) Sonlarni kamayish tartibida joylashtiring.
$$a=2,(4),\quad b=2,5-\frac{1}{8},\quad c=1,2:0,5$$
A) $a>b>c$ B) $a>c>b$ C) $b>a>c$
D) $c>a>b$ E) $c>b>a$

20. (98-7-7) Ushbu $m=0,55(57)$; $n=0,5(557)$; $l=0,555(7)$ sonlarni kamayish tartibida yozing.
A) $l>m>n$ B) $l>n>m$ C) $m>n>l$
D) $n>l>m$ E) $n>m>l$

21. (98-8-10) Sonlarni o'sish tartibida joylashtiring.
$$a=3,(6);\quad b=3,91-\frac{1}{4};\quad c=4,68:1,3$$
A) $b<a<c$ B) $a<c<b$ C) $c<b<a$
D) $a<b<c$ E) $c<a<b$

22. (98-12-6) $m=0,22(23)$; $n=0,2(223)$; $l=0,222(3)$ sonlarni o'sish tartibida yozing.
A) $n<m<l$ B) $l<m<n$ C) $m<n<l$
D) $m<l<n$ E) $n<l<m$

23. (96-3-63) Quyidagi oddiy kasr ko'rinishida berilgan sonlardan qaysilarini chekli o'nli kasr ko'rinishiga keltirib bo'lmaydi?
$$1)\frac{7}{40};\quad 2)\frac{3}{28};\quad 3)\frac{13}{35};\quad 4)\frac{18}{250};$$
A) $1;2$ B) $2;3$ C) $3;4$ D) $4;1$ E) $2;4$

24. (96-9-3) Quyidagi oddiy kasr ko'rinishida berilgan sonlardan qaysilarini chekli o'nli kasr ko'rinishiga keltirib bo'lmaydi?
$$1)\frac{7}{32};\quad 2)\frac{11}{160};\quad 3)\frac{5}{48};\quad 4)\frac{5}{14};$$
A) $2;3$ B) $3;4$ C) $4;1$ D) $1;2$ E) $2;4$

25. (96-12-61) Quyidagi oddiy kasr ko'rinishida berilgan sonlardan qaysilarini chekli o'nli kasr ko'rinishiga keltirib bo'lmaydi?
$$1)\frac{35}{88};\quad 2)\frac{4}{125};\quad 3)\frac{34}{75};\quad 4)\frac{11}{80};$$
A) $1;2$ B) $3;4$ C) $1;3$ D) $2;4$ E) $1;4$

26. (96-13-3) Quyidagi oddiy kasr ko'rinishida berilgan sonlardan qaysilarini chekli o'nli kasr ko'rinishiga keltirib bo'lmaydi?
$$1)\frac{14}{625};\quad 2)\frac{3}{64};\quad 3)\frac{32}{75};\quad 4)\frac{11}{375};$$
A) $1;2$ B) $2;3$ C) $3;4$ D) $4;1$ E) $2;4$

27. (98-7-6) Davri 0 yoki 9 dan farqli bo'lgan cheksiz davriy o'nli kasrlarni ko'rsating $m=\frac{1}{0,33}$
$$n=247,123123...,\ p=0,63(8),\ q=\frac{172}{99},\ l=\frac{17}{20}.$$
A) n,p B) $m,p,l,$ C) m,n,p,q D) m,q
E) *hammasi*

28. (98-12-5) Davri 0 yoki 9 dan farqli bo'lgan cheksiz davriy o'nli kasrlarni ko'rsating:
$m=2,32666...$, $n=\frac{7}{99}$, $p=\frac{5}{16}$,
$q=7,145222...$, $l=3,222$
A) m,n B) m,q C) m,n,q D) m,n,p
E) *hammasi*

29. (00-10-3) Hisoblang.
$$\frac{3,(73)-0,2(19)}{3\frac{513}{990}}$$
A) $\frac{3}{5}$ B) $\frac{3}{7}$ C) $\frac{3}{4}$ D) $\frac{2}{5}$ E) 1

30. (01-1-1) Hisoblang.

$$(1,08-\frac{2}{25}):\frac{4}{7}-0,25:\frac{1}{3}+0,(3)$$

A) 1 B) $\frac{4}{3}$ C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) $-\frac{2}{3}$

31. (01-7-1) Hisoblang.

$$\left(1\frac{3}{4}:1,125-1,75:0,(6)\right)\cdot 1\frac{5}{7}+2,8(3)$$

A) $2\frac{1}{7}$ B) 2 C) $2\frac{2}{7}$ D) 1 E) $1\frac{6}{7}$

32. (01-11-1) Hisoblang.

$$\left(6\frac{1}{3}\cdot 0,(5)+0,(4):\frac{3}{19}\right)\cdot 4\frac{5}{19}$$

A) 28 B) 27,5 C) 27 D) 26,5 E) 26

33. (98-11-3) Hisoblang.

$$\frac{0,8(3)-0,4(6)}{0,(3)}$$

A) 1,1 B) $1\frac{1}{3}$ C) 3 D) 0,3 E) $\frac{2}{3}$

34. (99-1-1) Hisoblang.

$$\frac{(16+81)\cdot(1+\frac{61}{36}):36}{\left[0,(4)+\frac{1}{0,(4)}\right]^2}\cdot 0,4$$

A) 0,4 B) 0,(4) C) 14,4 D) 36 E) $\frac{1}{36}$

35. (99-3-1) Hisoblang.

$$\frac{0,2(4)\cdot 4\frac{1}{11}+2\frac{1}{4}:1\frac{4}{5}}{1,125+\left(2\frac{2}{3}\right)^{-1}}$$

A) 1 B) 1,5 C) 1,25 D) 2,5 E) $\frac{2}{3}$

36. (99-10-1) Hisoblang.

$$\frac{0,48\cdot 0,75+0,52:1\frac{1}{3}}{(0,(3)+0,(6)):0,012}$$

A) 1 B) 0,08 C) 0,008 D) 0,009 E) 0,09

37. (00-3-1) Hisoblang.

$$\frac{1\frac{2}{13}\cdot 0,4(3)+2:1,(3)}{\frac{3}{8}+0,125}-\sqrt{\sqrt{256}}$$

A) -2 B) 0 C) 2 D) 1 E) -1

38. (00-7-1) Hisoblang.

$$\frac{0,(2)\cdot 0,625\cdot 4,5+1,8\cdot 0,175\cdot 0,(5)}{\frac{6}{7}\cdot 2\frac{1}{3}-1\frac{1}{6}\cdot\frac{6}{7}}$$

A) 0,9 B) 0,7 C) 0,8 D) 0,6 E) 0,5

39. (02-5-1)

$$\left(2,75\cdot 0,(36)-2,75:1\frac{1}{8}\right)\cdot 2,7+1,8(3)\cdot 3,6$$

ni hisoblang.
A) 1 B) 2,7 C) 3,2 D) 3 E) 2

40. (02-5-2)

$$0,5(6)+0,(8)$$

ni hisoblang.
A) 0,6(4) B) 1,3(6) C) 1,4(5) D) 1,36 E) 1,(36)

41. (02-10-3)

$$0,4(3)+0,6(2)\cdot 2\frac{1}{2}-\frac{\frac{1}{2}+\frac{1}{3}}{0,5(8)}:\frac{50}{53}$$

ni hisoblang.
A) 0,4(8) B) 0,5 C) $\frac{4}{9}$ D) $\frac{5}{9}$ E) $\frac{49}{90}$

42. (02-10-40)

$$-\frac{21}{6}+2,(2)$$

ni butun qismini toping.
A) -2 B) -1 C) 0 D) 1 E) 2

43. (02-11-2) $3\frac{127}{495}$ ni cheksiz davriy o'nli kasr ko'rinishida yozing.
A) 3,(127) B) 3,(254) C) 3,2(54)
D) 3,2(56) E) 3,25(4)

44. (02-12-20)

$$\left(\frac{81\cdot 3}{567}+\frac{22}{77}\right)\cdot 24,5-\frac{2}{3}:0,(3)$$

ni hisoblang.
A) 16,5 B) 14,5 C) 15,5 D) 16,5 E) 13,5

45. (03-3-3) $\frac{13}{225}$ ni cheksiz davriy o'nli kasr shaklida yozing.
A) 0,05(2) B) 0,5(2) C) 0,2(5)
D) 0,02(5) E) 0,05(7)

46. (03-6-2)

$$\frac{0,(4)+0,(41)+0,(42)+0,(43)}{0,(5)+0,(51)+0,(52)+0,(53)}$$

ni hisoblang.
A) $\frac{170}{211}$ B) $\frac{83}{103}$ C) $\frac{63}{107}$ D) $\frac{65}{106}$ E) $\frac{27}{46}$

47. (03-7-4)

$$\frac{0,(40)+0,(41)+0,(42)+0,(43)}{0,(50)+0,(51)+0,(52)+0,(53)}$$

ni hisoblang.
A) $\frac{170}{211}$ B) $\frac{83}{103}$ C) $\frac{63}{107}$ D) $\frac{65}{106}$ E) $\frac{27}{46}$

48. (03-7-42)

$$\frac{\frac{2}{9}+3,6(1)}{1,91(6)-1\frac{5}{6}}$$

ni hisoblang.
A) 46 B) 51 C) $\frac{23}{72}$ D) 42 E) 1

49. (03-8-27) 0,2(18) ni oddiy kasr shaklda yozing.
A) $\frac{12}{55}$ B) $\frac{13}{55}$ C) $\frac{28}{99}$ D) $\frac{218}{900}$ E) $\frac{13}{45}$

1.3 Algebraik ifodalar.

Ixtiyoriy $a>0$, $b>0$ va $n,m\in N$ sonlar uchun

1. $a^n=a\cdot a\cdot ...\cdot a$,
2. $a^0=1, a^{-n}=\frac{1}{a^n}$
3. $a^n\cdot a^m=a^{n+m}$
4. $\frac{a^n}{a^m}=a^{n-m}$
5. $(a^n)^m=a^{nm}$
6. $(ab)^n=a^n\cdot b^n$
7. $(\frac{a}{b})^n=\frac{a^n}{b^n}$

1.3.1 Ko'phadlarning standart shakli.

(97-10-5) Soddalashtiring.

$$2\frac{2}{3}\cdot\left(1\frac{1}{2}a-2\frac{1}{4}\right)+1\frac{1}{5}\cdot\left(2\frac{1}{2}a-\frac{5}{6}\right)$$

A) $a+5$ B) $7a-7$ C) 7 D) $1\frac{1}{2}a-5$ E) $6\frac{1}{3}a$
Yechish: Sonlarni oddiy kasrga keltirib, qavslarni ochamiz:

$$2\frac{2}{3}\cdot\left(1\frac{1}{2}a-2\frac{1}{4}\right)+1\frac{1}{5}\cdot\left(2\frac{1}{2}a-\frac{5}{6}\right)=$$
$$=\frac{8}{3}\cdot\left(\frac{3}{2}a-\frac{9}{4}\right)+\frac{6}{5}\cdot\left(\frac{5}{2}a-\frac{5}{6}\right)=$$
$$=4a-6+3a-1=7a-7$$

J: $7a-7$ (B).

1. (96-1-25) Ifodani ko'phadning standart shakliga keltiring.

$$2x(x-1)-(2x-1)\cdot(x+1)$$

A)$4x^2-1$ B) $2x^2-3x$ C) $3x+1$
D) $4x^2-5x+1$ E) $-3x+1$

2. (97-5-2) Soddalashtiring.

$$4a-13a+5a$$

A)$4a$ B) $-4a$ C) $6a$ D) $-6a$ E) $5a$

3. (97-5-6) Soddalashtiring.

$$-6-2(2-y)-2y+2$$

A)8 B) $-8-4y$ C) $8-4y$ D) -8 E) $-8+4y$

4. (97-9-2) Soddalashtiring.

$$7x-14x+6x$$

A)x B) $-2x$ C) $2x$ D) $-x$ E) $4x$

5. (97-9-6) Soddalashtiring.

$$-8-2(1-b)-2b+1$$

A)9 B) $9-4b$ C) $9+4b$ D) -9 E) $-9-4b$

6. (98-1-14) Soddalashtiring.

$$a(b-c)+b(c-a)-c(b-a)$$

A)$-2ac$ B) $2ab$ C) 0 D) 2 E) $2bc-2ac$

7. (98-8-14) Soddalashtiring.

$$a(b+c-bc)-b(c+a-ac)+c(b-a)$$

A)$-2abc$ B) $2ac$ C) $-2bc$ D) $ab-ac$ E) 0

8. (99-8-10) Agar $a+b+3=10$ bo'lsa,

$$3,8a+7,7+1,7b+2,5a+11,2+4,6b$$

ifodaning qiymatini toping.
A)53 B) 58 C) 72 D) 63 E) 70

9. (00-6-17) Soddalashtiring.

$$(a+b)(a-b+1)-(a-b)(a+b-1)$$

A)$2b$ B) $2a-2b$ C) $2a$
D) $2a^2+2b^2$ E) $2b^2-2a$

10. (96-7-5) Soddalashtiring.

$$2\frac{1}{2}\cdot\left(\frac{4}{5}x+2\right)-2\frac{1}{3}\cdot\left(\frac{3}{7}x-6\right)$$

A)19 B) $x-9$ C) $x+19$
D) $20+x$ E) $1\frac{2}{7}x+9$

11. (97-3-5) Soddalashtiring.

$$2\frac{1}{3}\cdot\left(\frac{6}{7}m+3\right)-1\frac{2}{3}\cdot\left(\frac{3}{5}m-3\right)$$

A)$m-2$ B) 4 C) $m+12$
D) $\frac{2}{3}m+2$ E) $4+m$

12. (97-7-5) Soddalashtiring.

$$\frac{3}{7}\cdot\left(1\frac{2}{5}a+2,1\right)+\frac{3}{5}\cdot\left(\frac{2}{3}a-\frac{5}{6}\right)$$

A)$a+\frac{2}{5}$ B) $a+1,3$ C) $1\frac{2}{3}a-\frac{2}{5}$
D) $a+0,6$ E) $2\frac{1}{3}a-1\frac{1}{6}$

13. (99-4-13) Soddalashtiring.

$$\frac{4}{9}\cdot\left(4\frac{1}{2}y-1\frac{1}{2}\right)-\frac{2}{7}\cdot\left(1\frac{1}{6}-3\frac{1}{2}y\right)$$

A) $0,2y-1$ B) $2y+1$ C) $3y-1$
D) $\frac{2}{3}y-\frac{1}{3}$ E) $y-1$

14. (99-8-24) Ko'phadlar ayirmasini toping.

$$P=(\frac{1}{3}x-\frac{1}{3}y)-(x+2y),$$

$$Q=\frac{1}{3}x+\frac{1}{3}y-(x-y)$$

A)$-\frac{11}{3}y$ B) $4y$ C) $-4y$ D) $\frac{13}{3}y$ E) $-\frac{13}{3}y$

15. (00-2-17) Agar bo'luvchi $x-2$ ga, bo'linma $x+3$ ga, qoldiq 5 ga teng bo'lsa, bo'linuvchi nimaga teng?
A)x^2-3x+6 B) x^2-5x-6 C) x^2+x-1
D) x^2-5 E) x^2-6

16. (00-2-18)* x ning qanday qiymatida

$$P(x) = x^3 + 4x^2 - 12x + 17$$

ko'phadning qiymatini biror sonning kvadrati shaklida tasvirlash mumkin?
A)-2 B) 2 C) 1 D) 3 E) -3

17. (01-8-12) Ushbu

$$(a+3b)(a+b+2) - (a+b)(a+3b+2)$$

ifodani ko'phad shaklida tasvirlang.
A)$2a-b$ B) $a-2b$ C) $4a+2b$
D) $4b$ E) $6ab$

1.3.2 Qisqa ko'paytirish formulalari.

Ixtiyoriy a, b va c sonlar uchun

1. $(a+b)^2 = a^2 + 2ab + b^2$
2. $(a-b)^2 = a^2 - 2ab + b^2$
3. $(a-b)(a+b) = a^2 - b^2$
4. $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
5. $(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$
6. $(a-b)(a^2+ab+b^2) = a^3 - b^3$
7. $(a+b)(a^2-ab+b^2) = a^3 + b^3$

(00-5-8)* Hisoblang.

$$\Big(1+\frac{1}{2}\Big)\cdot\Big(1+\frac{1}{2^2}\Big)\cdot\Big(1+\frac{1}{2^4}\Big)\cdot ...\cdot$$

$$\cdot\Big(1+\frac{1}{2^{16}}\Big)\cdot\Big(1+\frac{1}{2^{32}}\Big)$$

A)$1-\frac{1}{2^{64}}$ B) $2(1-\frac{1}{2^{64}})$ C) $4(1-\frac{1}{2^{32}})$
D) $4(1+\frac{1}{2^{32}})$ E) $\frac{1}{2^{64}}$

Yechish: Ifodani $1-\frac{1}{2}$ ga ko'paytirib, bo'lamiz va bir necha marta $(a-b)(a+b) = a^2 - b^2$ formulani qo'llaymiz.

$$\frac{(1-\frac{1}{2})\cdot(1+\frac{1}{2})\cdot ...\cdot(1+\frac{1}{2^{32}})}{1-\frac{1}{2}} =$$

$$= 2\Big(1-\frac{1}{2^2}\Big)\Big(1+\frac{1}{2^2}\Big)...\Big(1+\frac{1}{2^{32}}\Big) =$$

$$= 2\Big(1-\frac{1}{2^4}\Big)\Big(1+\frac{1}{2^4}\Big)...\Big(1+\frac{1}{2^{32}}\Big) =$$

$$= ... = 2\Big(1-\frac{1}{2^{64}}\Big)$$

J: $2\Big(1-\frac{1}{2^{64}}\Big)$ (B).

1. (96-1-17) Soddalashtiring.

$$(2a-b)^2 - (2a+b)^2$$

A)0 B) $-2b^2$ C) $-8ab$
D) $-4ab+2b^2$ E) $2b^2$

2. (96-9-68) Soddalashtiring.

$$(a-3b)^2 - (a+b)^2$$

A)$8b^2-8ab$ B) $8b^2$ C) $2b^2-8ab$
D) $-8b^2$ E) $2b^2-4ab$

3. (96-9-76) Ushbu $(4x-3)^2 - x(4x+1)$ifodani ko'phadning standart shakliga keltiring.
A)$2x^2+x-9$ B) $12x^2-25x+9$ C) $4x^2-13x$
D) $8x^2-x+7$ E) $12x^2-23x+9$

4. (96-10-18) Soddalashtiring.

$$(1-2a)^2 + (1+2a)(2a-1)$$

A)$8a^2-4a$ B) $-2a$ C) $-2a+2$
D) $4a^2-2a$ E) $8a^2$

5. (96-10-26) Ushbu $(x-1)(2-x)+(2x-3)^2$ ifodani ko'phadning standart shakliga keltiring.
A)$5x^2+9x-7$ B) $3x^2-8$ C) $3x^2-9x+7$
D) $12x+4-x^2$ E) $5x^2-10x+1$

6. (98-4-13)* Agar $5^z + 5^{-z} = 7$ bo'lsa, $25^z + 25^{-z}$ ning qiymati qancha bo'ladi?
A)47 B) 49 C) 51 D) 29 E) 38

7. (98-12-72)* Agar $49^z + 49^{-z} = 7$ bo'lsa, $7^z + 7^{-z}$ ni toping.
A)4 B) $\sqrt{7}$ C) $\sqrt{5}$ D) 14 E) 3

8. (98-7-26)* $-2a^2 - 2b^2$ ni $a+b$ va ab orqali ifodalang.
A) $4ab - 2(a+b)^2$ B) $2(a+b)^2 - 4ab$
C) $4ab + 2(a+b)^2$ D) $-4ab - 2(a+b)^2$
E) $2(a+b)^2 - 2ab$

9. (98-11-7) $(2k+1)^2 - (2k-1)^2$ ifoda, $k \in N$ da qaysi raqamlarga qoldiqsiz bo'linadi?
A) $2;4;8$ B) 2 C) 4 D) 8 E) $4;8$

10. (98-11-8) Soddalashtiring.

$$12^2 - (x+7)^2 - (5-x)\cdot(19+x)$$

A)0 B) 50 C) 140 D) 90 E) 85

11. (98-12-25)* a^2+b^2 ni ab va $a+b$ orqali ifodalang.
A) $(a+b)^2 - 2ab$ B) $(a+b)^2 - ab$
C) $(a+b)^2 - 4ab$ D) $(a+b)\cdot ab$
E) $(a+b)^2 + 2ab$

12. (99-2-9)* α va β irratsional sonlar $(\alpha \neq \beta)$, $\alpha+\beta$ esa ratsional son. Quyidagilarning qaysi biri ratsional son bo'ladi?
A) $\alpha - 2\beta$ B) $\alpha^2 + 2\alpha\beta + \beta^2$ C) $\frac{\alpha+2\beta}{2}$
D) $2\alpha + \beta$ E) $\alpha - 3\beta$

13. (99-6-35)* $a = 2^5 + 2^{-5}$ va $b = 2^5 - 2^{-5}$ bo'lsa, $a^2 - b^2$ nimaga teng.
A) 0 B) 2 C) $\frac{1}{2}$ D) $\frac{1}{4}$ E) 4

14. (99-6-40)* $a^2 + \frac{9}{a^2} = 22$ bo'lsa, $a - \frac{3}{a}$ nimaga teng.
A) 3 B) -3 C) 2 D) ± 4 E) 1

15. (99-10-13) Ushbu

$$(8+(2x-4))(8-(2x-4))$$

ifoda x ning qanday qiymatida eng katta qiymatga erishadi?
A) -2 B) $2,5$ C) $1,5$ D) $-1,5$ E) 2

16. (96-3-19) Ushbu $(x^2-xy+y^2)(x+y)$ ifodaning $x=-\frac{1}{2}$ $y=\frac{1}{\sqrt[3]{2}}$ bo'lgandagi qiymatini hisoblang.
A) $-\frac{5}{8}$ B) $\frac{9}{8}$ C) $\frac{3}{8}$ D) $-\frac{1}{8}$ E) $-\frac{3}{8}$

17. (96-6-10) Ushbu $(x^4-x^2y^2+y^4)(x^2+y^2)$ ko'paytma o'xshahs hadlari ixchamlanganidan keyin nechta qo'shiluvchidan iborat boladi?
A) 3 B) 4 C) 2 D) 5 E) 6

18. (96-11-20) $(b-c)(b^2+bc+c^2)$ ifodaning $b=-2$ va $c=1$ bo'lgandagi qiymatini hisoblang.
A) 7 B) 5 C) -9 D) -7 E) 9

19. (96-12-20) $(x^2+xy+y^2)(x-y)$ ifodaning $x=1$ va $y=-2$ bo'lgandagi qiymatini hisoblang.
A) 5 B) -9 C) 7 D) 9 E) -7

20. (97-2-10) Ushbu

$$(y^4-y^2+1)(y^2+1)+(y-1)(y+1)$$

ifodani soddalashtirgandan keyin hosil bo'lgan ko'phadning nechta hadi bo'ladi?
A) 3 B) 4 C) 2 D) 5 E) 6

21. (97-8-10)

$$(x^2+1)(x^4-x^2+1)+(x^3-1)^2$$

ni soddalashtiring, keyin hosil bo'lgan ko'phadning nechta hadi bo'ladi?
A) 5 B) 4 C) 3 D) 6 E) 2

22. (97-12-9) Ifodani soddalashtirgandan keyin nechta haddan iborat bo'ladi?

$$(y^3-1)^2+(y^2+1)(y^4-y^2+1)$$

A) 4 B) 5 C) 6 D) 3 E) 2

23. (00-5-21) $(2a+3b)(4a^2-6ab+9b^2)$ ifodaning $a=2$ va $b=1$ dagi qiymatini toping.
A) 91 B) 93 C) 96 D) 99 E) 101

24. (99-1-4)* Hisoblang.
$0,8\cdot(0,2+1)\cdot(0,2^2+1)\cdot$
$\cdot(0,2^4+1)\cdot(0,2^8+1)+(5^{-2})^8$
A) 1 B) $0,2^{16}$ C) $2\cdot 0,2^{16}+1$ D) 2 E) 3

25. (00-5-23) $(x+3)(x^2-3x+9)$ ifodaning $x=\frac{1}{2}$ dagi qiymatini hisoblang.
A) $-26,875$ B) $\frac{343}{27}$ C) $27\frac{1}{2}$ D) $-26\frac{1}{2}$ E) $27,125$

26. (01-8-7)* Agar $a+\frac{1}{a}=3$ bo'lsa, $\frac{a^6+1}{a^3}$ ning qiymatini toping.
A) 27 B) 24 C) 18 D) $21\frac{1}{3}$ E) aniqlab bo'lmaydi

27. (02-5-7)* Agar $a-\frac{1}{a}=\sqrt{7}$ bo'lsa, $a^4+\frac{1}{a^4}$ ning qiymatini hisoblang.
A) 81 B) 79 C) 49 D) 63 E) 77

28. (02-9-6)* Agar $a+\frac{1}{a}=3$ bo'lsa, $\frac{a^4+1}{2a^2}$ ning qiymati nimaga teng?
A) $3,5$ B) 4 C) $5,5$ D) 7 E) 10

29. (00-6-7)* Agar $a-\frac{1}{a}=\frac{2}{3}$ bo'lsa, $\frac{a^4+1}{a^2}$ ning qiymatini toping?
A) $2\frac{4}{9}$ B) $1\frac{1}{3}$ C) $1\frac{5}{9}$ D) $2\frac{5}{9}$ E) $4\frac{2}{3}$

30. (03-8-44)* Agar $a+a^{-1}=3$ bo'lsa, a^2+a^{-2} ni hisoblang?
A) 7 B) 4 C) 9 D) 13 E) 12

31. (03-8-45)* Agar $a+a^{-1}=5$ bo'lsa, a^3+a^{-3} ni hisoblang?
A) 110 B) 70 C) 80 D) 90 E) 100

1.3.3 Ko'phadlarni ko'paytuvchilarga ajratish.

1. (98-1-18) Ko'phadni ko'paytuvchilarga ajrating.

$$2a^2b-3a+10ab^2-15b$$

A) $(2ab+3)(a-5b)$ B) $(a+5b)(2ab-3)$
C) $(3+ab)(2a-5b)$ D) $(2a^2+b)(b-5a)$
E) $(ab+5)(2a-3b)$

2. (98-8-18) Ushbu $2n^2-3an-10n+15a$ ko'phadni ko'paytuvchilarga ajrating.
A) $(5-n)(3a-2n)$ B) $(5+n)(2n-3a)$
C) $(3a-n)(5-2n)$ D) $(2n+3a)(n+5)$
E) $(2n-5)(n+3a)$

3. (00-6-9) Ko'paytuvchilarga ajrating.

$$b^2+ab-2a^2-b+a$$

A) $(a-b)(2a-b)$ B) $(a+b)(2a-b-1)$
C) $(a-b)(2a-b-1)$ D) $(b-2a)(a-b+1)$
E) $(b-a)(2a+b-1)$

4. (00-6-18) $4y(5x-y)-(5x-2)(5x+2)$ ning eng katta qiymatini toping.
A) 10 B) 5 C) 4 D) 2 E) mavjud emas

5. (97-1-13) Ko'paytuvchilarga ajrating.

$$1-(2x-3)^2$$

A) $2(x+2)(x+1)$ B) $3(x-2)(x+1)$
C) $4(2-x)(x-1)$ D) $2(1-x)(x-2)$
E) $(2-3x)(x-1)$

6. (97-3-18) Ko'paytuvchilarga ajrating.

$$(x^2+1)^2-4x^2$$

A) $(x^2+1)\cdot(x-1)^2$ B) $x^2(x^2-2)$
C) $(x-1)^2\cdot(x+1)^2$ D) $(x-2)^2\cdot(x^2+1)$
E) $(x+2)^2(x-2)^2$

7. (97-6-13) Ushbu $9-(2c-1)^2$ ifodani ko'paytuvchilarga ajrating.
A) $2(c-1)(c+2)$ B) $4(c-2)(c+1)$
C) $(3c-1)(c+4)$ D) $(2c+1)(4c-3)$
E) $4(c+1)(2-c)$

8. (97-7-18) Ko'paytuvchilarga ajrating.

$$(a^2+4)^2-16a^2$$

A) $(a^2+2)(a^2-2)$ B) $(a+2)^2(a-2)^2$
C) $a^2(4+a^2)$ D) $(a^2-2)(a+2)^2$
E) $(a-4)^2(a+4)^2$

9. (97-10-18) Ko'paytuvchilarga ajrating.

$$(x^2+9)^2-36x^2$$

A) $(x^2-5)(x^2+4)$ B) $(x-3)^2\cdot(x+3)^2$
C) $(x-6)^2\cdot(x+6)^2$ D) $x^2(x^2-6)$
E) $(x^2-3)\cdot(x+3)^2$

10. (97-11-13) Ifodani ko'paytuvchilarga ajrating.

$$1-(8a-3)^2$$

A) $8(4a+1)\cdot(1-2a)$ B) $(16a-1)\cdot(4a-3)$
C) $4(2a+1)\cdot(4a-1)$ D) $4(a-2)\cdot(a+3)$
E) $8(1-2a)\cdot(4a-1)$

11. (98-2-9)* Ifodaning eng kichik qiymatini toping.

$$p^2-16p\,q+64q^2-12$$

A) -10 B) -12 C) -11 D) -13 E) -8

12. (99-4-17)* Ifodaning eng kichik qiymatini toping.

$$(2a-1)\,(2a+1)+3b\,(3b-4a)$$

A) -1 B) 0 C) -2 D) 1 E) $-0,5$

13. (99-4-16)* Ifodani ko'paytuvchilarga ajrating.

$$(a+b+2)\cdot(a+b)-(a-b)^2+1$$

A) $(a+b)(2a-1)$ B) $(a+1)(b+1)$ C) $2b\,(a+1)$
D) $(a+1)(2b+1)$ E) $(2b+1)(2a+1)$

14. (99-10-7)* Ko'paytuvchilarga ajrating.

$$a^5+a^4-2a^3-2a^2+a+1$$

A) $(a+1)^2\cdot(a-1)^3$ B) $(a+1)^3\cdot(a-1)^2$
C) $(a+1)^4\cdot(a-1)$ D) $(a+1)\cdot(a-1)^4$
E) $(a^2+1)^2\cdot(a-1)$

15. (96-7-18) Ko'paytuvchilarga ajrating.

$$(a^2+16)^2-64a^2$$

A) $(a^2-8)\cdot(a^2+4)$ B) $(a-2)^2\cdot(a+2)^2$
C) $(a-4)^2\cdot(a+4)^2$ D) $a^2\cdot(a^2-60)$
E) $(a-8)^2\cdot(a+8)^2$

16. (97-4-19) Ushbu

$$b^7x-b\,x^7$$

ifodani ko'pi bilan nechta ko'paytuvchiga ajratish mumkin?
A) 8 ta B) 7 ta C) 4 ta D) 9 ta E) 6 ta

17. (97-5-16)* Ko'paytuvchilarga ajrating.

$$x^4+x^2+1$$

A) $(x^2+x+1)(x^2+x-1)$
B) $(x^2+x+1)(x^2-x+1)$
C) $(x^2+x+1)(x^2-x-1)$
D) $(x^2+x+1)(-x^2+x-1)$
E) ko'paytuvchilarga ajratib bo'lmaydi

18. (99-9-9)* Ushbu

$$x^{12}-1$$

ifodani ko'paytuvchilarga ajratganda, nechta ratsional ko'paytuvchilardan iborat bo'ladi?
A) 4 B) 5 C) 6 D) 8 E) 7

19. (00-5-25)* Ko'paytuvchilarga ajrating.

$$a^3+9a^2+27a+19$$

A) $(a+1)(a^2-3a+19)$
B) $(a+1)(a^2+3a+19)$
C) $(a+1)(a^2+8a+19)$
D) $(a-1)(a^2+3a+19)$
E) $(a-1)(a^2+8a+19)$

20. (00-10-77)* Ko'phadni ko'paytuvchilarga ajrating.

$$(x-y)^3-(z-y)^3+(z-x)^3$$

A) $3(x-y)(y-z)(x-z)$
B) $-3(x-y)(z-y)(x-z)$
C) $3(y-x)(y-z)(z-x)$
D) $-3(x-y)(z-y)(z-x)$
E) ko'paytuvchilarga ajralmaydi

21. (01-8-8) Ushbu

$$(a+b)(a+b+2)-(a-b)(a-b-2)$$

ni ko'paytuvchilarga ajrating.
A) $2(a+b)(b+1)$ B) $4a(b+1)$
C) $2a(b-1)$ D) $4a(b-1)$
E) $(2a+1)(b-1)$

22. (03-4-7)* Agar $m-n$ ratsional son, mn, m va n lar esa irratsional sonlar bo'lsa, quyidagilardan qaysi biri ratsional son bo'ladi?
A) $m-2n$ B) m^2n-mn^2 C) $m^3-n^3-3mn(m-n)$
D) $2m-n$ E) $3m-5n$

23. (03-5-14)* $x^3-3x^2-4x+12$ ko'phad quyidagilarning qaysi biriga bo'linmaydi?
A) $x+3$ B) $x-3$ C) $x+2$
D) $x-2$ E) x^2-x-6

24. (03-6-9)* 7^6-27 soni quyidagilarning qaysi biriga qoldiqsiz bo'linadi?
A) 51 B) 49 C) 45 D) 23 E) 13

25. (03-7-14)* 7^6+27 soni quyidagilarning qaysi biriga qoldiqsiz bo'linadi?
A) 51 B) 49 C) 45 D) 23 E) 13

26. (03-8-35)* $(a+b+c)(ab+bc+ac)-abc$ ni ko'paytma shaklida yozing.
A) $(a+b)(b+c)(a+c)$ B) $a^2+b^2+c^2$
C) $(a+b)(b+c)(a-c)$ D) $a^2+b^2-c^2$ E) 0

1.3.4 Ayniyatlarni isbotlash. Ifodalarni soddalashtirish.

(97-10-19) Soddalashtiring:

$$\Big(\frac{3a}{a+6}-\frac{2a}{a^2+12a+36}\Big):\frac{3a+16}{a^2-36}+\frac{6(a-6)}{a+6}$$

A) 6 B) $\frac{6}{a+6}$ C) $\frac{1}{a-6}$ D) $a+6$ E) $a-6$

Yechish: Qavs ichidagi kasrlarni umumiy maxrajga keltiramiz:

$$\frac{3a}{a+6}-\frac{2a}{a^2+12a+36}=\frac{3a}{a+6}-\frac{2a}{(a+6)^2}=$$

$$=\frac{3a^2+18a-2a}{(a+6)^2}=\frac{3a^2+16a}{(a+6)^2}$$

Birinchi kasrning suratini soddalashtirib, ko'paytuvchilarga ajratamiz va keyingi amallarni bajaramiz:

$$\frac{a(3a+16)}{a+6}\cdot\frac{(a-6)(a+6)}{3a+16}+\frac{6(a-6)}{a+6}=$$

$$=\frac{a(a-6)}{a+6}+\frac{6(a-6)}{a+6}=\frac{(a-6)(a+6)}{a+6}=a-6.$$

J: $a-6$ (E).
(97-9-80) Hisoblang:

$$\frac{1000^3+3\cdot1000\cdot995\cdot1995+995^3}{1000^2+2\cdot1000\cdot995+995^2}$$

A) 1995 B) 195 C) 995 D) 2195 E) 895

Yechish: $a^3+3a^2b+3ab^2+b^3=(a+b)^3$ va $a^2+2ab+b^2=(a+b)^2$ ekanidan foydalanib,

$$\frac{1000^3+3\cdot1000\cdot995\cdot1995+995^3}{1000^2+2\cdot1000\cdot995+995^2}=$$

$$=\frac{1000^3+3\cdot1000^2\cdot995+3\cdot1000\cdot995^2+995^3}{(1000+995)^2}=$$

$=\frac{(1000+995)^3}{1995^2}=1995$ ni hosil qilamiz. **J** : 1995 (A).

1. (96-3-21) Kasrni qisqartiring:

$$\frac{x^2-3xy}{9y^2-x^2}$$

A) $\frac{x}{x+3y}$ B) $-\frac{x}{x+3y}$ C) $\frac{x}{x-3y}$ D) $-\frac{x}{x-3y}$ E) $\frac{y}{x+3y}$

2. (96-3-74) Soddalashtiring:

$$\frac{x^3+2x^2+x}{(x+1)^2}$$

A) $2x$ B) $x+1$ C) $x+2$ D) x E) $x-1$

3. (96-11-22) Kasrni qisqartiring:

$$\frac{a^2-2ab}{4b^2-a^2}$$

A) $\frac{a}{a+2b}$ B) $\frac{a}{a-2b}$ C) $-\frac{a}{a+2b}$ D) $-\frac{a}{a-2b}$ E) $-\frac{b}{a+2b}$

4. (96-12-22) Kasrni qisqartiring:

$$\frac{x^2+3xy}{9y^2-x^2}$$

A) $\frac{x}{x+3y}$ B) $-\frac{x}{x+3y}$ C) $\frac{x}{x-3y}$ D) $\frac{y}{3y-x}$ E) $\frac{x}{3y-x}$

5. (99-8-20) Ifodani soddalashtiring.

$$5\cdot4^{2n-3}-20\cdot\left(2^{n-2}\right)^4$$

A) 2 B) 4^{2n} C) 4 D) 2^{n-1} E) 0

6. (98-6-12)* Qisqartiring.

$$\frac{x^{2\pi}-y^{2\pi}}{x^{\pi}+y^{\pi}}$$

A) x^2+y^2 B) x^2-y^2 C) $x-y$ D) $x^{\pi}-y^{\pi}$ E) 0

7. (98-7-25) Soddalashtiring.

$$\frac{2^{5n-3}\cdot2^{3n+2}}{2^{4n-1}}$$

A) 2^{3n} B) 2^{4n+1} C) 2^{4n+2} D) 2^{5n} E) 2^{4n}

8. (98-11-9) Qisqartiring.

$$\frac{x^6-x^4}{x^3+x^2}$$

A) x^3-x^2+1 B) x^3+x^2+1 C) x^3-x^2
D) x^3+x^2 E) x^3+1

9. (98-12-24) Soddalashtiring.

$$\frac{3^{4n+3}\cdot3^{3n-2}}{3^{2n-1}}$$

A) 3^{5n+2} B) 3^{5n+3} C) 3^{5n+1}
D) 3^{5n-1} E) 3^{5n+4}

10. (99-8-23) $a=\frac{1}{2b}$ bo'lsa, a^2b^2-ab+1 ifodaning qiymatini toping.
A) $\frac{3}{4}$ B) $1\frac{1}{2}$ C) 1 D) $1\frac{1}{4}$ E) 2

11. (00-8-54) Qisqartiring.

$$\frac{a^8-a^4}{a^4+a^2}$$

A) a^6 B) a^4-a^2 C) a^4-1
D) a^4+a^2 E) a^2-a^4

12. (99-1-10) Soddalashtiring.

$$\frac{p-q}{p^3\cdot q^2}-\frac{p+q}{p^2\cdot q^3}$$

A) $-\frac{p^2+q^2}{p^3\cdot q^3}$ B) $\frac{2pq-p^2-q^2}{p^3\cdot q^3}$ C) $-\frac{2}{p^3\cdot q^2}$
D) $-\frac{2}{p^3\cdot q-p^2\cdot q^2}$ E) 0

13. (99-1-11) Soddalashtiring.

$$\frac{x^2-y^2}{2xy}:\frac{x+y}{2x}$$

A) $\frac{x-y}{y}$ B) $\frac{x-y}{y(1+y)}$ C) $\frac{(x-y)^2}{y(x+y)}$
D) $\frac{1}{y}$ E) $\frac{x}{y}$

14. (99-6-5) Soddalashtiring.

$$\left(\frac{-16x^{31}}{9y^3}\right)^3 : \left(\frac{8x^{23}}{3y^2}\right)^4$$

A) $\frac{-y}{x}$ B) $\frac{-x}{y}$ C) $\frac{x}{9y}$
D) $\frac{-y}{9x}$ E) $\frac{-x}{9y}$

15. (96-6-12) Ushbu
1. $-\frac{a-1}{a+b} = \frac{a+1}{a+b}$ 2. $-\frac{a-1}{a+b} = \frac{-a-1}{a+b}$
3. $-\frac{a-1}{a+b} = \frac{1-a}{a+b}$ 4. $-\frac{a-1}{a+b} = -\frac{1-a}{a-b}$
tengliklardan qaysi biri aniyat?
A) 1 B) 2 C) 3 D) 4 E) hech biri

16. (97-8-12) Quyidagi keltirilgan tengliklardan qaysi biri ayniyat?
A) $\frac{m^3-n^3}{m+n} = m^2+mn+n^2$
B) $2mn - n^2 - m^2 = (m+n)^2$
C) $m-(m-n)-(m-n) = 2n-m$
D) $-\frac{m-n}{n} = \frac{-m-n}{n}$ E) $m^3n^3 = (mn)^9$

17. (97-12-11) Quyidagi keltirilgan tengliklardan qaysi biri ayniyat?
1) $\frac{p^2-q^2}{p^2+q^2} = -\frac{p^2-q^2}{q^2-p^2}$
2) $\frac{p^2-q^2}{p^2+q^2} = -\frac{p^2-q^2}{p^2+q^2}$
3) $-\frac{p^2+q^2}{p^2-q^2} = \frac{p^2+q^2}{q^2-p^2}$
4) $-\frac{p^2-q^2}{q^2-p^2} = \frac{p^2-q^2}{p^2+q^2}$
A) 1 B) 2 C) 3 D) 4
E) bularning ichida ayniyat yo'q

18. (96-1-23) Soddalashtiring.

$$\left(x - \frac{1+x^2}{x-1}\right) : \frac{x^2+2x+1}{x-1}$$

A) -1 B) $\frac{1}{x+1}$ C) $\frac{x-2}{(x+1)^2}$ D) $-\frac{1}{x+1}$ E) 0

19. (96-7-19) Soddalashtiring.

$$\left(\frac{5m}{m+3} - \frac{14m}{m^2+6m+9}\right) : \frac{5m+1}{m^2-9} + \frac{3\cdot(m-3)}{m+3}$$

A) $\frac{3}{m+3}$ B) 3 C) $m-3$ D) 1 E) $\frac{m-3}{m+3}$

20. (96-9-15) Soddalashtiring.

$$\frac{1-x^{-1}+x^{-2}}{1-x+x^2}$$

A) 1 B) x^2 C) $\frac{1}{x^2}$ D) $1-\frac{1}{x}$ E) $1+\frac{1}{x}$

21. (96-9-74) Soddalashtiring.

$$\left(m^2 - \frac{1+m^4}{m^2-1}\right) : \frac{m^2+1}{m+1}$$

A) $m-1$ B) $\frac{1}{m-1}$ C) $\frac{1}{m+1}$ D) 1 E) $\frac{1}{1-m}$

22. (96-10-24) Soddalashtiring.

$$\left(b^2 - \frac{1+b^4}{b^2+1}\right) : \frac{1-b}{1+b^2}$$

A) 1 B) -1 C) $b-1$ D) $\frac{1}{b+1}$ E) $-b-1$

23. (96-12-72) Soddalashtiring.

$$\frac{x^3+x^2+x+1}{x^2+1}$$

A) $x-1$ B) x C) $2x$ D) $x+1$ E) $x+2$

24. (96-13-15) Soddalashtiring.

$$\left(x^{-1}+y^{-1}\right)\cdot\frac{xy}{(x+y)^2}$$

A) 1 B) $\frac{x^2\cdot y^2}{(x+y)^3}$ C) $x^2\cdot y^2$ D) $\frac{1}{x+y}$ E) $\frac{1}{(x+y)^2}$

25. (97-2-12) Quyidagilarning qaysi biri ayniyat?
1) $2a^2-4ab+2b^2 = -(a-b)^2$
2) $\frac{-(x^3-y^3)}{x^2+xy+y^2} = x-y$
3) $-(a-b+c) = -a+b-c$
4) $-\frac{a^2-1}{b} = \frac{a^2-1}{b}$
A) 1 B) 2 C) 3 D) 4 E) hech biri ayniyat emas

26. (97-3-19) Soddalashtiring.

$$\left(\frac{3a}{a-4} + \frac{10a}{a^2-8a+16}\right) : \frac{3a-2}{a^2-16} - \frac{4(a+4)}{a-4}$$

A) $a+4$ B) 4 C) $-\frac{4}{a+4}$ D) $\frac{1}{a-4}$ E) $4-a$

27. (97-4-21) Soddalashtiring.

$$\frac{a^{-3}+b^{-3}}{a^2-ab+b^2}\cdot a^3\cdot b^3$$

A) $(a+b)^2$ B) 1 C) ab D) $a-b$ E) $a+b$

28. (97-7-19) Soddalashtiring.

$$\left(\frac{2x}{x-5} + \frac{x}{x^2-10x+25}\right) : \frac{2x-9}{x^2-25} - \frac{5(x+5)}{x-5}$$

A) 5 B) $\frac{x+5}{x-5}$ C) $\frac{5}{x+5}$ D) $\frac{1}{x-5}$ E) $5+x$

29. (98-1-21) Soddalashtiring.

$$\left(\frac{4a}{4-a^2} - \frac{a-2}{4+2a}\right)\cdot\frac{4}{a+2} - \frac{a}{2-a}$$

A) -1 B) $\frac{2a}{2-a}$ C) $\frac{3+a}{2-a}$ D) 1 E) 2

30. (98-2-8) Soddalashtiring.

$$\frac{x^3-8}{x^2+2x+4} - \frac{x^2-4}{x-2}$$

A) 4 B) $2x$ C) $-2x$ D) 0 E) -4

31. (98-2-29) Ushbu

$$\frac{x^{-3}+8}{x^{-2}-2x^{-1}+4}$$

ifodaning $x = 0,5$ dagi qiymatini hisoblang.
A) 4,5 B) 3 C) 4 D) 5 E) 6

32. (98-8-21) Soddalashtiring.

$$\frac{x}{1-x} - \frac{1-x^2}{1+x^2}\cdot\left(\frac{1}{(x-1)^2} - \frac{x}{1-x^2}\right)$$

A) 1 B) -1 C) $\frac{x+1}{}$ D) $\frac{1}{}$ E) $\frac{2x-1}{}$

33. (98-9-7) Soddalashtiring.

$$\frac{a^2+ab+b^2}{a^3-b^3}-\frac{a^2-ab+b^2}{a^3+b^3}$$

A) $\frac{2b}{b^2-a^2}$ B) $\frac{2a}{a^2-b^2}$ C) $\frac{2b}{a^2-b^2}$
D) $\frac{2a}{b^2-a^2}$ E) $\frac{b}{a^2-b^2}$

34. (98-10-12) Soddalashtiring.

$$\frac{x^3+y^3}{x^2-xy+y^2}-\frac{x^2-y^2}{x+y}$$

A) $2x$ B) $2y$ C) $-2y$ D) $-2x$ E) $2x-2y$

35. (99-4-26) Ifodani soddalashtiring.

$$\frac{5x+6}{x^2-4}-\frac{x}{x^2-4}:\frac{x}{x-2}-\frac{x+2}{x-2}$$

A) 1 B) -1 C) $\frac{x-2}{x+2}$ D) $\frac{x^2+4}{4-x^2}$ E) $\frac{1}{x+2}$

36. (99-9-19) Soddalashtiring.

$$\Big(\frac{1}{a(a+1)}+\frac{1}{(a+1)(a+2)}\Big)\cdot\frac{a^2+2a}{8}$$

A) $\frac{1}{6}$ B) $\frac{1}{8}$ C) $\frac{3}{4}$ D) $\frac{1}{4}$ E) $\frac{5}{8}$

37. (00-3-16) Soddalashtiring.

$$\Big(\frac{a^2-4}{a^2+4}\Big)^2+\Big(\frac{4a}{a^2+4}\Big)^2$$

A) $a-4$ B) 2 C) $\frac{a^2-4}{a^2+4}$ D) $\frac{a-4}{a+4}$ E) 1

38. (00-5-26) Soddalashtiring.

$$\frac{x^3-2x^2}{3x+3}:\frac{x^2-4}{3x^2+6x+3}$$

A) $\frac{x(x+1)}{x+2}$ B) $\frac{x^2(x+1)}{x+2}$ C) $\frac{x^2(x-1)}{x+2}$
D) $\frac{x^2(x-2)}{x+2}$ E) $\frac{x^2(x+1)}{x-2}$

39. (00-6-15) Soddalashtiring.

$$\Big(\frac{1}{m^2-m}-\frac{1}{m-1}\Big)\cdot\frac{m}{m+2}+\frac{m}{m^2-4}$$

A) $\frac{2m-2}{m^2-4}$ B) $\frac{m}{m-2}$ C) $\frac{2}{m^2-4}$ D) $\frac{1}{m+2}$ E) $\frac{2m+1}{4-m^2}$

40. (00-7-13) Soddalashtiring.

$$(a^3-3a^2b+3ab^2-b^3)\cdot(a+b):\Big(\frac{a^3+b^3}{a+b}-ab\Big)$$

A) b^2-a^2 B) a^2-b^2 C) $(a-b)^2$
D) $(a+b)^2$ E) a^2+b^2

41. (00-10-6)* Kasrni qisqartiring.

$$\frac{x^{16}-x^8+1}{x^{24}+1}$$

A) $\Big[(x^2)^4+1\Big]^{-1}$ B) $\Big[(x^2)^3+1\Big]^{-1}$
C) $\Big[(x^2)^{-4}+1\Big]^{-1}$ D) $\Big[(x^2)^{-3}+1\Big]^{-1}$
E) $\Big[(x^3)^{-2}+1\Big]^{-1}$

42. (00-10-12) Soddalashtiring.

$$\frac{5\cdot2^{k-2}+10\cdot2^{k-1}}{10^{k+2}}$$

A) $4^{-1}\cdot5^{-k}$ B) $4^{-2}\cdot5^{-k}$ C) $4\cdot5^{-k}$
D) $2^{-1}\cdot5^{-k}$ E) $2\cdot5^{-k}$

43. (00-10-74) Kasrni qisqartiring.

$$\frac{2^{m+1}+2^{-m+1}}{(4^m+1)(3^{m+2}+3^{m+1})}$$

A) $0,5\cdot6^{-m}$ B) $\Big(\frac{2}{3}\Big)^m$ C) 6^{-m-1}
D) 3^m E) 2^m

44. (97-2-6) Ushbu $\frac{12-3n}{n}$ ifoda n ning nechta natural qiymatida natural son bo'ladi?
A) 6 B) 3 C) 5 D) 4 E) 2

45. (97-4-10) $n(n\in N)$ ning $\frac{5n^4+4n^2+8}{n^2}$ kasr butun son bo'ladigan barcha qiymatlarini toping.
A) 1 B) $1;2$ C) 2 D) $1;2;4$ E) $2;4$

46. (97-8-6) $\frac{10n-24}{n}$ ifoda natural son bo'ladigan n ning natural qiymatlari nechta?
A) 4 B) 7 C) 6 D) 5 E) 8

47. (97-9-70) $n(n\in N)$ ning $\frac{5n^3+6n^2+7n}{n}$ kasr natural son bo'ladigan barcha qiymatlarini toping.
A) $1;2;3$ B) $n\in N$ C) $1;2;3;6$
D) $1;2;5$ E) $1;2;4;8$

48. (97-12-5) Ifoda natural son bo'ladigan n ning barcha natural qiymatlari nechta?

$$\frac{16n^2-128}{n^2}$$

A) 5 B) 3 C) 2 D) 6 E) 7

49. (98-1-11) Ushbu $\frac{2n-3}{n+1}$ ifoda n ning nechta natural qiymatida butun son bo'ladi?
A) 4 B) 3 C) 2 D) 1 E) hech bir qiymatida

50. (98-8-11) Ushbu $\frac{3n-1}{n+2}$ ifoda n ning nechta butun qiymatida natural son bo'ladi?
A) 1 B) 3 C) 4 D) 2 E) hech bir qiymatida

51. (96-6-6) $\frac{6n-12}{n}$ ifoda n ning nechta natural qiymatida natural son bo'ladi?
A) 6 B) 5 C) 3 D) 2 E) 4

52. (98-10-3) Ushbu $\frac{n^2-12}{n}$ ifoda natural son bo'ladigan n ning barcha natural qiymatlari yig'indisini toping.
A) 22 B) 7 C) 11 D) 20 E) 18

53. (01-2-14) Soddalashtiring.

$$\frac{a^2+\frac{1}{a}}{a+\frac{1}{a}-1}$$

A) $a-1$ B) a^2-a+1 C) a^2+a+1
D) $a+1$ E) a^2+a-1

54. (01-3-30) Soddalashtiring.

$$\frac{2^{5n+3}\cdot 2^{3n-4}}{2^{4n+1}}$$

A) 2^{4n-1} B) 2^{n-2} C) 2^{2n-2} D) 2^{4n+1} E) 2^{4n-2}

55. (01-5-4) Soddalashtiring.

$$\frac{x^3+y^3}{x+y}:(x^2-y^2)+\frac{2y}{x+y}-\frac{xy}{x^2-y^2}$$

A) 1 B) $\frac{xy}{x^2-y^2}$ C) $\frac{y}{x+y}$ D) $\frac{x^2+y^2}{x^2-y^2}$ E) $\frac{x}{x^2-y^2}$

56. (01-5-6) Soddalashtiring.

$$\frac{x}{x^2+y^2}-\frac{y\cdot(x-y)^2}{x^4-y^4}$$

A) $\frac{1}{x+y}$ B) $\frac{1}{x-y}$ C) $x+y$ D) $x-y$ E) $2xy$

57. (01-6-8) Ushbu

$$\frac{n^3-4n^2-12}{n}(n\epsilon N)$$

kasrning barcha natural qiymatlar yig'indisini toping.
A) 102 B) 105 C) 104 D) 106 E) 103

58. (01-6-9) Agar $a=7+\sqrt{3}$ va $b=7-\sqrt{3}$ bo'lsa

$$\frac{a^3-b^3}{a^2-b^2}:\frac{a^2+ab+b^2}{a^3+3a^2b+3ab^2+b^3}$$

ning qiymatini hisoblang.
A) 192 B) 198 C) 196 D) 194 E) 190

59. (01-6-10) Soddalashtiring.

$$\Big(2a+\frac{2ab}{a-b}\Big)\Big(\frac{ab}{a+b}-a\Big):\frac{4,5a^2}{a^2-b^2}$$

A) $\frac{4a^2}{9}$ B) $-\frac{2a^2}{9}$ C) $\frac{2a^2}{9}$ D) $-\frac{4a^2}{9}$ E) $-\frac{a^2}{9}$

60. (01-7-7) n ning nechta butun qiymatida $\frac{n^2-n+3}{n+1}$ kasr butun son bo'ladi?
A) 1 B) 2 C) 3 D) 4 E) 6

61. (01-8-18) Soddalashtiring.

$$\frac{a^2}{a^2-1}+\frac{1}{a+1}:\Big(\frac{1}{2-a}+\frac{2}{a^2-2a}\Big)$$

A) $\frac{a}{a^2-1}$ B) $\frac{1}{a-1}$ C) $\frac{2a^2-a}{a^2-1}$ D) 1 E) $\frac{a}{a+1}$

62. (01-11-6) Ushbu

$$\frac{a^3+b^3}{a^2-ab+b^2}\cdot(a-b)\frac{a^3-b^3}{a^2+ab+b^2}\cdot(a+b)$$

ning $a=\sqrt{8}$ va $b=\sqrt{2}$ bo'lgandagi qiymatini hisoblang.
A) 34 B) 36 C) 32 D) 38 E) 30

63. (01-11-30) Ushbu

$$\frac{4^{a+1}-2^{2a-1}}{2^{2a}}$$

ning qiymati 9 dan qancha kam?
A) 4 B) $3,5$ C) 3 D) $4,5$ E) $5,5$

64. (02-1-9)

$$\frac{m^4-16}{m^4-4m^3+8m^2-16m+16}$$

kasrni qisqartiring.
A) $(m+2)\cdot(m-2)^{-1}$
B) $(m-2)\cdot(m+2)^{-1}$
C) $(m+2)\cdot(m-3)^{-1}$
D) $(m-3)\cdot(m+2)^{-1}$
E) $(m-2)\cdot(m-3)^{-1}$

65. (02-1-39) Agar $\frac{x}{y}=2$ bo'lsa, x^2-4y^2 nimaga teng?
A) 4 B) 8 C) 0 D) -8 E) -4

66. (02-3-15)

$$a^2b^2\Big(\frac{1}{(a+b)^2}\cdot\Big(\frac{1}{a^2}+\frac{1}{b^2}\Big)+\frac{2}{(a+b)^3}\cdot\Big(\frac{1}{a}+\frac{1}{b}\Big)\Big)$$

ni soddalashtiring.
A) 1 B) $\frac{1}{a+b}$ C) 2 D) $\frac{2}{a+b}$ E) $\frac{1}{(a+b)^2}$

67. (02-6-2) Agar $a+b+c=0$ bo'lsa, $a^3+a^2c-abc+b^2c+b^3$ ifodaning qiymatini toping.
A) 0 B) 1 C) 2 D) -1 E) -2

68. (02-6-7) Agar $a_1+a_2+a_3+....+a_{2001}=0$ bo'lsa, $1\cdot(a_1-a_2)+2\cdot(a_2-a_3)+3\cdot(a_3-a_4)+...+$ $+2000\cdot(a_{2000}-a_{2001})+2001a_{2001}$ ning qiymatini hisoblang.
A) 0 B) 5050 C) 1 D) $1001\cdot1000$ E) $2001\cdot1001$

69. (02-8-2)

$$\frac{1-b^{-1}+b^{-2}}{1-b+b^2}$$

ni soddalashtiring.
A) b^{-1} B) b^{-2} C) b^2 D) $b+1$ E) $b-1$

70. (02-9-14)

$$\Big(\frac{2}{1-x^2}-\frac{2}{(x-1)^2}\Big)\cdot(1-x)^2-\frac{4}{1+x}$$

ni soddalashtiring.
A) 4 B) -4 C) 0 D) $\frac{1-x}{1+x}$ E) $-\frac{2}{1+x}$

71. (02-10-41)

$$\frac{abc}{bc+ac-ab}-\Big(\frac{a-1}{a}+\frac{b-1}{b}-\frac{c-1}{c}\Big):$$

$$:\Big(\frac{1}{a}+\frac{1}{b}-\frac{1}{c}\Big)$$

ni soddalashtiring.
A) 1 B) 0 C) $\frac{1}{c}$ D) $\frac{2}{c}$ E) $\frac{1}{a}$

72. (03-4-10)

$$\Big(\frac{a+x}{a}-\frac{x-y}{x}\Big)\cdot\frac{a^2}{x^2+ay}:\frac{a}{8x}$$

ni soddalashtiring.
A) 10 B) 6 C) 7 D) 8 E) 9

73. (03-6-7)

$$\frac{x^3y+2x^2y-3xy}{x^3+5x^2+6x}:\frac{1-x^2}{x^2+3x+2}$$

ni soddalashtiring.
A) $\frac{y}{x}$ B) $-x$ C) $-y$ D) x E) y

74. (03-7-10)

$$\frac{x^3y+2x^2y-3xy}{x^3+5x^2+6x}:\frac{x^2-1}{x^2+3x+2}$$

ni soddalashtiring.
A) $\frac{y}{x}$ B) $-x$ C) $-y$ D) x E) y

75. (03-10-10) a ning nechta butun qiymatida

$$\frac{a^4-9}{a^3-3a}:\frac{a^3+3a}{a-5a^2}$$

ifodaning qiymati butun son bo'ladi?
A) 2 B) 3 C) 1 D) 4 E) 5

76. (03-11-71)

$$\frac{5a}{3(4-a)}+\frac{a+4}{8-3a}\cdot\Big(\frac{a-1}{a+4}-\frac{a-3}{a-4}\Big)$$

ifodaning $a=-0,2$ bo'lgandagi qiymatini hisoblang.
A) $-\frac{7}{9}$ B) 0 C) $-\frac{5}{9}$ D) $\frac{2}{3}$ E) $-\frac{1}{18}$

77. (96-1-13) Hisoblang.

$$\frac{1^2-0,4^2}{2,8\cdot0,4-2,8}$$

A) $\frac{1}{2}$ B) $-\frac{1}{2}$ C) -5 D) 5 E) $\frac{1}{7}$

78. (00-6-5) Soddalashtiring.

$$\frac{1,6^2-1,6\cdot0,8+0,4^2}{1,4^2-0,2^2}$$

A) 1,6 B) 0,375 C) 1,2 D) 0,6 E) 0,75

79. (96-3-66)* Hisoblang.

$$\Big(1-\frac{1}{2^2}\Big)\cdot\Big(1-\frac{1}{3^2}\Big)\cdot\ldots\cdot\Big(1-\frac{1}{100^2}\Big)$$

A) $\frac{8751}{9900}$ B) $\frac{143}{200}$ C) $\frac{441}{600}$ D) $\frac{101}{200}$ E) $\frac{151}{300}$

80. (96-9-6)* Hisoblang.

$$\Big(1-\frac{1}{5^2}\Big)\cdot\Big(1-\frac{1}{6^2}\Big)\cdot\ldots\cdot\Big(1-\frac{1}{103^2}\Big)$$

A) $\frac{64}{103}$ B) $\frac{67}{103}$ C) $\frac{69}{103}$ D) $\frac{415}{515}$ E) $\frac{416}{515}$

81. (96-9-63) Hisoblang.

$$\frac{0,2^2+2\cdot0,2\cdot0,3+0,3^2}{0,5\cdot0,4-0,5\cdot0,6}$$

A) -25 B) $-2,5$ C) -1 D) 0,25 E) 10

82. (96-10-13) Hisoblang.

$$\frac{4,5^2-1,5^2}{0,3\cdot0,7-0,3}$$

A) -20 B) 20 C) 200 D) -2 E) -200

83. (96-12-64)* Hisoblang.

$$\Big(1-\frac{1}{3^2}\Big)\cdot\Big(1-\frac{1}{4^2}\Big)\cdot\ldots\cdot\Big(1-\frac{1}{101^2}\Big)$$

A) $\frac{157}{303}$ B) $\frac{142}{303}$ C) $\frac{65}{101}$ D) $\frac{64}{101}$ E) $\frac{68}{101}$

84. (96-13-6)* Hisoblang.

$$\Big(1-\frac{1}{4^2}\Big)\cdot\Big(1-\frac{1}{5^2}\Big)\cdot\ldots\cdot\Big(1-\frac{1}{102^2}\Big)$$

A) $\frac{251}{408}$ B) $\frac{331}{408}$ C) $\frac{71}{102}$ D) $\frac{103}{136}$ E) $\frac{111}{136}$

85. (97-4-20) Hisoblang.

$$779^3+3\cdot779^2\cdot221+3\cdot779\cdot221^2+221^3+10$$

A) 10000010 B) 1000010 C) 1000000010
D) 100000010 E) 100010

86. (98-7-10) Hisoblang.

$$\frac{(3,7^2-6,3^2)\cdot(13^2-12,6^2)}{(4,2^2-5,8^2)\cdot(2,3^2-0,3^2)}$$

A) 32 B) 0,32 C) 3,2 D) $\frac{1}{32}$ E) $\frac{5}{16}$

87. (98-8-9) Ifodaning qiymatini hisoblang.

$$\frac{0,5^2-0,5}{0,4^2+2\cdot0,04+0,1^2}$$

A) 1 B) -1 C) $-0,1$ D) 10 E) -2

88. (98-1-9) Ifodaning qiymatini hisoblang.

$$\frac{0,2^2-2\cdot0,06+0,3^2}{0,5\cdot0,9-0,5}$$

A) 0,2 B) -2 C) $-0,2$ D) 0,25 E) -1

89. (98-12-9) Hisoblang.

$$\frac{(5,2^2-4,8^2)\cdot(16,7^2-6,7^2)}{(12^2-11,4^2)\cdot(6,4^2-3,6^2)}$$

A) $2\frac{8}{21}$ B) $\frac{21}{50}$ C) $1\frac{8}{21}$ D) $\frac{7}{50}$ E) $7\frac{1}{7}$

90. (99-6-6) Hisoblang.

$$(202^2-54^2+256\cdot352):(4^4\cdot10^2)$$

A) 4 B) 1 C) 2 D) 5 E) 10

91. (97-4-14) Agar $x = 4,5$ va $y = 3,5$ bo'lsa,

$$x^3 - x^2y - xy^2 + y^3$$

ni hisoblang.
A) 10 B) 9,5 C) 8 D) 7,2 E) 11

92. (97-9-74)* Agar $x = 71,8$ va $y = 70,8$ bo'lsa,

$$x^3 - y^3 - 2y^2 - 3y - 1 + x^2 - 2xy$$

ni hisoblang.
A) 1 B) 21 C) 79 D) 87,5 E) 92,1

93. (99-7-2) Hisoblang.

$$889^3 + 3000 \cdot 889 \cdot 111 + 111^3 + 889 + 111$$

A) 10001000 B) 1001000 C) 1001001000
D) 1000001000 E) 1001011000

94. (00-5-3) Hisoblang.

$$\frac{(25^2 - 21^2)(25^2 + 21 \cdot 25 + 21^2)}{25^3 - 21^3}$$

A) 4 B) 46 C) 36 D) 54 E) 84

95. (01-8-5) Soddalashtiring.

$$\frac{0,6 \cdot 0,8 + 0,6 \cdot 1,2}{0,2^2 - 0,4^2}$$

A) -10 B) 10 C) $-0,1$ D) -100 E) 0,1

96. (02-3-11)

$$\frac{2,71^4 - 1,29^4}{(2,71 + 1,29)^2 - 2,71 \cdot 2,58}$$

ni hisoblang.
A) 5,68 B) 4,84 C) 5,28 D) 6,14 E) 5,58

97. (02-5-6)

$$\frac{2,7(1,7^3 - 1,5^3)}{5,1^2 + 5,1 \cdot 4,5 + 4,5^2}$$

ni hisoblang.
A) 0,45 B) 0,27 C) 0,3 D) 0,06 E) 0,09

98. (03-2-33)*

$$\left(1 - \frac{1}{4}\right)\left(1 - \frac{1}{9}\right)\left(1 - \frac{1}{16}\right) \cdots \left(1 - \frac{1}{2000^2}\right)$$

ko'paytmaning qiymatini hisoblang.
A) $\frac{1999}{2000}$ B) $\frac{10}{1999}$ C) $\frac{2001}{2000}$ D) $\frac{1999}{4000}$ E) $\frac{2001}{4000}$

99. (03-3-5)

$$\frac{4(0,8^2 - 0,8 \cdot 1,7 + 1,7^2)}{1,6^3 + 3,4^3}$$

ni hisoblang.
A) 1,2 B) 0,2 C) 1,5 D) 0,5 E) 0,4

100. (03-11-61)

$$\frac{0,6^2 - 0,6 \cdot 0,2 + 0,1^2}{1,5 - 1,5^2}$$

ni hisoblang.
A) $-0,5$ B) $-\frac{1}{3}$ C) -3 D) $-1\frac{2}{3}$ E) $-2,5$

1.4 Ildizlar.

1.4.1 Ildizlarga oid formulalarning qo'llanilishi.

1. $(\sqrt{a})^2 = a, \qquad (a \geq 0)$
2. $\sqrt{ab} = \sqrt{a}\sqrt{b}, \qquad (a, b \geq 0)$
3. $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}, \qquad (a \geq 0, \quad b > 0)$
4. $a\sqrt{b} = \sqrt{a^2 b}, \qquad (a \geq 0)$
5. $a\sqrt{b} = -\sqrt{a^2 b}, \qquad (a \leq 0)$
6. $\sqrt{a^2} = |a|$

(97-11-8) Soddalashtiring.

$$2\sqrt{5\frac{1}{2}} + \frac{1}{3}\sqrt{99} - 2\sqrt{2\frac{3}{4}}$$

A) $3\sqrt{11}$ B) $2\sqrt{22}$ C) $\sqrt{22}$ D) 2 E) 0
Yechish: Ushbu $a\sqrt{b} = \sqrt{a^2 b}$ $(a, b \geq 0)$ formuladan foydalanib

$$2\sqrt{5\frac{1}{2}} + \frac{1}{3}\sqrt{99} - 2\sqrt{2\frac{3}{4}} = 2\sqrt{\frac{11}{2}} +$$

$$+\frac{1}{3}\sqrt{9 \cdot 11} - 2\sqrt{\frac{11}{4}} = \sqrt{4 \cdot \frac{11}{2}} + \frac{1}{3} \cdot 3\sqrt{11} - \sqrt{4 \cdot \frac{11}{4}} =$$

$$= \sqrt{22} + \sqrt{11} - \sqrt{11} = \sqrt{22}$$

ekanini hosil qilamiz. **J**: $\sqrt{22}$ (C).

1. (97-1-8) Soddalashtiring.

$$4\sqrt{3\frac{1}{2}} - 0,5\sqrt{56} - 3\sqrt{1\frac{5}{9}}$$

A) $2\sqrt{14}$ B) $2\sqrt{7}$ C) 0 D) 2 E) $\sqrt{7}$

2. (97-6-8) Soddalashtiring.

$$15\sqrt{\frac{3}{5}} - 0,5\sqrt{60} + 2\sqrt{3\frac{3}{4}}$$

A) 0 B) $\sqrt{15}$ C) $5\sqrt{3}$ D) $3\sqrt{15}$ E) $4\sqrt{5}$

3. (98-6-9) Hisoblang.

$$\frac{\sqrt{32} + \sqrt{98} - \sqrt{50}}{\sqrt{72}}$$

A) 2 B) 1 C) $\sqrt{2}$ D) $2\sqrt{2}$ E) 0,9988207

4. (99-4-20) Soddalashtiring.

$$\left(\sqrt{7} + \sqrt{2} - 1\right) \cdot \left(\sqrt{7} + 1 - \sqrt{2}\right)$$

A) $4 + 2\sqrt{2}$ B) $2 - \sqrt{2}$ C) $4 - \sqrt{2}$
D) $6 + 2\sqrt{2}$ E) $3\sqrt{2} + 2\sqrt{7}$

5. (99-6-36) Hisoblang.

$$\sqrt{192} - \sqrt{108} + \frac{\sqrt{243}}{3}$$

A) $5\sqrt{3}$ B) $5\sqrt{2}$ C) $3\sqrt{5}$ D) $3\sqrt{3}$ E) $8\sqrt{3}$

6. (99-7-3) $\sqrt{50}$ qiymatining butun qismini toping.
A) 8 B) 7 C) 6 D) 9 E) 5

7. (96-6-50) Soddalashtiring.

$$\frac{1}{3-\sqrt{8}}-2\sqrt{2}+6$$

A) 8 B) 7 C) 9 D) 10
E) to'g'ri javob keltirilmagan

8. (96-7-24) Ifodaning qiymatini toping.

$$\frac{3-\sqrt{5}}{3+\sqrt{5}}+\frac{3+\sqrt{5}}{3-\sqrt{5}}$$

A) 2 B) $3\frac{\sqrt{5}}{2}$ C) $4,5$ D) $\frac{3\sqrt{5}+2}{2}$ E) 7

9. (97-2-50) Soddalashtiring.

$$2\sqrt{3}-5-\frac{11}{\sqrt{12}-1}$$

A) $2\sqrt{3}-4$ B) 4 C) -4 D) -6 E) 6

10. (97-3-24) Ifodaning qiymatini toping.

$$\frac{4+\sqrt{6}}{4-\sqrt{6}}+\frac{4-\sqrt{6}}{4+\sqrt{6}}$$

A) 2 B) $\frac{3\sqrt{6}}{8}$ C) $4\frac{2}{5}$ D) $\frac{\sqrt{6}+8}{4}$ E) $3,2$

11. (97-7-24) Ifodaning qiymatini toping.

$$\frac{3+\sqrt{7}}{3-\sqrt{7}}-\frac{3-\sqrt{7}}{3+\sqrt{7}}$$

A) $4+\sqrt{7}$ B) $-3\sqrt{7}$ C) $6\sqrt{7}$ D) 3 E) 6

12. (97-8-50) Ifodani soddalashtiring.

$$\frac{19}{\sqrt{20}-1}-2\sqrt{5}+3$$

A) $4\sqrt{5}+4$ B) $4\sqrt{5}-4$ C) $2\sqrt{5}+4$
D) 4 E) $2\sqrt{5}-4$

13. (97-10-24) Ifodaning qiymatini toping.

$$\frac{4-\sqrt{2}}{4+\sqrt{2}}-\frac{4+\sqrt{2}}{4-\sqrt{2}}$$

A) $-\frac{8\sqrt{2}}{7}$ B) $8\sqrt{2}$ C) 6 D) -4 E) $-4\sqrt{2}$

14. (97-12-49) Soddalashtiring.

$$\frac{19}{\sqrt{20}+1}+6-2\sqrt{5}$$

A) 6 B) 5 C) $4\sqrt{5}-7$ D) $4\sqrt{5}-6$ E) $2\sqrt{5}-5$

15. (98-2-20) Hisoblang.

$$\frac{1}{2+\sqrt{3}}+\frac{2}{\sqrt{3}-1}$$

A) 2 B) 3 C) 4 D) $\sqrt{3}$ E) $2\sqrt{3}$

16. (99-6-38) Soddalashtiring.

$$\frac{\sqrt{5}}{\sqrt{5}-2}-\frac{10}{\sqrt{5}}$$

A) 1 B) 4 C) 3 D) 2 E) 5

17. (99-6-39) Ifodaning qiymatini toping.

$$\frac{1}{2+\sqrt{3}}+\frac{2}{\sqrt{5}-\sqrt{3}}-\frac{1}{2+\sqrt{5}}$$

A) 4 B) 0 C) $\sqrt{5}-\sqrt{3}$ D) $\sqrt{5}+\sqrt{3}$ E) 2

18. (99-10-15) Soddalashtiring.

$$\Big(\frac{1}{\sqrt{3}+\sqrt{2}}+\frac{1}{2+\sqrt{3}}\Big)\cdot(2+\sqrt{2})$$

A) $2\sqrt{2}$ B) $2\sqrt{3}$ C) 2 D) $3\sqrt{2}$ E) 4

19. (00-3-4) Soddalashtiring.

$$4\sqrt{7\frac{1}{2}}-\frac{2\sqrt{10}}{2\sqrt{3}-\sqrt{10}}$$

A) $2-3\sqrt{10}$ B) 10 C) $3\sqrt{10}-2$
D) -10 E) $4\sqrt{10}$

20. (00-5-35) Kasrning maxrajini irratsionallikdan qutqaring.

$$\frac{1}{1+\sqrt{2}-\sqrt{3}}$$

A) $\frac{2+\sqrt{2}+\sqrt{6}}{2}$ B) $\frac{2-\sqrt{2}+\sqrt{6}}{4}$ C) $\frac{2+\sqrt{2}-\sqrt{6}}{2}$
D) $\frac{2-\sqrt{2}-\sqrt{6}}{2}$ E) $\frac{2+\sqrt{2}+\sqrt{6}}{4}$

21. (00-10-47) Amallarni bajaring.

$$\frac{9}{5-\sqrt{7}}+\frac{22}{7+\sqrt{5}}-\frac{1}{\sqrt{7}+\sqrt{5}}$$

A) 1 B) 6 C) $\frac{1}{5}$ D) 5 E) -1

22. (98-7-17) O'zaro teskari sonlarni aniqlang.
1) $\frac{\sqrt{7}}{2}$ va $\frac{2\sqrt{7}}{7}$ 2) $\sqrt{6}-\sqrt{5}$ va $\sqrt{6}+\sqrt{5}$
3) $\frac{2\sqrt{5}}{9}$ va $\frac{9\sqrt{5}}{10}$ 4) $\sqrt{3}-1$ va $\sqrt{3}+1$.
A) hammasi B) $2;3;4$ C) $1;3;4$
D) $1;2;4$ E) $1;2;3$

23. (98-12-16) O'zaro teskari sonlarni aniqlang.
1) $\frac{\sqrt{5}}{3}$ va $\frac{3\sqrt{5}}{5}$ 2) $3-\sqrt{2}$ va $3+\sqrt{2}$
3) $\frac{2\sqrt{3}}{5}$ va $\frac{5\sqrt{3}}{6}$ 4) $\sqrt{2}+1$ va $\sqrt{2}-1$.
A) $1;3;4$ B) $1;2;3$ C) $2;3;4$ D) $1;3$ E) $2;4$

24. (01-7-6) Ushbu $\sqrt{45\cdot10\cdot18}$ va $\sqrt{21\cdot56\cdot6}$ sonlarning eng katta umumiy bo'luvchisini toping.
A) 9 B) 10 C) 18 D) 12 E) 6

25. (01-1-6) Kasrning maxrajini irratsionallikdan qutqaring.

$$\frac{3\sqrt{5}-2\sqrt{2}}{2\sqrt{5}-3\sqrt{2}}$$

A) $\frac{1}{2}(\sqrt{5}+3\sqrt{2})$ B) $\frac{1}{2}(3\sqrt{5}-2\sqrt{2})$ C) $9+2,5\sqrt{10}$
D) $2,5\sqrt{10}-9$ E) $\sqrt{2}-1,5\sqrt{5}$

26. (01-6-23) Hisoblang.

$$\left(\frac{\sqrt{2+\sqrt{3}}}{\sqrt{2-\sqrt{3}}}+\frac{\sqrt{2-\sqrt{3}}}{\sqrt{2+\sqrt{3}}}\right)^2$$

A) 12 B) 14 C) 18 D) 16 E) 15

27. (01-7-4) Soddalashtiring.

$$4+5\sqrt{2}+\frac{\sqrt{75}}{\sqrt{3}-\sqrt{6}}$$

A) $2\sqrt{2}+1$ B) 3 C) 2 D) -2 E) -1

28. (01-9-13) Ushbu

$$\left(\sqrt{0,2}-\sqrt{0,8}+\sqrt{1,8}+\sqrt{3,2}\right):\frac{1}{5^{\frac{1}{2}}}-2$$

ifodaning qiymatini toping.
A) 4 B) 6 C) 2 D) 1 E) 0

29. (01-11-8) Ushbu

$$\left(\sqrt{18}+\sqrt{72}-\sqrt{12}\right)\cdot\left(\sqrt{18}+\sqrt{72}+\sqrt{12}\right)$$

ifodaning qiymatini hisoblang.
A) 148 B) 149 C) 147 D) 150 E) 151

30. (02-2-6)

$$3\sqrt{\frac{1}{5}}+\frac{1}{2}\sqrt{20}+\sqrt{\frac{4}{5}}$$

ni soddalashtiring.
A) $2\sqrt{5}$ B) $\sqrt{5}$ C) $3\sqrt{5}$ D) $\frac{6}{\sqrt{5}}$ E) $\frac{7}{\sqrt{5}}$

31. (02-4-2) Agar $x=\frac{(\sqrt{7}-5)}{2}$ bo'lsa,

$$(x+1)(x+2)(x+3)(x+4)$$

ning qiymatini hisoblang.
A) $0,75$ B) $-0,75$ C) 3 D) -3 E) $-1,5$

32. (02-6-5) Agar $a=\sqrt{7}+\sqrt{6}$, $b=\sqrt{7}-\sqrt{6}$ bo'lsa, $2a^2-5ab+2b^2$ ni hisoblang.
A) 47 B) 2 C) 55 D) 49 E) 3

33. (02-6-26)

$$\frac{1}{\sqrt{7}-\sqrt{6}}-\frac{3}{\sqrt{6}-\sqrt{3}}-\frac{4}{\sqrt{7}+\sqrt{3}}$$

ni hisoblang.
A) 0 B) 1 C) 2 D) 3 E) 4

34. (02-7-46)

$$\sqrt{0,9}+\sqrt{14,4}-\sqrt{8,1}$$

ni soddalashtiring.
A) $\sqrt{3,6}$ B) $\sqrt{0,36}$ C) $3,6$ D) $3\sqrt{10}$ E) $6\sqrt{10}$

35. (02-9-10)

$$3\sqrt{3\frac{2}{3}}-\sqrt{132}+4\sqrt{2\frac{1}{16}}$$

ni soddalashtiring.
A) 0 B) $2\sqrt{33}$ C) $3\sqrt{3}$ D) $4\sqrt{11}$ E) 2

36. (00-2-3)* Ifodani hisoblang.

$$[\sqrt{1}]+[\sqrt{2}]+[\sqrt{3}]+...+[\sqrt{10}]$$

bunda $[a]-a$ sonining butun qismi.
A) 15 B) 19 C) 18 D) 17 E) 21

37. (98-7-20) Agar $a:b=-\sqrt{5}$ bo'lsa, a^2-5b^2 ni hisoblang.
A) 0 B) $\sqrt{5}$ C) 5 D) -5 E) $-\sqrt{5}$

38. (98-6-5) Agar $a>0$, $b>0$ va $c<0$ bo'lsa, to'g'ri tenglikni ko'rsating.
A) $\sqrt{a^2\cdot b^2\cdot c^2}=a|b|c$
B) $\sqrt{a^2\cdot b^2\cdot c^2}=abc$
C) $\sqrt{a^2\cdot b^2\cdot c^2}=-ab|c|$
D) $\sqrt{a^2\cdot b^2\cdot c^2}=|a|bc$
E) $\sqrt{a^2\cdot b^2\cdot c^2}=-abc$

39. (03-5-2)

$$\frac{\sqrt{196}\cdot\sqrt{19,6}}{\sqrt{0,196}\cdot\sqrt{1,96}}$$

ni hisoblang.
A) 1000 B) 100 C) 196 D) 10 E) $19,6$

40. (03-5-12) Agar $\sqrt{5}=m$, $\sqrt{7}=n$ bo'lsa, $\sqrt{560}$ ni m va n orqali ifodalang.
A) $4mn$ B) $2mn$ C) $6mn$ D) $8mn$ E) $16mn$

1.4.2 Hisoblashga oid misollar.

1. $\sqrt{a+b\sqrt{c}}=\sqrt{\frac{a+A}{2}}+\sqrt{\frac{a-A}{2}}$, $A=\sqrt{a^2-b^2c}$

2. $\sqrt{a-b\sqrt{c}}=\sqrt{\frac{a+A}{2}}-\sqrt{\frac{a-A}{2}}$, $A=\sqrt{a^2-b^2c}$

(96-3-73) Ayirmaning qiymatini toping.

$$\sqrt{9-2\sqrt{20}}-\sqrt{9+2\sqrt{20}}$$

A) -3 B) -6 C) -4 D) -5 E) 4
Yechish: $x=\sqrt{9-2\sqrt{20}}-\sqrt{9+2\sqrt{20}}$ deb belgilaymiz. $x<0$ ekani ravshan. U holda

$$x^2=9-2\sqrt{20}-2\sqrt{(9-2\sqrt{20})(9+2\sqrt{20})}+9+$$

$$+2\sqrt{20}=18-2\sqrt{81-80}=18-2=16.$$

Demak, $x=-4$ ekan. J: -4 (C).

1. (96-6-28) Hisoblang.

$$\sqrt{23-8\sqrt{7}}+\sqrt{23+8\sqrt{7}}$$

A) 7 B) 6 C) 8 D) 9 E) 5

2. (96-9-13) Yig'indining qiymatini toping.

$$\sqrt{11+6\sqrt{2}}+\sqrt{11-6\sqrt{2}}$$

A) 6 B) 4 C) 8 D) 5 E) 7

3. (96-12-71) Ayirmaning qiymatini toping.

$$\sqrt{9+2\sqrt{20}}-\sqrt{9-2\sqrt{20}}$$

A) 4 B) 5 C) 6 D) 3 E) -4

4. (96-13-13) Yig'indining qiymatini toping.

$$\sqrt{7+4\sqrt{3}}+\sqrt{7-4\sqrt{3}}$$

A) 3 B) 5 C) 4 D) 6 E) 7

5. (97-1-25) Hisoblang.

$$\sqrt{\sqrt{28-16\sqrt{3}}}$$

A) $3-\sqrt{3}$ B) $4\sqrt{3}-1$ C) $2-\sqrt{3}$
D) $\sqrt{3}-1$ E) $2\sqrt{3}-1$

6. (97-1-55) Hisoblang.

$$\sqrt{4-\sqrt{7}}-\sqrt{4+\sqrt{7}}$$

A) 0 B) -4 C) $-2\sqrt{2}$ D) $-\sqrt{2}$ E) $-\sqrt{10}$

7. (97-2-28) Hisoblang.

$$\sqrt{19+8\sqrt{3}}+\sqrt{19-8\sqrt{3}}$$

A) 6 B) 7 C) 9 D) 8 E) 5

8. (97-5-21) Soddalashtiring.

$$\sqrt{7-4\sqrt{3}}$$

A) $2+\sqrt{3}$ B) $\sqrt{3}-2$ C) $3+\sqrt{3}$
D) $2-\sqrt{3}$ E) $3-\sqrt{3}$

9. (97-6-25) Hisoblang.

$$\sqrt{\sqrt{17-12\sqrt{2}}}$$

A) $3-2\sqrt{2}$ B) $2-\sqrt{2}$ C) $2\sqrt{2}-1$
D) $\sqrt{2}-1$ E) $3-\sqrt{2}$

10. (97-6-53) Hisoblang.

$$\sqrt{3-\sqrt{5}}+\sqrt{3+\sqrt{5}}$$

A) $2\sqrt{3}$ B) $\sqrt{10}$ C) 2 D) $\sqrt{2}$
E) to'g'ri javob keltirilmagan

11. (97-8-27) Hisoblang.

$$\sqrt{11-6\sqrt{2}}+\sqrt{11+6\sqrt{2}}$$

A) 8 B) 4 C) 3 D) 6 E) 5

12. (97-9-21) Soddalashtiring.

$$\sqrt{9+4\sqrt{2}}$$

A) $2\sqrt{2}+1$ B) $2\sqrt{2}-1$ C) $3+\sqrt{2}$
D) $3-\sqrt{2}$ E) $3+2\sqrt{2}$

13. (97-11-25) Hisoblang.

$$\sqrt{15-4\sqrt{7+4\sqrt{3}}}$$

A) $\sqrt{3}-1$ B) $4-\sqrt{3}$ C) $3\sqrt{3}$
D) $3-2\sqrt{3}$ E) $2-\sqrt{3}$

14. (97-12-27) Hisoblang.

$$\sqrt{9-4\sqrt{2}}-\sqrt{9+4\sqrt{2}}$$

A) 2 B) 3 C) -3 D) -4 E) -2

15. (98-4-31) Hisoblang.

$$\sqrt{3-\sqrt{5}}\cdot(3+\sqrt{5})(\sqrt{10}-\sqrt{2})$$

A) 8 B) 4 C) 10 D) 1 E) 2

16. (98-5-10) Hisoblang.

$$\sqrt{19-8\sqrt{3}}$$

A) $4-\sqrt{3}$ B) $4+\sqrt{3}$ C) $3+\sqrt{3}$
D) $3\sqrt{3}$ E) $4-\sqrt{6}$

17. (98-7-14) Hisoblang.

$$\left(\sqrt{3-\sqrt{5}}+\sqrt{3+\sqrt{5}}\right)^2\cdot 0,5^{-2}$$

A) 38 B) 30 C) 40 D) 44 E) 50

18. (98-7-29) Soddalashtiring.

$$\sqrt{13+30\sqrt{2+\sqrt{9+4\sqrt{2}}}}$$

A) $3+\sqrt{3}$ B) $5+\sqrt{2}$ C) $5+2\sqrt{3}$
D) $5+3\sqrt{2}$ E) $3+\sqrt{2}$

19. (98-10-41) Hisoblang.

$$\sqrt{19-8\sqrt{3}}+\sqrt{3}$$

A) -4 B) 4 C) $4+2\sqrt{3}$ D) $2\sqrt{3}-4$ E) $2\sqrt{3}-2$

20. (99-1-9) Hisoblang.

$$\sqrt{11+6\sqrt{2}}+\sqrt{11-6\sqrt{2}}$$

A) 6 B) 22 C) $\sqrt{22}$ D) $6,012$ E) $5,92$

21. (99-2-13) Ushbu

$$\sqrt{9+\sqrt{65}}\cdot\sqrt{9-\sqrt{65}}$$

soni 14 dan qanchaga kam?
A) 8 B) 9 C) 10 D) 11 E) 12

22. (99-3-4) Qaysi ifodaning qiymati ratsional sondan iborat?
1) $(1-\sqrt{2})\cdot(1+\sqrt{2})$; 3) $\frac{0,5}{1-\sqrt{0,5}}-\sqrt{0,5}$;
2) $1+2\sqrt{7}$; 4) $(1+\sqrt{0,5})^2-(1-\sqrt{0,5})^2$
A) 1; 2 B) 1; 3 C) 1; 4 D) 1 E) 3; 4

23. (99-5-11) Agar $\sqrt{t^5+3}-\sqrt{t^5-2}=1$ bo'lsa, $\sqrt{t^5+3}+\sqrt{t^5-2}$ ning qiymati nechaga teng bo'ladi?
A) 2 B) 3 C) 4 D) 5 E) 8

24. (99-7-4) Hisoblang.

$$\sqrt{9+\sqrt{77}}\cdot\sqrt{9-\sqrt{77}}$$

A) 3 B) 12 C) 2 D) 4 E) 1

25. (99-7-12) Hisoblang.

$$\sqrt{11-6\sqrt{2}}$$

A) 2 B) $3-\sqrt{2}$ C) $3-\sqrt{3}$ D) 3 E) $\sqrt{6}$

26. (99-10-14) Hisoblang.

$$\frac{\sqrt{3+2\sqrt{2}}+\sqrt{3-2\sqrt{2}}}{4\sqrt{2}}$$

A) $\frac{\sqrt{2}}{4}$ B) $0,5$ C) $\frac{\sqrt{2}}{2}$ D) $0,75$ E) $0,8$

27. (00-1-48) Hisoblang.

$$\sqrt{7+2\sqrt{10}}\cdot\sqrt{7-2\sqrt{10}}$$

A) 2 B) $3,2$ C) 3 D) $2,5$ E) $1,5$

28. (00-8-27) Soddalashtiring.

$$\sqrt{2+\sqrt{3}}\cdot\sqrt{2+\sqrt{2+\sqrt{3}}}\cdot$$
$$\cdot\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{3}}}}\cdot$$
$$\cdot\sqrt{2-\sqrt{2+\sqrt{2+\sqrt{3}}}}$$

A) 1 B) $\sqrt{2}$ C) $\sqrt{3}$ D) $\sqrt{1+\sqrt{2}}$ E) $\sqrt{2+\sqrt{2}}$

29. (00-8-28) Soddalashtiring.

$$\sqrt{6-2\sqrt{5}}$$

A) $\sqrt{5}-1$ B) $1-\sqrt{5}$ C) $2-\sqrt{3}$
D) $1+\sqrt{5}$ E) $2-\sqrt{5}$

30. (00-10-4) Soddalashtiring.

$$\sqrt{21-2\sqrt{21+2\sqrt{19-6\sqrt{2}}}}$$

A) $3\sqrt{2}+1$ B) $3\sqrt{2}+2$ C) $3\sqrt{2}-2$
D) $2\sqrt{3}+2$ E) $3\sqrt{2}-1$

31. (96-7-14) Hisoblang.

$$\sqrt{\frac{65^3+35^3}{100}-35\cdot 65}$$

A) 100 B) 30 C) 10 D) 45 E) 65

32. (97-3-14) Ifodaning qiymatini toping.

$$\sqrt{\frac{68^3-32^3}{36}+68\cdot 32}$$

A) $16\frac{2}{3}$ B) 85 C) 100 D) $25\frac{5}{6}$ E) 120

33. (97-7-14) Ifodaning qiymatini toping.

$$\sqrt{\frac{59^3+41^3}{100}-59\cdot 41}$$

A) 24 B) 100 C) 18 D) 50 E) 36

34. (97-10-14) Ifodaning qiymatini toping.

$$\sqrt{\frac{82^3-18^3}{64}+82\cdot 18}$$

A) 64 B) 100 C) $12,5$ D) 50 E) 82

35. (01-1-4) Hisoblang.

$$\sqrt{5-2\sqrt{6}}-\sqrt{5+2\sqrt{6}}$$

A) $2\sqrt{2}$ B) $-4\sqrt{6}$ C) $\sqrt{2}$
D) $-\sqrt{2}$ E) $-2\sqrt{2}$

36. (01-2-22) Hisoblang.

$$\sqrt{\frac{9+\sqrt{65}}{2}}+\sqrt{\frac{9-\sqrt{65}}{2}}$$

A) $\sqrt{13}$ B) $9-\sqrt{10}$ C) $4\sqrt{2}$
D) $7-\sqrt{2}$ E) $8-\sqrt{3}$

37. (01-11-36) Soddalashtiring.

$$\sqrt{6+4\sqrt{2}}+\sqrt{6-4\sqrt{2}}$$

A) $3,8$ B) $3,6$ C) 4 D) $4,2$ E) $4,5$

38. (02-7-45) Agar $a=19-\sqrt{192}$ bo'lsa, $\sqrt{a}+\sqrt{3}$ ifodaning qiymatini toping?
A) 4 B) 6 C) 5 D) $2+\sqrt{3}$ E) $4\sqrt{3}$

39. (02-10-4)

$$\sqrt{\sqrt{5}-\sqrt{3-\sqrt{29-6\sqrt{20}}}}$$

ning qiymatini toping.
A) 1 B) $\sqrt[4]{5}$ C) $\sqrt{5}-\sqrt{3}$ D) 2 E) $\sqrt{5}$

40. (02-10-43)

$$\sqrt{52-30\sqrt{3}}-\sqrt{52+30\sqrt{3}}$$

ning qiymatini hisoblang.
A) -10 B) 10 C) -8 D) 8 E) -6

41. (03-1-1)

$$\sqrt{(\frac{\pi}{2}-\sqrt{3})^2}+\sqrt{(\frac{\pi}{3}-\sqrt{2})^2}-\sqrt{5+2\sqrt{6}}$$

ni soddalashtiring.
A) $\frac{5\pi}{6}-2(\sqrt{2}+\sqrt{3})$ B) $\sqrt{3}+\sqrt{2}$ C) $\frac{5\pi}{6}$
D) $-2\sqrt{3}-2\sqrt{2}$ E) $\frac{-5\pi}{6}$

42. (03-4-11)

$$\sqrt{2+\sqrt{3}}-\sqrt{2-\sqrt{3}}$$

ning qiymatini hisoblang.
A) $\sqrt{3}$ B) $2\sqrt{3}$ C) $2\sqrt{2}$ D) $\sqrt{2}$ E) $\sqrt{6}$

43. (03-5-4) $\dfrac{8+2\sqrt{2}}{4+\sqrt{128}}$ kasr qisqartirilgandan keyin, quyidagilarning qaysi biriga teng bo'ladi?
A) $\frac{\sqrt{2}}{2}$ B) $\frac{\sqrt{2}}{4}$ C) $\frac{2}{\sqrt{2}}$ D) $\sqrt{2}+1$ E) $\frac{\sqrt{2}+1}{2}$

44. (03-7-50)

$$\sqrt{11-4\sqrt{7}}$$

ni soddalashtiring.
A) $\sqrt{7}+2$ B) $\sqrt{7}-2$ C) $\sqrt{7}-1$
D) $2-\sqrt{7}$ E) $\sqrt{7}$

45. (03-8-24) Ifodani soddalashtiring:

$$\Big(\frac{15}{\sqrt{6}+1}+\frac{4}{\sqrt{6}-2}-\frac{12}{3-\sqrt{6}}\Big)\cdot(\sqrt{6}+11)$$

A) -115 B) 127 C) 100 D) -116 E) $21\sqrt{6}$

46. (03-10-8) Agar $x=\frac{\sqrt{3}-1}{2}$ bo'lsa, $(x-1)(x+2)$ ifodaning qiymatini toping.
A) $-1,5$ B) $1,5$ C) 3 D) -3 E) $2\sqrt{3}$

47. (03-10-17)

$$\frac{\sqrt{2}+1}{3+2\sqrt{2}}-\frac{\sqrt{2}-1}{3-2\sqrt{2}}$$

ni soddalashtiring.
A) 1 B) -1 C) 2 D) -2 E) $\sqrt{2}$

48. (03-11-74)

$$\sqrt{17-12\sqrt{2}}\cdot(6+4\sqrt{2})$$

ning qiymatini hisoblang.
A) $\sqrt{2}$ B) $-\sqrt{2}$ C) $\sqrt{3+\sqrt{8}}$ D) 2 E) $\sqrt{3-\sqrt{8}}$

1.4.3 Ifodalarni soddalashtiring.

1. (97-1-57) Ushbu

$$\frac{(x+\sqrt{y})\cdot\sqrt{y-2\cdot\sqrt{y}\cdot x+x^2}}{y-x^2}$$

ifodani $x=2\sqrt{6}$ va $y=23$ bo'lganda hisoblang.
A) 1 B) -1 C) $\frac{1}{2}$ D) $-\frac{1}{2}$
E) to'g'ri javob keltirilmagan

2. (97-6-56) Ifodani $m=15$ va $n=3\sqrt{2}$ bo'lganda hisoblang.

$$\frac{(\sqrt{m}+n)\sqrt{m-2\sqrt{m}\cdot n+n^2}}{m-n^2}$$

A) 1 B) -1 C) -3 D) 0
E) to'g'ri javob keltirilmagan

3. (99-1-15) Soddalashtiring.

$$\Big(\frac{1}{\sqrt{a}+\sqrt{b}}-\frac{\sqrt{a}+\sqrt{b}}{a-b}\Big)\cdot\frac{a-2\sqrt{a}\sqrt{b}+b}{2\sqrt{b}}$$

A) $\frac{\sqrt{b}-\sqrt{a}}{\sqrt{a}+\sqrt{b}}$ B) $\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}}$ C) $\frac{\sqrt{b}+\sqrt{a}}{\sqrt{a}-\sqrt{b}}$
D) $\frac{\sqrt{a}-\sqrt{b}}{a+b}$ E) $\frac{\sqrt{b}-\sqrt{a}}{a-b}$

4. (00-1-20) Soddalashtiring.

$$\Big(\frac{1}{\sqrt{a+1}+\sqrt{a}}+\frac{1}{\sqrt{a}-\sqrt{a-1}}\Big)\cdot$$

$$\cdot(\sqrt{a+1}-\sqrt{a-1})$$

A) 1 B) 2 C) $2\sqrt{a}$ D) $2\sqrt{a-1}$ E) $2\sqrt{a+1}$

5. (01-1-7) Soddalashtiring.

$$\Big(\frac{a\sqrt{a}+b\sqrt{b}}{\sqrt{a}+\sqrt{b}}-\sqrt{ab}\Big):(a-b)+\frac{2\sqrt{b}}{\sqrt{a}+\sqrt{b}}\cdot$$

$$\cdot(\sqrt{a+1}-\sqrt{a-1})$$

A) $\sqrt{a}-\sqrt{b}$ B) $\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}}$ C) $\frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}}$
D) $\sqrt{a}+\sqrt{b}$ E) 1

6. (01-1-62) Ifodani soddalashtiring. $(a\geq 0,5)$.

$$\sqrt{a^2}-\sqrt{a^2+a+0,25}+\sqrt{a^2-a+0,25}$$

A) $a-0,25$ B) $a-0,5$ C) $a-0,75$
D) $a-1$ E) $a+0,25$

7. (01-1-70) Agar $x=0,5\Big(\frac{\sqrt{a}}{\sqrt{b}}-\frac{\sqrt{b}}{\sqrt{a}}\Big)$, $a>0$ va $b>0$ bo'lsa, $\dfrac{2b\sqrt{1+x^2}}{\sqrt{1+x^2}-x}$ ni hisoblang.
A) $\frac{a+b}{2}$ B) $2a+b$ C) $a+2b$
D) $2(a-b)$ E) $a+b$

8. (01-2-57)* Agar $x=e$ va $y=\pi$ bo'lsa,

$$\frac{\sqrt{x^2-2xy+y^2}}{\sqrt{x^2+2xy}+y^2}+\frac{2x}{x+y}$$

ning qiymatini hisoblang.
A) $\frac{3e-\pi}{\pi+e}$ B) $\frac{\pi-e}{\pi+e}$ C) -1 D) 1 E) $\frac{2e-\pi}{\pi+e}$

9. (01-7-13) Soddalashtiring.

$$\Big(\frac{1}{\sqrt{a}+\sqrt{a+1}}+\frac{1}{\sqrt{a}-\sqrt{a-1}}\Big):\left(1+\sqrt{\frac{a+1}{a-1}}\right)$$

A) $\sqrt{a+1}$ B) $\sqrt{a-1}$ C) $\sqrt{\frac{a-1}{a+1}}$
D) $\sqrt{a}$ E) $\sqrt{a+1}-\sqrt{a-1}$

10. (01-7-14) Agar $a=(2+\sqrt{3})^{-1}$ va $b=(2-\sqrt{3})^{-1}$ bo'lsa,

$$(a+1)^{-1}+(b+1)^{-1}$$

ning qiymatini hisoblang.
A) 2 B) 0,5 C) $2\sqrt{3}$ D) $\sqrt{3}$ E) 1

11. (01-9-48) Soddalashtiring.

$$\frac{\sqrt{16x^2+9-24x}}{16x^2-9}$$

A) $\frac{1}{4x+3}$ B) $\begin{cases} \frac{1}{4x+3}, & \text{agar} \quad x<\frac{3}{4} \\ -\frac{1}{4x+3}, & \text{agar} \quad x>\frac{3}{4} \end{cases}$
C) $\begin{cases} -\frac{1}{4x+3}, & \text{agar} \quad x<\frac{3}{4} \\ \frac{1}{4x+3}, & \text{agar} \quad x>\frac{3}{4} \end{cases}$
D) $-\frac{1}{4x+3}$ E) soddalashmaydi

12. (01-10-1) Agar $a=\sqrt{2}$ va $b=\sqrt[3]{3}$ bo'lsa,

$$\sqrt{a^2-2ab+b^2}+\sqrt{a^2+2ab+b^2}$$

ning qiymatini hisoblang.
A) $\sqrt{8}$ B) $\sqrt[3]{12}$ C) $\sqrt{18}$ D) $\sqrt[3]{24}$ E) $\sqrt{27}$

13. (01-11-7) Soddalashtiring.

$$\frac{3}{a-\sqrt{a^2-3}}+\frac{3}{a+\sqrt{a^2-3}}$$

A) $1,5a$ B) $3a$ C) $2a$ D) $2,5a$ E) $2,4a$

14. (02-3-8) Agar $a=0,0025$ bo'lsa,

$$\frac{\sqrt{(a+2)^2-8a}}{\sqrt{a}-\frac{2}{\sqrt{a}}}$$

ifodaning qiymatini hisoblang.
A) $-0,05$ B) $0,05$ C) $0,5$ D) $-0,5$ E) $0,005$

15. (02-3-10) Agar $a=4^{-1}$; $b=4^{2a}$ va $c=4^b$ bo'lsa, $\frac{ac}{b}$ ifodaning qiymati nechaga teng bo'ladi?
A) 2 B) 4 C) 8 D) 1 E) $0,5$

16. (02-3-14) Agar $a=\frac{1}{2}\left(\sqrt{\frac{2}{3}}+\sqrt{\frac{3}{2}}\right)$ bo'lsa,

$$\frac{\sqrt{a^2-1}}{a-\sqrt{a^2-1}}$$

ning qiymatini toping.
A) $\frac{1}{4}$ B) $\frac{3}{4}$ C) $\frac{1}{2}$ D) $\frac{1}{8}$ E) $\frac{5}{8}$

17. (02-6-8) $x=5\sqrt{6}$ va $y=6\sqrt{5}$ bo'lsa,

$$\sqrt{x^2+2xy+y^2}-\sqrt{x^2-2xy+y^2}$$

ning qiymatini hisoblang.
A) $\sqrt{720}$ B) $\sqrt{700}$ C) $\sqrt{640}$
D) $\sqrt{600}$ E) $\sqrt{560}$

18. (02-6-27)* Agar $a=5,2$ bo'lsa,

$$\frac{a^2-a-6-(a+3)\sqrt{a^2-4}}{a^2+a-6-(a-3)\sqrt{a^2-4}}$$

ning qiymatini toping.
A) $1,5$ B) $-2,5$ C) $-1,5$ D) $2,4$ E) $-3,2$

19. (02-9-25) Soddalashtiring.

$$\left(\frac{1}{a+\sqrt{2}}-\frac{a^2+2}{a^3+2\sqrt{2}}\right)^{-1}\cdot$$

$$\left(\frac{a}{2}-\frac{1}{\sqrt{2}}+\frac{1}{a}\right)^{-1}\cdot\frac{\sqrt{2}}{a+\sqrt{2}}$$

A) $\frac{1}{\sqrt{2}}$ B) 2 C) -2 D) $\frac{1}{a\sqrt{2}}$ E) $-a\sqrt{2}$

20. (02-11-12) Soddalashtiring.

$$\left(\frac{1+\sqrt{x}+x}{x\sqrt{x}-1}\right)^{-1}-x^{\frac{1}{2}}$$

A) $\sqrt{x}+1$ B) 1 C) $\sqrt{x}-1$ D) -1 E) $\sqrt{x}$

21. (02-12-13) Soddalashtiring.

$$\frac{\sqrt{x}+1}{x\sqrt{x}+x+\sqrt{x}}:\frac{1}{\sqrt{x}-x^2}+x$$

A) $2x$ B) 2 C) 1 D) $2x-1$ E) -1

22. (02-12-25)

$$\frac{3}{a-\sqrt{a^2-3}}+\frac{3}{a+\sqrt{a^2-3}}$$

ni soddalashtiring.
A) $1,5a$ B) $3a$ C) $2,5a$ D) $2a$ E) $2,4a$

23. (03-3-8) Soddalashtiring.

$$\left(\frac{\sqrt{y}-\sqrt{x}}{y-\sqrt{xy}+x}+\frac{x}{x\sqrt{x}+y\sqrt{y}}\right)\cdot\frac{x\sqrt{x}+y\sqrt{y}}{y^3}$$

A) $\sqrt{x}+\sqrt{y}$ B) $\sqrt{x}-\sqrt{y}$ C) $\sqrt{x}$
D) $\sqrt{y}$ E) $\frac{1}{y^2}$

24. (03-4-17) Soddalashtiring.

$$\sqrt{x+2\sqrt{x-1}}+\sqrt{x-2\sqrt{x-1}} \quad (1\le x\le 2)$$

A) $2\sqrt{x-1}$ B) 2 C) -2 D) $-2\sqrt{x-1}$ E) 4

25. (03-8-41)

$$\frac{c-2\sqrt{c}+1}{\sqrt{c}-1}$$

kasrni qisqartiring.
A) $\sqrt{c}-1$ B) $c-1$ C) $c+1$ D) $\sqrt{c}+1$ E) 1

26. (03-10-12) Agar $x=\frac{4}{5}m$ bo'lsa,

$$\frac{\sqrt{m+x}+\sqrt{m-x}}{\sqrt{m+x}-\sqrt{m-x}}$$

ning qiymatini toping.
A) 2 B) $2m$ C) 4 D) -2 E) $4m$

27. (03-10-15) Agar $x<0$ bo'lsa,

$$\sqrt{x^2-12x+36}-\sqrt{x^2}$$

ni soddalashtiring.
A) 6 B) -6 C) $6-2x$ D) $2x-6$ E) 8

28. (03-11-5) Soddalashtiring.

$$a\cdot\left(\frac{\sqrt{a}+\sqrt{b}}{2b\sqrt{a}}\right)^{-1}+b\cdot\left(\frac{\sqrt{a}+\sqrt{b}}{2a\sqrt{b}}\right)^{-1}$$

A) $2ab$ B) ab C) $4ab$ D) $\frac{1}{2}ab$ E) $\frac{1}{4}ab$

29. (03-11-77)

$$\frac{\sqrt{x+4\sqrt{x-4}}-2}{\sqrt{x-4\sqrt{x-4}}+2}$$

ni soddalashtiring.
A) 1 B) -1 C) $0,5$ D) $0,25$ E) 2

1.4.4 n-darajali ildiz. Ratsional ko'rsatkichli daraja.

Ixtiyoriy $a>0$, $b>0$ va $n,m\epsilon N$ sonlar uchun

1. $a^{\frac{n}{m}}=\sqrt[m]{a^n}$
2. $\sqrt[m]{a\cdot b}=\sqrt[m]{a}\cdot\sqrt[m]{b}$
3. $\sqrt[m]{\frac{a}{b}}=\frac{\sqrt[m]{a}}{\sqrt[m]{b}}$
4. $a\sqrt[m]{b}=\sqrt[m]{a^m\cdot b}$
5. $\sqrt[n]{\sqrt[m]{a}}=\sqrt[nm]{a}$
6. $(\sqrt[n]{a})^m=\sqrt[n]{a^m}$
7. $\sqrt[n]{a}=\sqrt[nm]{a^m}$
8. $(\sqrt[n]{a})^n=a$
9. $\sqrt[2n+1]{-a}=-\sqrt[2n+1]{a}$

(00-3-17) Soddalashtiring.

$$\frac{a-a\sqrt{a}}{\sqrt[3]{a^2}+\sqrt[6]{a^5}+a}+\frac{\sqrt[3]{a^2}-a}{\sqrt[3]{a}+\sqrt{a}}+2\sqrt{a}$$

A) $2\sqrt[3]{a}$ B) $2\sqrt{a}$ C) $\sqrt[3]{a}+2\sqrt{a}$ D) 0 E) $\frac{1}{\sqrt[3]{a}}$

Yechish: $\sqrt[6]{a}=x$ deb belgilaymiz. U holda $a=x^6$, $\sqrt[3]{a^2}=x^4$, $\sqrt{a}=x^3$, $\sqrt[3]{a}=x^2$ bo'ladi. U holda berilgan ifoda

$$\frac{x^6-x^6\cdot x^3}{x^4+x^5+x^6}+\frac{x^4-x^6}{x^2+x^3}+2x^3$$

ko'rinishga keladi. Uni soddalashtiramiz:

$$\frac{x^6(1-x^3)}{x^4(1+x+x^2)}+\frac{x^4(1-x^2)}{x^2(1+x)}+2x^3=$$

$$=\frac{x^2(1-x)(1+x+x^2)}{1+x+x^2}+\frac{x^2(1-x)(1+x)}{1+x}+2x^3=$$

$$=x^2(1-x)+x^2(1-x)+2x^3=x^2-x^3+$$

$$+x^2-x^3+2x^3=2x^2=2\sqrt[3]{a}$$

J: $2\sqrt[3]{a}$(A)

1. (99-5-5) Soddalashtiring.

$$\frac{27a+1}{9a^{\frac{2}{3}}-3\sqrt[3]{a}+1}-\frac{27a-1}{9\sqrt[3]{a^2}+3a^{\frac{1}{3}}+1}$$

A) $\sqrt[3]{a}-1$ B) 1 C) 2 D) $a+1$ E) $a-3$

2. (99-8-16) $\frac{1}{243}$ sonini 9 asosli daraja shaklida ifodalang.
A) $9^{-5/2}$ B) $9^{-3/4}$ C) $9^{-5/3}$ D) $9^{-3/2}$ E) $9^{-5/4}$

3. (97-4-3) Eng katta son berilgan javobni toping.
A) $\sqrt{15}$ B) $\sqrt[3]{65}$ C) $\sqrt[4]{81}$ D) 4 E) $\sqrt[4]{4^3}$

4. (97-9-63) Eng katta sonni toping.
A) 3 B) $\sqrt[3]{26}$ C) $\sqrt{10}$ D) $\sqrt[4]{82}$ E) $\sqrt[5]{242}$

5. (98-5-7) Hisoblang.

$$\frac{15^{\frac{2}{3}}\cdot 3^{\frac{1}{3}}}{5^{-\frac{1}{3}}}$$

A) 45 B) 15 C) 5 D) 3 E) 30

6. (98-9-27) Soddalashtiring.

$$\frac{a^{2/3}\cdot b^{2/3}\cdot((ab)^{-1/6})^4}{(ab)^{-8/3}}$$

A) $(ab)^{4/3}$ B) $-(ab)^{4/3}$ C) $(ab)^3$
D) $(ab)^{5/3}$ E) $(ab)^{8/3}$

7. (98-4-9) Hisoblang.

$$\frac{(\frac{1}{49})^{-\frac{1}{2}}-(\frac{1}{8})^{-\frac{1}{3}}}{64^{\frac{2}{3}}}$$

A) $\frac{3}{4}$ B) $\frac{5}{16}$ C) $\frac{2}{5}$ D) $\frac{4}{7}$ E) $\frac{5}{6}$

8. (99-7-9) Hisoblang.

$$\frac{30^{\frac{1}{3}}\cdot 3^{\frac{2}{3}}}{10^{-\frac{2}{3}}}$$

A) 15 B) 20 C) 60 D) 45 E) 30

9. (00-10-5) Hisoblang.

$$\left[65\cdot\left(4^{1/4}\right)^{-12}+\frac{2^{-5}}{-2}\right]^{-1}$$

A) $\frac{1}{2}$ B) 2 C) $\frac{1}{4}$ D) $\frac{1}{8}$ E) 1

10. (00-3-6) Hisoblang.

$$0,027^{-\frac{1}{3}}-\left(-\frac{1}{6}\right)^{-2}+256^{\frac{3}{4}}-3^{-1}+5,5^0$$

A) 33 B) 32,97 C) 31 D) 32 E) 31,99

11. (98-9-18) Agar $n=81$ bo'lsa, $\sqrt[3]{n\sqrt{n}}$ qiymati qanchaga teng bo'ladi?
A) 3 B) 6 C) 9 D) 4 E) 5

12. (98-11-55) Agar $a>0$, $b>0$ va $c<0$ bo'lsa, $\sqrt[3]{a^3b^3c^3}$ quyidagilarning qaysi biriga teng bo'ladi?
A) $a|bc|$ B) $-abc$ C) $ab|c|$ D) $|abc|$ E) abc

13. (98-11-59) Hisoblang.

$$\frac{\sqrt[3]{-24}+\sqrt[3]{81}+\sqrt[3]{192}}{\sqrt[3]{-375}}$$

A) -1 B) 1 C) $-\frac{83}{125}$ D) $\frac{83}{125}$ E) $0,99$

14. (99-2-12) Hisoblang.

$$\sqrt{3\cdot\sqrt[3]{18}}\cdot\sqrt[6]{96}$$

A) 6 B) 18 C) 9 D) 10 E) 12

15. (99-8-17) Hisoblang.

$$\sqrt[7]{243\cdot 81^2\cdot 9^4}$$

A) 27 B) 81 C) 9 D) $9\sqrt[7]{3}$ E) $27\sqrt[7]{3}$

16. (00-8-29) Sonlarni o'sish tartibida joylashtiring.

$$1;\quad \sqrt{2};\quad \sqrt[3]{3};\quad \sqrt[4]{4}$$

A) $1;\sqrt{2}=\sqrt[4]{4};\sqrt[3]{3}$ B) $1;\sqrt[3]{3};\sqrt{2};\sqrt[4]{4}$
C) $\sqrt[3]{3};\sqrt{2}=\sqrt[4]{4};1$ D) $\sqrt{2}=\sqrt[4]{4};\sqrt{3};1$
E) $\sqrt[3]{3};1;\sqrt[4]{4};\sqrt{2}$

17. (00-10-1) Hisoblang.

$$\left[\left(\frac{1}{33}\right)^{-1}\cdot(\sqrt[4]{4})^{-12}+\frac{2^{-5}}{-2}\right]^{-1}$$

A) $\frac{1}{2}$ B) 4 C) 2 D) $\frac{1}{4}$ E) $0,75$

18. (98-7-8) Sonlardan qaysilari irratsional sonlar?
$m=\sqrt[4]{256},\ \ \pi=3,141516....,$
$p=\sqrt{\sqrt{\sqrt{81}}+13},\ \ q=\frac{1}{\sqrt{2}}$
A) p,q B) m,p C) m,n
D) π,q E) hammasi

19. (98-12-7) Ushbu $m=\sqrt[4]{2,56},\ \ n=3,4(25),$
$p=3,142...,\ \ q=\sqrt{\sqrt{\sqrt{16}}+2}$ sonlardan qaysilari irratsional sonlar hisoblanadi?
A) m,p B) p,q C) m,q
D) p E) hammasi

20. (98-1-35) Hisoblang.

$$\sqrt[3]{2\sqrt{6}-5}\cdot\sqrt[6]{49+20\sqrt{6}}$$

A) 1 B) -1 C) $4\sqrt{6}$ D) 2 E) $-2\sqrt{6}$

21. (98-5-2) Hisoblang.

$$\sqrt[3]{9+\sqrt{73}}\cdot\sqrt[3]{9-\sqrt{73}}$$

A) 2 B) 3 C) 4 D) 1 E) 6

22. (98-7-18) Soddalashtiring.

$$\sqrt{2\sqrt{2}-1}\cdot\sqrt[4]{9+4\sqrt{2}}$$

A) 7 B) $\sqrt[4]{7}$ C) $2\sqrt{2}+1$ D) $\sqrt{7}$ E) $\sqrt{8}-1$

23. (98-8-35) Hisoblang.

$$\sqrt{3-2\sqrt{2}}\cdot\sqrt[4]{17+12\sqrt{2}}$$

A) $6\sqrt{2}$ B) 2 C) 4 D) 1 E) $5-2\sqrt{2}$

24. (98-11-5) Soddalashtiring.

$$\sqrt[3]{80+48\sqrt{3}}$$

A) $4\sqrt{3}+1$ B) $2\sqrt{3}+2$ C) $4\sqrt{2}+2$
D) $3\sqrt{2}+2$ E) $2\sqrt{3}+1$

25. (98-12-13) Hisoblang.

$$\left(\sqrt[6]{9+4\sqrt{5}}+\sqrt[3]{\sqrt{5}+2}\right)\cdot\sqrt[3]{\sqrt{5}-2}$$

A) 2 B) 1 C) 3 D) 4 E) 6

26. (98-12-17) Soddalashtiring.

$$\sqrt[4]{97+56\sqrt{3}}$$

A) $\sqrt{3}+2$ B) $\sqrt{2}+3$ C) $\sqrt{2}+\sqrt{3}$
D) $7+4\sqrt{3}$ E) $\sqrt{3}+3$

27. (00-3-2) Hisoblang.

$$\sqrt[3]{216\cdot 512}+\sqrt[5]{32\cdot 243}$$

A) 45 B) 48 C) 49 D) 50 E) 54

28. (00-7-18) Hisoblang.

$$\frac{\sqrt[4]{3+2\sqrt{2}}}{\sqrt{\sqrt{2}+1}}$$

A) 2 B) $1,5$ C) $0,5$ D) $\frac{2}{3}$ E) 1

29. (00-8-55) Hisoblang.

$$\sqrt[3]{2-\sqrt{3}}\cdot\sqrt[6]{7+4\sqrt{3}}$$

A) 1 B) -1 C) 0 D) 7 E) 2

30. (00-8-56) Hisoblang.

$$\sqrt[6]{3-2\sqrt{2}}:\sqrt[3]{\sqrt{2}-1}$$

A) 3 B) 2 C) 1 D) -1 E) 0

31. (99-10-3) Ifodani hisoblang.

$$\sqrt[4]{\frac{4,1^3-2,15^3}{1,95}+4,1\cdot 2,15}$$

A) $1,5$ B) $1,75$ C) $2,25$ D) $2,75$ E) $2,5$

32. (98-11-16) Soddalashtiring.

$$b\cdot\sqrt{ab}\sqrt[3]{ab}\cdot\left(a\sqrt[3]{a^2b^2\cdot\sqrt{ab}}\right)^{-1}$$

A) $b\cdot a^{-2}$ B) $b^{-2}\cdot a$ C) $b^{-1}\cdot a$
D) $b\cdot a^{-1}$ E) $b\cdot a$

33. (97-9-81) Soddalashtiring.

$$\frac{\sqrt[3]{x^2}+2\sqrt[3]{x}+1}{x+3\sqrt[3]{x^2}+3\sqrt[3]{x}+1}-\frac{1}{\sqrt[3]{x}+1}$$

A) 1 B) $\frac{1}{\sqrt[3]{x}+1}$ C) $\sqrt[3]{x}$ D) 0 E) $\sqrt[3]{x}+1$

34. (98-11-62) Qisqartiring.

$$\frac{x^{\sqrt[4]{\pi}}-y^{\sqrt[4]{\pi}}}{x^{2\sqrt[4]{\pi}}-y^{2\sqrt[4]{\pi}}}$$

A) $\frac{1}{x^{\sqrt[4]{\pi}}+y^{\sqrt[4]{\pi}}}$ B) $x^{\sqrt{\pi}}+y^{\sqrt{\pi}}$ C) $x^{\sqrt{\pi}}-y^{\sqrt{\pi}}$
D) $\frac{1}{x^{\sqrt[4]{\pi}}-y^{\sqrt[4]{\pi}}}$ E) $x^{\frac{\pi}{2}}+y^{\frac{\pi}{2}}$

35. (99-9-2) Agar $a=27$ bo'lsa,

$$\left(\frac{a-b}{\sqrt[3]{a}-\sqrt[3]{b}}+\sqrt[3]{ab}\right):\left(\sqrt[3]{a}+\sqrt[3]{b}\right)+$$

$$+\left(\sqrt[3]{a^2}-\sqrt[3]{b^2}\right):\left(\sqrt[3]{a}+\sqrt[3]{b}\right)$$

ning qiymatini hisoblang.
A) 4 B) 4,5 C) 5 D) 6 E) 6,5

36. (00-1-7) Soddalashtiring. Bunda $(b>a>0)$.

$$\sqrt{\frac{a^{\frac{3}{2}}-b^{\frac{3}{2}}}{a^{\frac{1}{2}}-b^{\frac{1}{2}}}+a^{\frac{1}{2}}\cdot b^{\frac{1}{2}}}-\sqrt{\frac{a^{\frac{3}{2}}+b^{\frac{3}{2}}}{a^{\frac{1}{2}}+b^{\frac{1}{2}}}-a^{\frac{1}{2}}\cdot b^{\frac{1}{2}}}$$

A) $2\sqrt{a}$ B) $2\sqrt{b}$ C) $2(\sqrt{b}-\sqrt{a})$
D) $2(\sqrt{a}-\sqrt{b})$ E) $2\sqrt{b}-\sqrt{a}$

37. (97-1-18) Soddalashtiring.

$$\left[\frac{x^{\frac{1}{2}}-y^{\frac{1}{2}}}{x-y}-\frac{1}{x^{\frac{1}{2}}-y^{\frac{1}{2}}}\right]\cdot\frac{x+2x^{\frac{1}{2}}\cdot y^{\frac{1}{2}}+y}{4y^{\frac{1}{2}}}$$

A) $\sqrt{x}+\sqrt{y}$ B) $\frac{1}{\sqrt{x}-\sqrt{y}}$ C) 1
D) $-\frac{1}{2}$ E) $\frac{\sqrt{x}+\sqrt{y}}{2(\sqrt{y}-\sqrt{x})}$

38. (97-6-18) Soddalashtiring.

$$\left(\frac{a^{0,5}-b^{0,5}}{a^{0,5}+b^{0,5}}+\frac{2a^{0,5}\cdot b^{0,5}}{a-b}\right)\cdot\frac{b-2a^{0,5}\cdot b^{0,5}+a}{a+b}$$

A) $\frac{1}{\sqrt{a}+\sqrt{b}}$ B) 0,3 C) $a^{0,5}-b^{0,5}$
D) -1 E) $\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}}$

39. (97-11-18) Soddalashtiring.

$$\frac{a+b}{a+2a^{0,5}\cdot b^{0,5}+b}:\left(\frac{a^{0,5}+b^{0,5}}{a^{0,5}-b^{0,5}}-\frac{2a^{0,5}\cdot b^{0,5}}{a-b}\right)$$

A) $\sqrt{a}+\sqrt{b}$ B) $\frac{1}{\sqrt{a}-\sqrt{b}}$ C) $\frac{2\sqrt{ab}}{\sqrt{a}+\sqrt{b}}$
D) 1 E) $\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}}$

40. (98-5-17) $(a^{\frac{1}{2}}-b^{\frac{1}{2}})(a+a^{\frac{1}{2}}\cdot b^{\frac{1}{2}}+b)$ ni soddalashtiring, so'ng a va b lar daraja ko'rsatkichlarining yig'indisini hisoblang.
A) 2 B) 1 C) 4 D) $1\frac{1}{2}$ E) 3

41. (98-5-18) Soddalashtiring.

$$\frac{(5b^{\frac{1}{4}}+10)(b^{\frac{3}{4}}-2b^{\frac{1}{2}})}{b-4b^{\frac{1}{2}}}$$

A) $1\frac{1}{4}$ B) $\frac{1}{5}$ C) 1 D) 5 E) -2

42. (98-10-44) Soddalashtiring. Bunda $(a>b)$.

$$\sqrt{a-2a^{\frac{1}{2}}\cdot b^{\frac{1}{2}}+b}-\frac{a-b}{a^{\frac{1}{2}}-b^{\frac{1}{2}}}$$

A) $2b^{\frac{1}{2}}$ B) $2a^{\frac{1}{2}}$ C) $-2b^{\frac{1}{2}}$
D) $-2a^{\frac{1}{2}}$ E) $2a^{\frac{1}{2}}-2b^{\frac{1}{2}}$

43. (99-2-11) Agar $a=8$, $b=2$ bo'lsa,

$$\frac{a^{\frac{3}{2}}-b^{\frac{3}{2}}}{a^{\frac{1}{2}}-b^{\frac{1}{2}}}-\frac{a^{\frac{3}{2}}+b^{\frac{3}{2}}}{a^{\frac{1}{2}}+b^{\frac{1}{2}}}$$

ning qiymati nechaga teng?
A) 10 B) 6 C) 8 D) 12 E) 4

44. (99-7-19) $(a^{\frac{1}{2}}+b^{\frac{1}{2}})(a-a^{\frac{1}{2}}\cdot b^{\frac{1}{2}}+b)$ ni soddalashtirib, a va b asosli darajalar ko'rsatkichlarining yig'indisini toping.
A) 1 B) 4 C) 2 D) 0 E) 3

45. (99-7-20) Kasrni qisqartiring.

$$\frac{(30-15a^{\frac{1}{4}})\cdot(2a^{\frac{1}{4}}+a^{\frac{1}{2}})}{8a^{\frac{1}{4}}-2a^{\frac{3}{4}}}$$

A) 15 B) 10 C) 7,5 D) $-7,5$ E) -10

46. (99-10-17) Agar $a=0,16$, $b=0,81$ bo'lgandagi ifodaning qiymatini hisoblang.

$$\left(\frac{a^{\frac{3}{2}}+b^{\frac{3}{2}}}{(a^{\frac{1}{2}}+b^{\frac{1}{2}})^2}-\frac{a^{\frac{1}{2}}\cdot b^{\frac{1}{2}}}{a^{\frac{1}{2}}+b^{\frac{1}{2}}}\right)\cdot(a-b)$$

A) $-\frac{1}{4}$ B) $-\frac{1}{8}$ C) $\frac{1}{3}$ D) $-\frac{1}{5}$ E) $\frac{1}{6}$

47. (00-2-20) Soddalashtiring. $(a\geq 1)$.

$$\sqrt{a^{\frac{2}{3}}-2a^{-\frac{1}{3}}+a^{-\frac{4}{3}}}:a^{-\frac{2}{3}}$$

A) $a-2$ B) a^2-1 C) $a-1$
D) $\sqrt{a-1}$ E) $\sqrt{a^2-1}$

48. (00-8-53) Soddalashtiring.

$$\frac{a^{\frac{3}{4}}-36a^{\frac{1}{4}}}{a^{\frac{1}{2}}-6a^{\frac{1}{4}}}$$

A) $\sqrt[4]{a}-6$ B) $\sqrt[4]{a}+6$ C) $\sqrt{a}-6$
D) $\sqrt{a}+6$ E) $a+6$

49. (00-9-14) Soddalashtiring.

$$\frac{729a+1}{81\sqrt[3]{a^2}-9a^{\frac{1}{3}}+1}-\frac{729a-1}{81a^{\frac{2}{3}}+9\sqrt[3]{a}+1}$$

A) 1 B) 2 C) 3 D) 9 E) $a+2$

50. (01-2-56) Hisoblang.

$$\frac{\sqrt[5]{17}}{\sqrt[5]{544}}+\frac{\sqrt[3]{54}}{\sqrt[3]{128}}$$

A) 1 B) $1,2$ C) $1,25$ D) $1,5$ E) $1,75$

51. (01-3-22) Hisoblang.

$$\sqrt{3+2\sqrt{2}}\cdot\sqrt[4]{17-12\sqrt{2}}$$

A) 2 B) 1 C) $\sqrt{2}$ D) $2\sqrt{2}$ E) 3

52. (01-6-24) Soddalashtiring.

$$\frac{\sqrt{\sqrt{a^3}+\sqrt[12]{a^9}}}{a\sqrt[4]{a}\cdot\sqrt{a}}$$

A) $2a^{-2}$ B) $2a^{-1}$ C) a^{-1} D) a^{-2} E) $2a^{-3}$

53. (01-6-32) Ushbu

$$\left(\frac{x^{\frac{3}{2}}-y^{\frac{3}{2}}}{x^{\frac{1}{2}}-y^{\frac{1}{2}}}-x-y\right)\cdot x^{\frac{1}{3}}\cdot y^{\frac{1}{3}}$$

ifodaning $x=16^{\frac{1}{3}}$ va $y=4^{\frac{1}{3}}$ bo'lgandagi qiymatini hisoblang.
A) 2 B) 4 C) $2\sqrt[3]{4}$ D) 3 E) $2\sqrt[3]{2}$

54. (01-6-33) Ushbu

$$a=(\frac{1}{3})^{\sqrt{3}},\ \ b=\sqrt[4]{3^6}\ \ va\ \ c=(\sqrt{3})^{\frac{1}{2}}$$

sonlarni o'sish tartibida joylashtiring.
A) $a<b<c$ B) $a<c<b$
C) $c<b<a$ D) $c<a<b$
E) $b<a<c$

55. (01-9-7) Ushbu

$$\sqrt{4-2\sqrt{2}}\cdot\sqrt[4]{6+4\sqrt{2}}$$

ifodaning qiymatini toping.
A) 2 B) 1 C) 3 D) 4 E) 6

56. (01-10-21) Hisoblang.

$$\frac{\sqrt[3]{(5+2\sqrt{6})^2}}{\sqrt[3]{5-\sqrt{24}}}-13-2\sqrt{6}$$

A) -1 B) -3 C) -7 D) -8 E) -11

57. (02-1-1) $\sqrt[3]{2\sqrt{2\sqrt[3]{2}}}$ ni hisoblang.
A) $\sqrt[9]{32}$ B) $\sqrt[3]{16}$ C) $\sqrt[3]{8}$ D) $\sqrt[9]{64}$ E) 64

58. (02-1-10) $\sqrt[3]{a}=\sqrt[3]{c}-\sqrt[3]{b}$ bo'lsa, $(a+b-c)^3$ ni toping.
A) $-27abc$ B) $-81abc$ C) $-81a^2b^2c^2$
D) $-27abc^2$ E) $81abc$

59. (02-1-20) Soddalashtiring.

$$\frac{\sqrt{a^3b}\cdot\sqrt[3]{a^4}+\sqrt{a^4b^3}:\sqrt[6]{a}}{(b^2-ab-2a^2)\cdot\sqrt{ab}}$$

A) $\frac{a\sqrt[3]{a}}{b-2a}$ B) $a\sqrt[3]{a}$ C) $\frac{b-2a}{\sqrt{a}}$
D) $a\sqrt{a}$ E) $\frac{a\sqrt{a}}{a^2}$

60. (02-3-6)

$$\sqrt[4]{68+8\sqrt{72}}\cdot\sqrt[8]{4-\sqrt{15}}\cdot\sqrt[8]{4+\sqrt{15}}+1$$

ni soddalashtiring.
A) $3+\sqrt{2}$ B) $1+\sqrt{3}$ C) $\sqrt{2}+\sqrt{3}$
D) $2\sqrt{2}$ E) $2+\sqrt{2}$

61. (02-5-3) $a=\sqrt{3},\ \ b=\sqrt[3]{5}\ \ va\ \ c=\sqrt[4]{7}$ sonlarni o'sish tartibida joylashtiring.
A) $a<b<c$ B) $c<b<a$
C) $b<a<c$ D) $b<c<a$
E) $c<a<b$

62. (02-7-44) Hisoblang.

$$\sqrt[3]{2000\cdot1998-1997\cdot2001+5}$$

A) 2 B) 3 C) $\sqrt[3]{17}$ D) 4 E) $\sqrt[3]{13}$

63. (02-10-7)

$$\left(\frac{9}{a+8}-\frac{a^{\frac{1}{3}}+2}{a^{\frac{2}{3}}-2a^{\frac{1}{3}}+4}\right)\cdot$$

$$\cdot\frac{a^{\frac{4}{3}}+8a^{\frac{1}{3}}}{1-a^{\frac{2}{3}}}+\frac{5-a^{\frac{2}{3}}}{1+a^{\frac{1}{3}}}$$

ni soddalshtiring.
A) 5 B) $\frac{1}{1-a}$ C) $\frac{2}{1-a^{\frac{2}{3}}}$ D) 4 E) $a+1$

64. (02-10-9)

$$\left(3\frac{3}{8}\right)^{-\frac{2}{3}}+27^{\frac{2}{3}}\cdot9^{0,5}\cdot3^{-2}+\left(\left(\frac{7}{9}\right)^3\right)^0-\left(-\frac{1}{2}\right)^{-2}$$

ni hisoblang.
A) $\frac{4}{9}$ B) $\frac{8}{9}$ C) 1 D) 0 E) $1\frac{2}{3}$

65. (02-10-42) $m=(\frac{4}{7})^{-\frac{2}{3}},\ \ n=(\frac{49}{16})^{\frac{4}{3}}\ \ va\ \ k=(\frac{16}{49})^{-\frac{1}{4}}$ sonlarini o'sish tartibida joylashtiring.
A) $k<m<n$ B) $m<k<n$
C) $m<n<k$ D) $k<n<m$
E) $n<m<k$

66. (02-11-6) $a=\sqrt{45\cdot10\cdot18},\ \ va\ \ b=\sqrt[3]{16\cdot36\cdot81}$ sonlarning eng kichik umumiy karralisi va eng katta umumiy bo'luvchisi ayirmasini toping.
A) 54 B) 72 C) 154 D) 162 E) 172

67. (02-12-34)

$$a=\sqrt[3]{2},\ \ b=\sqrt[4]{3}\ \ va\ \ c=\sqrt[6]{5}$$

sonlarni o'sish tartibida joylashtiring.
A) $a<b<c$ B) $c<b<a$
C) $a<c<b$ D) $b<a<c$
E) $c<a<b$

68. (01-5-5) Soddalashting.

$$\frac{a-b}{a+b+2\sqrt{ab}}:\frac{a^{-\frac{1}{2}}-b^{-\frac{1}{2}}}{a^{-\frac{1}{2}}+b^{-\frac{1}{2}}}$$

A) -1 B) $a+b$ C) $\frac{1}{a-b}$ D) $\frac{ab}{a+b}$ E) $\sqrt{ab}$

69. (01-6-34) Soddalashting.

$$\left(\frac{a^{\frac{1}{2}}+1}{a^{\frac{1}{2}}-1}+\frac{a^{\frac{1}{2}}-1}{a^{\frac{1}{2}}+1}-\frac{4}{a-1}\right)^{-3}$$

A) $\frac{3}{8}$ B) $\frac{5}{8}$ C) $\frac{1}{8}$ D) $\frac{3}{4}$ E) $\frac{1}{2}$

70. (02-12-44) Agar $a=729$ bo'lsa,

$$\frac{a^{\frac{4}{3}}-8a^{\frac{1}{3}}}{a^{\frac{2}{3}}+2a^{\frac{1}{3}}+4}:(\sqrt[3]{a}-2)$$

ning qiymatini toping.
A) 9 B) 6 C) 12 D) 15 E) 3

71. (99-8-5) Hisoblang.

$$\sqrt[3]{5\sqrt{2}-7}$$

A) $\sqrt{2}-2$ B) $1-\frac{\sqrt{2}}{2}$ C) $\frac{\sqrt{2}}{2}-1$
D) $1-\sqrt{2}$ E) $\sqrt{2}-1$

72. (03-1-59) Soddalashtiring.

$$\frac{2a^{-\frac{1}{3}}}{a^{\frac{2}{3}}-3a^{-\frac{1}{3}}}-\frac{a^{\frac{2}{3}}}{a^{\frac{5}{3}}-a^{\frac{2}{3}}}-\frac{a+1}{a^2-4a+3}$$

A) 0 B) 1 C) -1 D) $\frac{a-1}{a+1}$ E) $\frac{a}{a-3}$

73. (03-4-9) Agar $x=256$ bo'lsa,

$$\frac{x-1}{x^{\frac{3}{4}}+x^{\frac{1}{2}}}\cdot\frac{x^{\frac{1}{2}}+x^{\frac{1}{4}}}{x^{\frac{1}{2}}+1}\cdot x^{\frac{1}{4}}+1$$

ning qiymatini toping.
A) 14 B) 15 C) 16 D) 13 E) 12

74. (03-4-18)

$$\sqrt[3]{16+16\sqrt{2}}\cdot\sqrt[6]{48-32\sqrt{2}}$$

ni hisoblang.
A) 2 B) 6 C) 4 D) 8 E) 5

75. (03-4-28) $a=64$ bo'lganda,

$$\frac{a^{\frac{4}{3}}-8a^{\frac{1}{3}}b}{a^{\frac{2}{3}}+2a^{\frac{1}{3}}b^{\frac{1}{3}}+4b^{\frac{2}{3}}}:\left(1-\frac{2b^{\frac{1}{3}}}{a^{\frac{1}{3}}}\right)-4a^{\frac{2}{3}}$$

ning qiymatini hisoblang.
A) -46 B) -48 C) -44 D) -50 E) -42

76. (03-5-5)

$$\left(\left(\sqrt[4]{2}-\sqrt[4]{8}\right)^2+5\right)\cdot\left(\left(\sqrt[4]{2}+\sqrt[4]{8}\right)^2-5\right)$$

ni hisoblang.
A) 17 B) 16 C) 20 D) $17\sqrt{2}$ E) 25

77. (03-5-10)

$$\frac{\sqrt[3]{26-15\sqrt{3}}\cdot(2-\sqrt{3})}{7-4\sqrt{3}}$$

ni soddalashtiring.
A) 1 B) $\frac{1}{2}$ C) $2-\sqrt{3}$ D) 2 E) 3

78. (03-6-46)

$$\sqrt[3]{1-\sqrt{3}}\cdot\sqrt[6]{4+2\sqrt{3}}$$

ni hisoblang.
A) $-\sqrt{2}$ B) $\sqrt[3]{2}$ C) $-\sqrt[3]{2}$ D) $\sqrt{2}$ E) $\sqrt[3]{3}$

79. (03-6-54)

$$1^{-0,43}-0,008^{-\frac{1}{3}}+(15,1)^0$$

ni hisoblang.
A) 5 B) -3 C) -4 D) -5 E) -2

80. (03-7-11) Agar $x=\sqrt[8]{\frac{32\sqrt{2}}{\sqrt{8}}}$ bo'lsa, quyidagilardan qaysi biri butun son bo'ladi?
A) x B) x^2 C) x^3 D) x^5 E) x^7

81. (03-7-51)

$$\left((a^{-\frac{3}{2}}b)(ab^{-2})^{-\frac{1}{2}}(a^{-1})^{-\frac{2}{3}}\right)^3$$

ni soddalashtiring.
A) $\frac{1}{a^4\cdot b^6}$ B) $a^4\cdot b^6$ C) $\frac{a^4}{b^6}$ D) $\frac{b^6}{a^4}$ E) $a^2\cdot b^3$

82. (03-8-5) $a=\sqrt{42\cdot 63\cdot 24}$ *va* $b=\sqrt[3]{512\cdot 49\cdot 56}$ sonlarining eng katta umumiy bo'luvchisi shu sonlarning eng kichik umumiy karralisining necha foizini tashkil etadi.
A) $2,5$ B) $2,(5)$ C) $2,7$ D) $2,(7)$ E) 3

83. (03-8-6)

$$\left(\sqrt[4]{13}\cdot\sqrt[3]{\frac{\sqrt[4]{13}-1}{(\sqrt[4]{13}+1)^2}}+\frac{\sqrt[4]{13}-1}{\sqrt[3]{(\sqrt{13}-1)^2}}\right)^{\frac{3}{5}}\cdot$$

$$\cdot(\sqrt{13}-1)^{\frac{4}{5}}$$

ni hisoblang.
A) $\sqrt{13}+1$ B) $\sqrt{13}-1$ C) 12
D) $(\sqrt{13}-1)^{-1}$ E) $2\sqrt{13}$

84. (03-8-9)

$$\frac{2}{2+\sqrt[3]{2}+\sqrt[3]{4}}$$

kasrning maxrajini irratsionallikdan qutqaring.
A) $2-\sqrt[3]{4}$ B) $1-\sqrt[3]{4}$ C) $1+\sqrt[3]{4}$
D) $\sqrt[3]{2}$ E) $\sqrt[3]{4}$

85. (03-8-14)

$$\frac{x^2-2x\sqrt{3}-\sqrt[3]{4}+3}{x-\sqrt{3}}$$

ifodaning $x=\sqrt{3}-\sqrt[3]{2}$ bo'lgandagi qiymatini toping.
A) $\sqrt{3}$ B) $\sqrt[3]{2}$ C) 1 D) 0 E) $\frac{\sqrt{3}}{2}$

86. (03-8-49)

$$ab\cdot\left(\frac{a^{1-n}}{b^n}-\frac{b^{1-n}}{a^n}\right)^{\frac{1}{n}}\cdot\frac{1}{\sqrt[n]{a-b}}$$

ni soddalashtiring.
A) 1 B) ab C) $\sqrt{ab}$ D) 0 E) $\sqrt{a-b}$

1.5 Tenglamalar.

1.5.1 Chiziqlli tenglamalar. Proportsiya.

1. $ax+b=cx+d$ tenglamaning yechimi:
   $x=\frac{d-b}{a-c}$ $(a\neq c)$

(97-11-6) Tenglamani yeching.

$$\frac{x-3}{6}+x=\frac{2x-1}{3}-\frac{4-x}{2}$$

A) 3 B) 2 C) -2 D) -4 E) $\emptyset$
Yechish: Tenglamani undagi kasrlarning umumiy maxraji 6 ga ko'paytiramiz:

$$x-3+6x=2(2x-1)-3(4-x)$$

Qavslarni ochamiz:

$$x-3+6x=4x-2-12+3x$$

x li hadlarni chap qismga, qolgan hadlarni o'ng qismga o'tkazamiz:

$$7x-7x=-14+3,\ \ 0=-11.$$

Noto'g'ri tenglik hosil qildik. Bu esa berilgan tenglama ildiziga ega emasligini bildiradi. J: $\emptyset$ (E).

1. (96-7-3) Tenglamani yeching.

$$6,4\cdot(2-3x)=6\cdot(0,8x-1)+6,8$$

A) 5 B) $-0,5$ C) $0,5$ D) -2 E) $2,5$

2. (99-4-12) Tenglamani yeching.

$$4,5-1,6\cdot(5x-3)=1,2\cdot(4x-1)-15,1$$

A) 20 B) 2 C) $0,2$ D) $0,5$
E) to'g'ri javob keltirilmagan

3. (96-7-7) Tenglamani yeching:

$$\left(18\frac{1}{3}+x\right):3\frac{1}{7}=7$$

A) $4\frac{1}{3}$ B) $3\frac{2}{3}$ C) $3\frac{1}{3}$ D) $5\frac{2}{3}$ E) $4\frac{2}{3}$

4. (97-1-6) Tenglamani yeching.

$$\frac{3x-11}{4}-\frac{3-5x}{8}=\frac{x+6}{2}$$

A) 5 B) $-4,5$ C) $6,5$ D) 7 E) 8

5. (97-3-3) Tenglamani yeching.

$$0,7(6y-5)=0,4(y-3)-1,16$$

A) $0,3$ B) -3 C) $-0,3$ D) 2 E) 30

6. (97-3-7) Tenglamani yeching.

$$(x+2\frac{22}{25}):7\frac{1}{3}=3$$

A) $20\frac{22}{25}$ B) $19\frac{22}{25}$ C) $19\frac{3}{25}$
D) $18\frac{3}{25}$ E) $18\frac{28}{25}$

7. (97-6-6) Tenglamani yeching.

$$6-\frac{x-1}{2}=\frac{3-x}{2}+\frac{x-2}{3}$$

A) $4,5$ B) 8 C) 17 D) 11 E) 14

8. (97-7-3) Tenglamani yeching.

$$0,9(4x-2)=0,5(3x-4)+4,4$$

A) $1,2$ B) $2,5$ C) -3 D) 2 E) $0,2$

9. (97-7-7) Tenglamani yeching.

$$(x+3\frac{2}{9}):4\frac{1}{6}=6$$

A) $22\frac{2}{9}$ B) $21\frac{7}{9}$ C) $22\frac{1}{3}$ D) $20\frac{4}{9}$ E) $21\frac{5}{6}$

10. (97-10-3) Tenglamani yeching.

$$0,2(5y-2)=0,3(2y-1)-0,9$$

A) 2 B) $0,2$ C) -2 D) $-1,2$ E) $2\frac{1}{2}$

11. (97-10-7) Tenglamani yeching:

$$\left(3\frac{19}{22}+x\right):4\frac{1}{5}=5$$

A) $17\frac{19}{22}$ B) $18\frac{3}{22}$ C) $17\frac{3}{22}$ D) 21 E) $18\frac{3}{11}$

12. (98-1-4) Tenglamani yeching.

$$2,8x-3(2x-1)=2,8-3,19x$$

A) -20 B) 20 C) -2 D) 200 E) $0,2$

13. (98-7-1) x ni toping.

$$420:(160-1000:x)=12$$

A) 8 B) $\frac{1}{8}$ C) 35 D) 36 E) -8

14. (98-8-4) Tenglamani yeching.

$$5,6-7(0,8x+1)=14-5,32x$$

A) $5,5$ B) 55 C) -55 D) $-5,5$ E) 50

15. (98-12-1) x ni toping.

$$(360+x)\cdot1002=731460$$

A) 370 B) 270 C) 470 D) 730 E) 1090

16. (98-12-12) Tenglamani yeching.

$$(12,5-x):5=(3,6+x):6$$

A) $5\frac{2}{11}$ B) $5\frac{3}{11}$ C) $5\frac{4}{11}$ D) $5\frac{1}{11}$ E) $5\frac{5}{11}$

17. (99-4-9) Tenglamani yeching.

$$\frac{(2x+6\frac{6}{13})}{3}=4\frac{1}{3}$$

A) $3\frac{3}{13}$ B) $3\frac{19}{26}$ C) $3\frac{7}{26}$ D) $4\frac{3}{13}$ E) $4\frac{7}{26}$

18. (99-8-11) Tenglamani yeching.

$$\frac{(x-12):\frac{3}{8}}{0,3\cdot 3\frac{1}{3}+7}=1$$

A) 25 B) 14 C) 15 D) 16 E) 18

19. (00-5-10) Tenglamani yeching.

$$1\frac{1}{12}x:2\frac{1}{12}=2\frac{3}{5}$$

A) 5 B) 3 C) $1\frac{5}{12}$ D) 4 E) $3\frac{2}{5}$

20. (96-3-72) Ushbu

$$(\alpha x-2y)(x+3y)=\alpha x^2+5xy-6y^2$$

ayniyatdagi noma'lum koeffitsent α ni toping.
A) $\frac{5}{2}$ B) 2 C) $\frac{5}{3}$ D) $\frac{7}{3}$ E) 3

21. (99-1-16) Tenglamani yeching.

$$8\cdot(3^2+1)\cdot(3^4+1)\cdot(3^8+1)\cdot\ldots\cdot(3^{128}+1)\cdot$$

$$\cdot x=3^{256}-1$$

A) 1 B) $\frac{1}{8}$ C) $\frac{1}{2}$ D) -1 E) 2

22. (96-1-6) Proportsiyaning noma'lum hadini toping.

$$2\frac{4}{5}:x=1\frac{2}{3}:2\frac{6}{7}$$

A) $\frac{1}{2}$ B) $\frac{2}{3}$ C) $4\frac{4}{5}$ D) $\frac{3}{5}$ E) $2\frac{1}{5}$

23. (96-7-12) Tenglamani yeching.

$$6,9:4,6=x:5,4$$

A) $7,1$ B) $7,7$ C) $8,1$ D) $8,4$ E) $9,2$

24. (96-9-75) Proportsiyaning noma'lum hadini toping.

$$3\frac{3}{5}:2\frac{7}{10}=3\frac{3}{4}:x$$

A) $2\frac{13}{16}$ B) $2\frac{3}{10}$ C) $3\frac{1}{3}$ D) $1\frac{15}{16}$ E) $1\frac{13}{18}$

25. (96-10-6) Proportsiyaning noma'lum hadini toping.

$$5\frac{5}{8}:7\frac{1}{2}=x:6\frac{2}{5}$$

A) $4\frac{4}{5}$ B) $3\frac{2}{5}$ C) $5\frac{1}{8}$ D) $4\frac{1}{5}$ E) $3\frac{3}{8}$

26. (97-3-12) Tenglamani yeching.

$$3,5:x=0,8:2,4$$

A) $10,5$ B) $9,2$ C) $13,5$ D) $7,8$ E) $11,5$

27. (97-7-12) Tenglamani yeching.

$$5,4:2,4=x:1,6$$

A) $3,6$ B) 4 C) $2,8$ D) $4,6$ E) $3,9$

28. (97-10-12) Tenglamani yeching.

$$0,25:1,4=0,75:x$$

A) $3,6$ B) $2,4$ C) $4,2$ D) $5,2$ E) $3,4$

29. (98-7-13) Tenglamani yeching.

$$\left(\frac{1}{3}+x\right):7=\left(\frac{3}{4}+x\right):9$$

A) $1\frac{3}{8}$ B) $1\frac{1}{8}$ C) $1\frac{5}{8}$ D) $1\frac{7}{8}$ E) $1\frac{1}{4}$

30. (01-2-59) Tenglamani yeching.

$$\frac{0,(3)+0,1(6)}{0,(319)+1,(680)}\cdot x=8^{0,(6)}$$

A) 4 B) 32 C) 2 D) 1 E) 16

31. (01-8-4) Tenglamani yeching.

$$\left(4\frac{3}{8}x+5\frac{1}{16}\right)\cdot\frac{4}{15}=\frac{5}{12}x+2\frac{2}{5}$$

A) $\frac{1}{15}$ B) $1\frac{2}{5}$ C) $\frac{3}{185}$ D) $2\frac{1}{5}$ E) $\frac{7}{15}$

32. (01-12-30) Tenglamani yeching.

$$x:2,0(6)=0,(27):0,4(09)$$

A) $1,3$ B) $1,37$ C) $1,(37)$ D) $1,(32)$ E) $1,3(7)$

33. (02-3-5) $a-2b:4:a+3b:24$ sonlar proportsiyaning ketma-ket hadlari bo'lsa, $\frac{a^2-b^2}{2ab}$ ifodaning qiymatini toping.
A) $\frac{4}{3}$ B) 2 C) 3 D) $\frac{8}{3}$ E) $\frac{7}{2}$

34. (02-3-16)

$$\frac{x}{3}+\frac{x}{15}+\frac{x}{35}+\frac{x}{63}+\frac{x}{99}+\frac{x}{143}=12$$

tenglamani yeching.
A) 26 B) 13 C) 18 D) 16 E) 24

35. (02-7-43) $986^2-319^2=2001n$ bo'lsa, n ning qiymatini toping.
A) 435 B) 443 C) 515 D) 475 E) 445

36. (02-11-9)

$$\frac{2x+3}{2}+\frac{2-3x}{3}=2,1(6)$$

tenglamani yeching.
A) $\emptyset$ B) 2 C) -2 D) $-\frac{1}{2}$
E) cheksiz ko'p yechimga ega

37. (03-3-7)

$$\frac{x}{3}-\frac{x+8}{6}=\frac{3x+2}{9}-\frac{x+11}{6}$$

tenglamani yeching.
A) -5 B) 5 C) $\emptyset$ D) -4
E) cheksiz ko'p ildizga ega

38. (03-4-1)

$$\frac{2\frac{2}{7}\cdot(-2,6)\cdot 3,5}{4}=\frac{\frac{4}{13}\cdot(-3,9)\cdot 3,25}{x}$$

proportsiyaning noma'lum hadini toping.
A) $0,68$ B) $0,7$ C) $0,75$ D) $0,78$ E) $0,74$

39. (03-7-44)
$$\frac{3+25x}{3x+7}=5$$
tenglamani yeching.
A) $-3,2$ B) $1,5$ C) $-1\frac{1}{5}$ D) $3,2$ E) -3

40. (03-7-48) Tenglamani yeching.
$$\Big(1,7:\Big(1\frac{2}{3}\cdot x-3,75\Big)\Big):\frac{8}{25}=1\frac{5}{12}$$
A) $5,2$ B) $5\frac{3}{4}$ C) 4 D) $4\frac{1}{3}$ E) $4,5$

41. (03-8-10) Tenglamani yeching.
$$\frac{0,1(6)+0,(6)}{0,(3)+1,1(6)}\cdot(x+1)=0,3(8)x$$
A) $2,(6)$ B) $-2,(6)$ C) $3,(6)$
D) $-3,(6)$ E) $-3,(3)$

42. (03-8-11)
$$\frac{3x-2}{4}+\frac{2x+3}{2}-2,5x+2=0$$
tenglamani yeching.
A) $\emptyset$ B) 4 C) 10 D) -10
E) yechimlari cheksiz ko'p

43. (03-11-55) Tenglamani yeching.
$$12\frac{1}{2}:2\frac{1}{2}=16\frac{2}{3}:y$$
A) $3\frac{1}{3}$ B) $3\frac{2}{3}$ C) $3\frac{1}{6}$ D) $3\frac{5}{6}$ E) $3\frac{1}{9}$

44. (03-11-57) Tenglamani yeching.
$$12\Big(1\frac{3}{4}x+\frac{5}{8}\Big)=-6\frac{1}{2}$$
A) $-\frac{1}{3}$ B) $-\frac{2}{3}$ C) $\frac{2}{3}$ D) $-\frac{13}{21}$ E) $\frac{3}{4}$

45. (03-11-62)
$$1,2\cdot(0,5-5x)+4,2=3\cdot(4-2,1x)$$
tenglamaning ildizi - 10 dan qancha ortiq?
A) 14 B) 24 C) 34 D) 28 E) $12,4$

1.5.2 Kvadrat tenglamalar.

Kvadrat tenglamaning umumiy ko'rinishi $ax^2+bx+c=0;\ \ (a\neq 0)$. Uning diskriminanti: $D=b^2-4ac$

1. Agar $D>0$ bo'lsa, haqiqiy ildizlari ikkita: $x_1=\frac{-b-\sqrt{D}}{2a},\ \ x_2=\frac{-b+\sqrt{D}}{2a}$.
2. Agar $D=0$ bo'lsa, haqiqiy ildizlari bitta: $x_1=x_2=\frac{-b}{2a}$.
3. Agar $D<0$ bo'lsa, haqiqiy ildizlari yo'q.
4. Kvadrat uchhadni ko'paytuvchilarga ajratish: $ax^2+bx+c=a(x-x_1)(x-x_2)$ $x_1,\ x_2$ sonlar $ax^2+bx+c=0$ tenglamaning ildizlari.

(97-2-25) Ushbu $x^2-6x+q=0$ tenglamaning ildizlaridan biri 2 ga teng. Bu tenglamaning barcha koeffitsiyentlari yig'indisini toping.
A) 2 B) -6 C) 3 D) -5 E) 4

Yechish: $x^2-6x+q=0$ tenglamaga $x_1=2$ ni qo'yib, $4-12+q=0$ ni hosil qilamiz. Bu erdan $q=8$ bo'ladi. U holda koeffitsentlar yig'indisi $1+(-6)+8=3$ ga teng. Javob: 3 (C)

1. (96-1-18) Tenglamaning nechta ildizi bor?
$$3-x=-\frac{4}{x}$$
A) 1 B) 2 C) 3 D) ildizi yo'q
E) cheksiz ko'p

2. (96-9-69) Tenglamaning nechta ildizi bor?
$$\frac{2}{x}=x+2$$
A) 3 B) 2 C) 1 D) ildizi yo'q
E) cheksiz ko'p

3. (96-10-19) Tenglamaning nechta ildizi bor?
$$x+6=-\frac{3}{x}$$
A) 1 B) 2 C) 3 D) ildizi yo'q
E) cheksiz ko'p

4. (97-5-22) $x^2+5x-6=0$ kvadrat tenglamaning kichik ildizini katta ildiziga nisbatini toping.
A) 6 B) -6 C) $\frac{1}{6}$ D) $-\frac{1}{6}$ E) 1

5. (97-9-22) Kvadrat tenglamaning kichik ildizini katta ildiziga nisbatini toping.
$$x^2+5x+6=0$$
A) $\frac{2}{3}$ B) $-\frac{1}{3}$ C) $\frac{3}{2}$ D) $-\frac{1}{2}$ E) -3

6. (98-11-70) $b^{-1}\cdot x^2=2x-b$, tenglik x ning qanday qiymatlarida to'g'ri bo'ladi?
A) b B) $\frac{b}{2}$ C) $-b$ D) $\frac{b}{2};-b$ E) 1

7. (99-10-5) Tenglama ildizlarining o'rta arifmetigi ularniing ko'paytmasidan qancha kam?
$$\frac{x^2+16}{x}=10$$
A) 13 B) 12 C) 14 D) 11 E) 10

8. (00-1-12) Ushbu
$$2x^2-26x+72=0$$
tenglama ildizlarining o'rta proportsiyanalini toping.
A) 4 B) 5 C) 7 D) 6 E) 8

9. (00-2-13) Agar $a^2+6a+9=0$ bo'lsa, $a^3+3a^2-9a-27$ ning qiymatini toping.
A) 0 B) 3 C) 1 D) 4 E) -1

10. (00-7-15) $2x^2 - 3x - 2 = 0$ va $2x^2 - 5x + 2 = 0$ tenglamalarning umumiy ildizi 5 dan qancha kam?
A) $1,5$ B) 2 C) $2,5$ D) 3 E) $3,5$

11. (00-8-64) Tenglamani yeching.
$$1998x^2 - 2000x + 2 = 0$$
A) $1; \frac{2}{1998}$ B) $-1; \frac{2}{1998}$ C) $1; -\frac{2}{1998}$
D) $-1; -\frac{2}{1998}$ E) $1; -1$

12. (96-7-13) Agar
$$(3x - 1) \cdot (x - 2) = 0$$
bo'lsa, $3x - 1$ qanday qiymatlarni qabul qilishi mumkin?
A) faqat $\frac{1}{3}$ B) faqat 0 C) $\frac{1}{3}$ yoki 0
D) $\frac{1}{3}$ yoki 2 E) 0 yoki 5

13. (97-3-13) Agar
$$(2x + 1) \cdot (x - 1,5) = 0$$
bo'lsa, $2x + 1$ qanday qiymatlar qabul qiladi?
A) faqat 0 B) faqat $-\frac{1}{2}$ C) 0 yoki $-\frac{1}{2}$
D) 0 yoki $1,5$ E) 4 yoki 0

14. (97-7-13) Agar $(x-5)\cdot(\frac{1}{5}x+4) = 0$ bo'lsa, $\frac{1}{5}x+4$ qanday qiymatlar qabul qiladi?
A) faqat 0 B) faqat -20 C) 0 yoki 5
D) 0 yoki 8 E) -20 yoki 0

15. (97-10-13) $(4x + 1) \cdot (x - \frac{1}{4}) = 0$ bo'lsa, $4x + 1$ qanday qiymatlar qabul qilishi mumkin?
A) faqat $-\frac{1}{4}$ B) faqat $\frac{1}{4}$ C) faqat 0
D) 0 yoki 2 E) $-\frac{1}{4}$ yoki $\frac{1}{4}$

16. (96-3-18) Ushbu
$$x^2 - x - 2$$
kvadrat uchhadni chiziqli ko'paytuvchilarga ajrating.
A) $(x - 1)(x + 2)$ B) $(x - 1)(x - 2)$
C) $(x + 1)(x + 2)$ D) $(x + 1)(x - 2)$
E) $(1 - x)(x + 2)$

17. (96-11-19) Kvadrat uchhadni chiziqli ko'paytuvchilarga ajrating.
$$x^2 - 3x + 2$$
A) $(x - 1)(x + 2)$ B) $(x - 2)(x + 1)$
C) $(x - 1)(x - 2)$ D) $(x + 1)(x + 2)$
E) $(1 - x)(x + 2)$

18. (96-12-19) Kvadrat uchhadni chiziqli ko'paytuvchilarga ajrating.
$$x^2 + x - 2$$
A) $(x - 1)(x - 2)$ B) $(x - 1)(x + 2)$
C) $(1 - x)(x + 2)$ D) $(x + 1)(x - 2)$
E) $(x + 1)(x + 2)$

19. (01-2-23) Ushbu
$$x^2 - 13x + 36 = 0$$
tenglama ildizlarining o'rta proportsional qiymatini toping.
A) 4 B) 9 C) $6,5$ D) 13 E) 6

20. (01-3-31) Ushbu
$$x - 6 = \frac{13}{x}$$
tenglamaning nechta haqiqiy ildizi bor?
A) 1 B) 2 C) 3 D) ildizi yo'q
E) cheksiz ko'p

21. (02-1-49) 3 va -2 sonlari qaysi tenglamaning ildizlari ekanligini ko'rsating.
A) $x^2 - x = 6$ B) $x^2 + x = 6$
C) $x^2 + 6 = x$ D) $x^2 + 6 = -x$
E) $x^2 + 1 = 6x$

22. (02-4-3)
$$x^2 - 18x + 45 = 0$$
tenglamaning katta ildizini toping.
A) -3 B) 3 C) -15 D) 15 E) 5

23. (96-6-26) Kasrni qisqartiring.
$$\frac{x^2 - 3x + 2}{x^2 - 1}$$
A) $\frac{x+2}{x-1}$ B) $\frac{x+2}{x+1}$ C) $\frac{x-2}{x-1}$ D) $\frac{x-2}{x+1}$ E) $\frac{x+3}{x-1}$

24. (97-2-27) Kasrni qisqartiring.
$$\frac{x^2 - 16}{x^2 - 5x + 4}$$
A) $\frac{4+x}{1-x}$ B) $\frac{4-x}{x+1}$ C) $\frac{x+4}{x+1}$ D) $\frac{x-4}{x+1}$ E) $\frac{x+4}{x-1}$

25. (97-8-26) Kasrni qisqartiring.
$$\frac{y^2 - 3y - 4}{y^2 - 1}$$
A) $\frac{y+4}{y+1}$ B) $\frac{4-y}{y-1}$ C) $\frac{y+4}{y-1}$ D) $\frac{y-4}{y+1}$ E) $\frac{y-4}{y-1}$

26. (97-12-26) Kasrni qisqartiring.
$$\frac{n^2 - 7n + 6}{n^2 - 1}$$
A) $\frac{n+6}{n-1}$ B) $\frac{n-6}{n+1}$ C) $\frac{n+6}{n+1}$ D) $\frac{n-6}{n-1}$ E) $\frac{n-3}{n+1}$

1.5.3 Viyet teoremasi.

1. Viyet teoremasi: Agar x_1, x_2 sonlar $ax^2+bx+c = 0$ tenglamaninig ildizlari bo'lsa, u holda
$$\begin{cases} x_1 + x_2 = -\frac{b}{a} \\ x_1 \cdot x_2 = \frac{c}{a} \end{cases}$$

2. Viyet teoremasi: Agar x_1, x_2 sonlar $x^2+px+q = 0$ tenglamaninig ildizlari bo'lsa, u holda
$$\begin{cases} x_1 + x_2 = -p \\ x_1 \cdot x_2 = q \end{cases}$$

3. $x_1^2 + x_2^2 = (x_1 + x_2)^2 - 2x_1x_2 = p^2 - 2q$
4. $(x_1 - x_2)^2 = (x_1 + x_2)^2 - 4x_1x_2 = p^2 - 4q$
5. $x_1^3 + x_2^3 = 3pq - p^3$
6. $x_1^4 + x_2^4 = p^4 - 4p^2q + 2q^2$

(00-3-18) Agar

$$x^2 - 3x - 6 = 0$$

tenglamaning ildizlari x_1 va x_2 bo'lsa, $\frac{1}{x_1^3} + \frac{1}{x_2^3}$ ni toping.
A) $\frac{1}{3}$ B) $0,5$ C) $-0,5$ D) $0,375$ E) $-0,375$
Yechish: Viyet teoremasiga ko'ra

$$x_1 + x_2 = 3, \quad x_1 \cdot x_2 = -6$$

bu yerdan

$$x_1^2 + x_2^2 = (x_1 + x_2)^2 - 2x_1x_2 =$$

$$= 3^2 - 2 \cdot (-6) = 9 + 12 = 21$$

ni hosil qilamiz. U holda

$$\frac{1}{x_1^3} + \frac{1}{x_2^3} = \frac{x_1^3 + x_2^3}{(x_1x_2)^3} =$$

$$= \frac{(x_1 + x_2)(x_1^2 - x_1 \cdot x_2 + x_2^2)}{(x_1x_2)^3} =$$

$$= \frac{3(21 + 6)}{(-6)^3} = -\frac{3 \cdot 27}{6^3} = -\frac{3}{8} = -0,375$$

J. -0,375 (E)

1. (96-13-18) x_1 va x_2 sonlar

   $$x^2 + x - 5 = 0$$

   tenglamaning ildizlari ekanligi ma'lum. $x_1^2 + x_2^2$ ning qiymatini toping.
   A) 10 B) 12 C) 11 D) 9 E) 8

2. (97-4-24) a va b sonlari

   $$3x^2 - 2x - 6 = 0$$

   tenglamaning ildizlari bo'lsa, a^2+b^2 ni hisoblang.
   A) 6 B) 8 C) $4\frac{4}{9}$ D) $4\frac{2}{9}$ E) $3\frac{5}{9}$

3. (97-9-84) Agar a va b sonlari

   $$x^2 - 8x + 7 = 0$$

   kvadrat tenglamaning ildizlari bo'lsa, $\dfrac{1}{a^2} + \dfrac{1}{b^2}$ ni hisoblang.
   A) $1\frac{1}{49}$ B) $1\frac{1}{50}$ C) $2\frac{1}{15}$ D) $1\frac{1}{10}$ E) $2\frac{1}{49}$

4. (98-4-25) Agar

   $$x^2 + x - 1 = 0$$

   tenglamaning ildizlari x_1 va x_2 bo'lsa, $x_1^3 + x_2^3$ ning qiymati qanchaga teng bo'ladi?
   A) 1 B) 3 C) 2 D) -2 E) -4

5. (98-5-21) Ushbu

   $$x^2 + 4x - 5 = 0$$

   tenglamaning ildizlari x_1 va x_2 bo'lsa, $x_1^3 \cdot x_2^3$ ni hisoblang.
   A) 124 B) -125 C) 130 D) 5 E) -124

6. (98-10-13) Tenglamaning ildizlari yig'indisi va ko'paytmasining yig'indisini hisoblang:

   $$2x^2 - 5x + 2 = 0$$

   A) 2,5 B) 7 C) 2,8 D) 3,5 E) 3,2

7. (99-7-23) Agar

   $$x^2 + 2x + 1 = 0$$

   tenglamaning ildizlari x_1 va x_2 bo'lsa, $x_1^3 - x_2^3$ ni hisoblang.
   A) 1 B) 3 C) 4 D) 0 E) -2

8. (99-8-27) Tenglama ildizlari kublarining yig'indisini toping.

   $$2x^2 - 5x + 1 = 0$$

   A) $11\frac{7}{8}$ B) 12 C) $12\frac{8}{9}$ D) $12\frac{7}{8}$ E) 13

9. (00-8-32) x_1 va x_2 lar

   $$3x^2 - 8x - 15 = 0$$

   tenglamaning ildizlari bo'lsa, $\frac{x_1}{x_2} + \frac{x_2}{x_1}$ ning qiymatini hisoblang.
   A) $-3\frac{19}{45}$ B) $-3\frac{1}{45}$ C) 5 D) $-\frac{8}{3}$ E) $-1\frac{11}{13}$

10. (01-10-2) Agar x_1 va x_2 $x^2+x-5=0$ tenglamaning ildizlari bo'lsa, $x_1^2x_2^4 + x_1^4x_2^2$ ning qiymatini hisoblang.
    A) 225 B) 145 C) 125 D) 175 E) 275

11. (02-6-9) Agar x_1 va x_2 $x^2+x-3=0$ tenglamaning ildizlari bo'lsa, $\frac{1}{x_1^2x_2^4} + \frac{1}{x_1^4x_2^2}$ ning qiymatini hisoblang.
    A) $\frac{5}{81}$ B) $\frac{7}{81}$ C) $\frac{11}{81}$ D) $\frac{4}{27}$ E) $\frac{3}{16}$

12. (02-11-13) Agar x_1 va x_2

    $$9x^2 + 3x - 1 = 0$$

    tenglamaning ildizlari bo'lsa, $\frac{3x_1x_2}{x_1+x_2}$ ning qiymatini toping.
    A) -1 B) 1 C) 2 D) $\frac{1}{3}$ E) 3

13. (02-11-16) x_1 va x_2

    $$3x^2 - 5x + 2 = 0$$

    kvadrat tenglamaning ildizlari. Ildizlari $\frac{x_1}{3x_2-x_1}$ va $\frac{x_2}{3x_1-x_2}$ ga teng bo'lgan kvadrat tenglama tuzing.
    A) $3x^2 - 7x + 4 = 0$ B) $7x^2 + 9x - 2 = 0$
    C) $7x^2 + 9x + 2 = 0$ D) $7x^2 - 9x + 2 = 0$
    E) $3x^2 + 7x - 4 = 0$

14. (02-5-15) Ildizlaridan biri $\frac{1}{6+\sqrt{2}}$ ga teng bo'lgan ratsional koeffitsientli kvadrat tenglama tuzing.
A) $34x^2-12x+1=0$ B) $x^2-12x+1=0$
C) $34x^2-12x-1=0$ D) $x^2-12x+34=0$
E) $34x^2+12x-1=0$

15. (02-11-14) Ildizlaridan biri $3+\frac{\sqrt{2}}{2}$ ga teng bo'lgan ratsional koeffitsientli kvadrat tenglama tuzing.
A) $x^2-3x+9=0$ B) $x^2-6x+17=0$
C) $x^2-12x+9=0$ D) $2x^2+12x-17=0$
E) $2x^2-12x+17=0$

16. (03-1-5) Agar x_1 va x_2

$$x^2+3x-3=0$$

tenglamaning ildizlari bo'lsa, $x_1^4+x_2^4$ ning qiymatini hisoblang.
A) 207 B) 192 C) 243 D) 168 E) 252

17. (03-3-17) Agar x_1 va x_2

$$2x^2+3x-4=0$$

tenglamaning ildizlari bo'lsa, $\frac{x_1^3-x_2^3}{x_1-x_2}$ ning qiymatini hisoblang.
A) $0,25$ B) $-0,25$ C) $4,25$ D) $-4,25$ E) $3,25$

18. (03-8-19)

$$x^2-\frac{\sqrt{85}}{4}x+1\frac{5}{16}=0$$

tenglamaning katta va kichik ildizlari kublarining ayirmasini toping.
A) -2 B) -1 C) 2 D) 1 E) $\frac{1}{2}(\sqrt{85}-6)$

1.5.4 Ratsional tenglamalar.

(00-3-26) Tenglamaning haqiqiy ildizlari yig'indisini toping.

$$(x^2+5x+4)(x^2+5x+6)=120$$

A) 3 B) -3 C) 2 D) -5 E) -4
Yechish: Tenglama $y=x^2+5x$ belgilash yordamida $(y+4)(y+6)=120$ tenglamaga keladi. Uni yechamiz,

$$y^2+10y+24-120=0.$$

$$y^2+10y-96=0,\ \ y_1=6,\ \ y_2=-16$$

Endi berilgan tenglama ikkita tenglamaga ajraydi.

$$1)\ x^2+5x=6,\ \ x^2+5x-6=0,$$

$$x_1=1,\ \ x_2=-6,\ \ 2)\ x^2+5x=-16,$$

$$x^2+5x+16=0,\ \ D=25-64=-39<0.$$

Bu holda yechim yo'q. Demak berilgan tenglama $x_1=1$ va $x_2=-6$ ikkita ildizga ega ekan. U holda $x_1+x_2=-5$. J: -5 (D)

1. (96-7-15) Tenglamaning ildizlari yig'indisini toping.

$$x^4-13x^2+36=0$$

A) 13 B) 5 C) 0 D) 36 E) 1

2. (97-3-15) Tenglamaning ildizlari yig'indisini toping.

$$x^4-17x^2+16=0$$

A) 17 B) 0 C) -16 D) -17 E) 4

3. (97-7-15) Tenglamaning eng katta va eng kichik ildizlari ayirmasini toping.

$$x^4-10x^2+9=0$$

A) 1 B) 8 C) 2 D) 4 E) 6

4. (97-10-15) Tenglamaning eng katta va eng kichik ildizlari ayirmasini toping.

$$x^4-13x^2+36=0$$

A) 5 B) 1 C) 7 D) 0 E) 6

5. (98-4-33) Tenglamaning ildizlari yig'indisini toping.

$$2x^4-7x^2+2=0$$

A) 7 B) $3,5$ C) 0 D) 2 E) aniqlab bo'lmaydi

6. (01-6-14) Ushbu

$$(x^2+1)^4-3(x^2+1)^2-4=0$$

tenglamaning nechta ildizi bor?
A) 6 B) 4 C) 3 D) 2 E) 5

7. (98-6-20) Ushbu

$$(x+\frac{1}{x})^2-2(x+\frac{1}{x})-3=0$$

tenglama ildizlari ko'paytmasini toping.
A) 3 B) -1 C) 4 D) $\sqrt{2}$ E) 1

8. (98-11-10) Tenglamaning haqiqiy ildizlari ko'paytmasini aniqlang.

$$y^4-2y^2-8=0$$

A) 4 B) -16 C) 16 D) -4 E) 64

9. (98-12-89) Tenglamaning barcha ildizlari yig'indisini toping.

$$5x^4-8x^2+1=0$$

A) $1,6$ B) 0 C) 8 D) $\frac{1}{5}$
E) aniqlab bo'lmaydi

10. (00-8-7) Tenglamaning haqiqiy ildizlari yig'indisini toping.

$$x^6-65x^3=-64$$

A) 5 B) 65 C) 64 D) 16 E) 1

11. (00-1-16) Ifoda nechta ratsional koeffisiyentli ko'paytuvchilarga ajraladi?

$$(x^4+x^2+1)\cdot(x^4+x^2+2)-12$$

A) 4 B) 2 C) 3 D) 5 E) 6

12. (98-6-22) Tenglamani yeching.

$$\frac{2x^2-5x+3}{(10x-5)(x-1)}=0$$

A) 1 B) $1;\frac{3}{2}$ C) $\frac{3}{2}$ D) 5 E) $\frac{1}{2}$

13. (98-7-19) b ning qanday qiymatida $\frac{7b^3}{b^3+1}$ kasrning qiymati $\frac{56}{9}$ ga teng bo'ladi?
A) -2 B) 2 C) 4 D) 10 E) $\frac{1}{4}$

14. (98-11-18) Ushbu

$$\frac{x^2+1}{x}+\frac{x}{x^2+1}=-2,5$$

tenglamaning yechimlari quyidagi oraliqlarning qaysi birida joylashgan?
A) $(-\infty;-1)$ B) $[-1;8)$ C) $[2;8)$
D) $[3;8)$ E) $[4;8)$

15. (98-11-71) Tenglamani yeching.

$$\frac{1-\frac{1}{x-1}}{1+\frac{1}{x-1}}=0$$

A) -2 B) 0 C) -1 D) 1 E) 2

16. (98-12-63) Tenglama ildizlarining yig'indisini toping.

$$\frac{2}{3-x}+\frac{1}{2}=\frac{6}{x(3-x)}$$

A) 4 B) 7 C) 3 D) 10 E) 0

17. (00-5-36) Tenglamaning ildizlari nechta?

$$\frac{x^2-x-2}{x^2+x}=0$$

A) 2 B) 4 C) 1 D) 3 E) $\emptyset$

18. (01-1-8) Tenglamani yeching.

$$\frac{2}{x-3}=\frac{x+5}{x^2-9}$$

A) -2 B) 2 C) 1 D) -1 E) $1,5$

19. (01-3-2) Tenglamaning yechimlari ko'paytmasini toping.

$$(x^2+\frac{1}{x^2})-4(x+\frac{1}{x})+5=0$$

A) 3 B) $2\sqrt{3}$ C) 6 D) $-2\sqrt{3}$ E) 1

20. (01-12-24) Ushbu

$$(x^2-2)^2=5x^3+7x$$

tenglamaning manfiy ildizlari nechta?
A) 1 ta B) 2 ta C) 3 ta
D) 4 ta E) manfiy ildizi yo'q

21. (02-2-19) Agar

$$\frac{(3\cdot 2^{20}+7\cdot 2^{19})\cdot 52}{(13\cdot 8^4)^2\cdot x}=-1$$

bo'lsa, x ni toping.
A) $-\frac{1}{2}$ B) $-\frac{1}{4}$ C) $-\frac{1}{13}$ D) $-\frac{5}{32}$ E) $-\frac{11}{32}$

22. (02-3-25)

$$\frac{26}{5(x+x^{-1})}=1$$

tenglama ildizlarining ko'paytmasini toping.
A) 1 B) 5 C) 2 D) $2,4$ E) $4,8$

23. (02-4-4)

$$x^4-(\sqrt{5}+\sqrt{3})x^2+\sqrt{15}=0$$

tenglamaning ildizlari sonini toping.
A) 2 B) 4 C) 1 D) 0 E) 3

24. (02-7-10)

$$x^6-9x^3+8=0$$

tenglamaning haqiqiy ildizlari yig'indisini toping.
A) 3 B) 9 C) -9 D) 8 E) 4

25. (02-7-41)

$$(x+1)(x+2)(x+4)(x+5)=40\ \ (x\in R)$$

tenglamaning ildizlari yig'indisini toping.
A) -6 B) 0 C) -5 D) 6 E) 7

26. (02-9-22)

$$(2x-1)(5x-2)^2=100(x^2-0,16)(x-0,5)$$

tenglamaning ildizlari yig'indisini hisoblang.
A) $0,5$ B) $-1,2$ C) $-0,3$ D) $2,1$ E) $0,9$

27. (02-10-45)

$$\frac{1}{x^2-3x-3}+\frac{5}{x^2-3x+1}=2$$

tenglamaning ildizlari yig'indisini toping.
A) 6 B) 5 C) 4 D) 3 E) 2

28. (02-11-20)

$$\frac{3x^2+8x-3}{x+3}=x^2-x+2$$

tenglamaning ildizlari yig'indisini toping.
A) -8 B) -6 C) -4 D) 4 E) 6

29. (02-12-10)

$$\Big(x+\frac{1}{x}\Big)^2-4,5\Big(x+\frac{1}{x}\Big)+5=0$$

tenglamaning ildizlari ko'paytmasini toping.
A) 4 B) 2 C) 1 D) -1 E) -2

30. (03-1-69)

$$(x^2+x+1)(x^2+x+2)=12$$

tenglamaning haqiqiy ildizlari ko'paytmasini toping.
A) -12 B) 6 C) -2 D) 8 E) 2

31. (03-3-28)

$$\frac{3x^2+8x-3}{x+3}=x^2-x+2$$

tenglama ildizlarining ko'paytmasini toping.
A) 2 B) -2 C) 6 D) -6 E) 3

32. (03-6-39)
$$x^3 + 2x^2 = x + 2$$
tenglamaning ildizlari yig'indisini toping.
A) -3 B) -2 C) -1 D) 1 E) 2

33. (03-6-8) Agar
$$\frac{4x^2 - 4xy + 3y^2}{2y^2 + 2xy - 5x^2} = 1$$
bo'lsa, $\frac{x+y}{x-y}$ ning qiymatini toping.
A) 2 B) -2 C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) -1

34. (03-7-13) Agar
$$\frac{4x^2 - 4xy + 3y^2}{2y^2 + 2xy - 5x^2} = 1$$
bo'lsa, $\frac{x+y}{y-x}$ ning qiymatini toping.
A) 2 B) -2 C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) -1

35. (03-7-56)
$$\frac{x+8}{3} = x - \frac{x-3}{x}$$
tenglama ildizlari ayirmasining modulini toping.
A) 5,5 B) 5 C) 3,5 D) 4 E) 2,5

36. (03-8-17)
$$\frac{3x^2 + 4x - 4}{x+2} = x^2 - 4x + 4$$
tenglama ildizlarining yig'indisini toping.
A) 10 B) -5 C) -4 D) 8 E) 7

37. (03-8-42)
$$x^2 + 3x + \frac{6}{2 - 3x - x^2} = 1$$
tenglama butun ildizlarining yig'indisini toping.
A) -3 B) 1 C) -5 D) 3 E) 4

38. (03-9-8)
$$(x^2 + x - 4)(x^2 + x + 4) = 9$$
tenglama ildizlarining ko'paytmasini toping.
A) 16 B) 4 C) -4 D) 5 E) -5

39. (03-10-29)
$$13x^4 - 5x^2 - 17 = 0$$
tenglamaning barcha ildizlari yig'indisining, barcha ildizlari ko'paytmasiga nisbatini toping.
A) 1 B) 0 C) $\frac{3}{2}$ D) $\frac{2}{3}$ E) aniqlab bo'lmaydi

40. (03-10-62)
$$x^8 = \frac{5x^4 + 1}{3}$$
tenglamaning barcha haqiqiy ildizlari yig'indisini toping.
A) 0 B) 1 C) 2 D) 2,5 E) aniqlab bo'lmaydi

41. (03-11-63)
$$\frac{x^3 - 8}{x - 2} = 6x + 1$$
tenglamaning ildizlari yig'indisini toping.
A) 6 B) 4 C) -4 D) 3 E) -2

42. (03-12-2)
$$3x^4 - 5x^2 + 2 = 0$$
tenglamaning eng kichik va eng katta ildizlari ayirmasini toping.
A) 2 B) $\frac{2\sqrt{6}}{3}$ C) $-\frac{2\sqrt{6}}{3}$ D) -2 E) $\frac{5}{3}$

43. (03-10-27)
$$(4x^2 - 7x - 5)(5x^2 + 13x + 3)(3x - x^2 - 8) = 0$$
tenglamaning barcha haqiqiy ildizlari ko'paytmasini toping.
A) 1 B) 0 C) 0,75 D) $-0,75$ E) 1,25

1.5.5 Parametrli chiziqli tenglamalar.

1. $Ax = B$ tenglama bitta ildizga ega: $A \neq 0$
2. $Ax = B$ tenglama cheksiz ko'p ildizga ega: $\begin{cases} A = 0 \\ B = 0 \end{cases}$
3. $Ax = B$ tenglama ildizga ega emas: $\begin{cases} A = 0 \\ B \neq 0 \end{cases}$

(98-1-20) m ning qanday qiymatlarida
$$m(mx - 1) = 9x + 3$$
tenglama cheksiz ko'p ildizga ega?
A) $m = 0$ B) $m = 3$ C) $m = -3$
D) $m = -1$ E) $m \in \emptyset$
Yechish: Qavslarni ochamiz.
$$m^2x - m = 9x + 3$$
Uni $(m^2 - 9)x = m + 3$ ko'rinishiga keltiramiz. Bu tenglama yechimga ega bo'lishi uchun $\begin{cases} m^2 - 9 = 0 \\ m + 3 = 0 \end{cases}$ bo'lishi kerak. Demak, $m = -3$. J: -3 (C)

1. (96-1-20) m ning qanday qiymatlarida $my + 1 = m$ tenglama yechimga ega bo'lmaydi?
A) $m = 1$ B) $m = 0$ C) $m = -1$
D) $m = 2$ E) $m \in R$

2. (96-7-22) a ning qanday qiymatlarida $ax - a = x - 1$ tenglama cheksiz ko'p yechimga ega bo'ladi?
A) $a = 1$ B) $a = 2$ C) $a = -1$ D) $a \in R$
E) hech qanday a da yechimga ega emas

3. (96-9-71) a ning qanday qiymatlarida $ax = 2x + 3$ tenglama yechimga ega bo'lmaydi?
A) $a \neq 1$ B) $a = 2$ C) $a \neq 2$
D) $a \neq -2$ E) $a = 0$

4. (96-10-21) n ning qanday qiymatlarida $nx + 1 = n + x$ tenglama cheksiz ko'p yechimga ega bo'ladi?
A) $n = 0$ B) $n = 1$ C) $n = 2$
D) $n \neq 1$ E) $n = -2$

5. (97-3-22) a ning qanday qiymatlarida $ax-3=a+2x$ tenglamaning yechimi bo'lmaydi?
A) $a=0$ B) $a=2$ C) $a=-1$ D) $a=-2$
E) hech bir qiymatida

6. (97-7-22) m ning qanday qiymatlarida $m^2x-m=x+1$ tenglama ildizlari cheksiz ko'p bo'ladi?
A) $m=1$ B) $m=0$ C) $m=-1$
D) $m=\pm1$ E) $\emptyset$

7. (97-10-22) n ning qanday qiymatlarida $nx+5=n-2x$ tenglamaning ildizi bo'lmaydi?
A) 5 B) -2 C) 1 D) -5
E) bunday qiymatlar yo'q

8. (98-5-19) Ushbu $(a^2-1)x+3=0$ tenglama yechimga ega bo'lmaydigan a ning barcha qiymatlari yig'indisini hisoblang.
A) 1 B) 2 C) 0 D) -1 E) -2

9. (98-7-30) Ushbu $10(ax-1)=2a-5x-9$ tenglama a ning qanday qiymatlarida yagona yechimga ega?
A) $(-\infty;-\frac{1}{2})\cup(-\frac{1}{2};\infty)$ B) $-\frac{1}{2}$ C) $\frac{1}{5}$
D) $(-\infty;-\frac{1}{2})$ E) $(-\frac{1}{2};\infty)$

10. (98-8-20) n ning qanday qiymatida $n^2(y-1)=y-n$ tenglamaning ildizi yo'q?
A) $n=0$ B) $n=1$ C) $n=-1$
D) $n=2$ E) $n=-1$ va $n=1$

11. (98-12-28) Tenglama a ning qanday qiymatlarida cheksiz ko'p yechimga ega?

$$10(ax-1)=2a-5x-9$$

A) $-\dfrac{1}{2}$ B) 2 C) $\dfrac{1}{2}$ D) -2 E) $\dfrac{1}{5}$

12. (99-7-21) a ning

$$(a^2-4)x+5=0$$

tenglama yechimga ega bo'lmaydigan barcha qiymatlari ko'paytmasini hisoblang.
A) 4 B) -4 C) 0 D) 2 E) -2

13. (99-8-21) Tenglama a ning qanday qiymatida yechimga ega emas?

$$6x-a-6=(a+2)(x+2)$$

A) 4 B) 2 C) -2 D) 6 E) -6

14. (00-1-8) Ushbu $nx=n^2-12$ tenglamaning ildizlari natural son bo'ladigan $n(n\in N)$ ning barcha qiymatlari yig'indisini toping.
A) 20 B) 18 C) 22 D) 16 E) 24

15. (00-2-16) Tenglama k ning qanday qiymatida yechimga ega emas?

$$\frac{2kx+3}{3}=\frac{k-2+x}{2}$$

A) $\frac{3}{4}$ B) $\frac{2}{5}$ C) $\frac{1}{4}$ D) 1 E) $\frac{3}{5}$

16. (00-3-11) k ning qanday qiymatida

$$k(k+6)x=k+7(x+1)$$

tenglama yechimga ega bo'lmaydi?
A) 1 va 7 B) 1 C) 7 D) 1 va -7 E) -7

17. (01-1-10) a ning qanday qiymatida

$$(a^2+2)x=a(x-a)+2$$

tenglamaning ildizlari cheksiz ko'p bo'ladi?
A) $-\sqrt{2}$ B) $\sqrt{2}$ C) $\sqrt{2};\ -\sqrt{2}$ D) $\emptyset$
E) To'g'ri javob berilmagan

18. (01-8-11) a ning qanday qiymatlarida

$$a(3x-a)=6x-4$$

tenglama bitta musbat yechimga ega?
A) $(-2;2)$ B) $(-2;\infty)$ C) $(-2;2)\cup(2;\infty)$
D) $(2;\infty)$ E) $a\neq2$

19. (02-7-6) m ning qanday qiymatida

$$\frac{6x-m}{2}=\frac{7mx+1}{3}$$

tenglamaning ildizi nolga teng bo'ladi?
A) $-\frac{2}{3}$ B) $\frac{4}{5}$ C) $-\frac{3}{2}$ D) $\frac{1}{2}$ E) $-\frac{1}{3}$

20. (02-7-7) a ning qanday qiymatida

$$\frac{3x-a}{5}=\frac{ax-4}{3}$$

tenglama ildizga ega emas?
A) 1,8 B) 2 C) 2,2 D) 1 E) 3

21. (02-8-3)

$$ax+5=7x+b$$

tenglama yechimga ega bo'lmasa, quyidagilardan qaysi biri to'g'ri?
A) $a=7;\ b\neq5$ B) $a\neq7;\ b=5$
C) $a=8;\ b=12$ D) $a=13;\ b=13$
E) $a=10;\ b=15$

22. (98-3-14) Ushbu $(k^2-4k+2)x=k-x-3$ yoki $(k+2)x-1=k+x$ tenglamalardan biri cheksiz ko'p yechimga ega bo'ladigan k ning nechta qiymati mavjud?
A) 0 B) 1 C) 2 D) 3 E) cheksiz ko'p

23. (98-10-62) k ning $(k^2-3k+1)x=k-x-4$ va $(k+1)x+1=k+x$ tenglamalardan hech bo'lmaganda birining cheksiz ko'p yechimga ega bo'ladigan nechta qiymati mavjud?
A) bunday qiymat yo'q B) 1 C) 2 D) 3
E) cheksiz ko'p

1.5.6 Parametrli kvadrat tenglamalar.

1. $ax^2+bx+c=0$. $(a\neq0)$ tenglama:
a) $b^2-4ac>0$ da ikkita ildizga ega;
b) $b^2-4ac=0$ da bitta ildizga ega;
c) $b^2-4ac<0$ da ildizga ega emas;
d) $c<0$ da turli ishorali ildizlarga ega.

2. ax^2+bx+c kvadrat uchhad $a>0$ va $D=0$ bo'lganda to'la kvadrat bo'ladi.

1. (97-2-24) Tenlamaning ildizi 0 ga teng bo'ladigan m ning barcha qiymatlari ko'paytmasini toping.

$$x^2-9x+(m^2-4)(m^2-9)=0$$

A) 36 B) $4\sqrt{3}$ C) -6 D) 6 E) $6\sqrt{3}$

2. (00-8-31) b ning qanday qiymatida

$$x^2+\frac{2}{3}x+b$$

uchhad to'la kvadrat bo'ladi?
A) $\frac{1}{9}$ B) $\frac{1}{3}$ C) $\frac{2}{9}$ D) $\frac{2}{3}$ E) $\frac{4}{9}$

3. (00-8-34) k ning qanday qiymatlarida

$$x^2+2(k-9)x+k^2+3k+4$$

ifodani to'la kvadrat shaklida tasvirlab bo'ladi?
A) $\frac{11}{3}$ B) 3 C) 4 D) $\frac{5}{7}$ E) $\frac{7}{9}$

4. (96-6-25) Ushbu

$$x^2-px+8=0$$

tenglamaning ildizlaridan biri 4 ga teng. Bu tenglamaning barcha koeffisientlari yig'indisini toping.
A) 3 B) 2 C) 15 D) 14 E) 4

5. (00-10-21) p ning qanday qiymatida

$$x^2+px+15=0$$

tenglamaning ildizlaridan biri 5 ga teng bo'ladi?
A) -4 B) 4 C) -2 D) 2 E)-8

6. (97-8-24) Ushbu

$$x^2+px-12=0$$

tenglamaning ildizlaridan biri 4 ga teng. Shu tenglamaning koeffisientlari yig'indisini toping.
A) -13 B) -10 C) -12 D) -11 E) -9

7. (97-12-24) Ushbu

$$x^2+px-12=0$$

tenglamaning ildizlaridan biri 2 ga teng. $p:(-12)$ nimaga teng?
A) $\frac{1}{3}$ B) $-\frac{5}{12}$ C) $\frac{2}{3}$ D) $-\frac{1}{3}$ E) $-\frac{2}{3}$

8. (01-6-13) a ning qanday qiymatida

$$x^2-(a-1)x+36=0$$

tenglamaning ildizlaridan biri 4 ga teng bo'ladi?
A) 13 B) 14 C) 11 D) 10 E) 15

9. (96-9-18) x_1 va x_2 sonlar

$$x^2+x+a=0$$

tenglamaning ildizlari bo'lib, $\frac{1}{x_1}+\frac{1}{x_2}=\frac{1}{2}$ tenglikni qanoatlantiradi. a ni toping.
A) -1 B) -2 C) -3 D) 2 E) 1

10. (02-1-14) k ning qanday qiymatlarida

$$kx^2-6kx+2k+3=0$$

tenglama ildizlari kublarining yig'indisi 72 ga teng bo'ladi?
A) $0,5$ B) $0,9$ C) 2 D) $1,9$ E) $2,5$

11. (96-12-75) x_1 va x_2 sonlar

$$x^2+ax+6=0$$

kvadrat tenglamaning yechimlari va $\frac{1}{x_1}+\frac{1}{x_2}=0,5$ bo'lsa, a ning qiymatini toping.
A) -1 B) -2 C) -3 D) 3 E) 2

12. (98-7-34) m ning qanday qiymatlarida

$$4x^2-(\sqrt{3}m-3)x-9=0$$

tenglamaning ildizlari qarama-qarshi sonlar bo'ladi?
A) $1,5$ va $-1,5$ B) $\sqrt{3}$ va $-\sqrt{3}$ C) $1,5$
D) $\sqrt{3}$ E) 0

13. (98-7-35) Ushbu

$$x^2+px+6=0$$

tenglama ildizlari ayirmasining kvadrati 40 ga teng bo'lsa, ildizlarining yig'indisi qancha bo'lishini toping?
A) $\sqrt{40}$ B) 8 C) -8 D) -8 va 8 E) 0

14. (98-10-43) Ushbu

$$2x^2+x-a=0$$

tenglamaning ildizlaridan biri 2 ga teng. Ikkinchi ildizining qiymatini toping.
A) $2,5$ B) $-2,5$ C) $1,5$ D) $-1,5$ E) -2

15. (98-12-32) m ning qanday qiymatlarida

$$3x^2+(3m-15)x-27=0$$

tenglamaning ildizlari qarama-qarshi sonlar bo'ladi?
A) 5 B) 0 C) $-3;3$ D) -5 E) $0;5$

16. (98-12-33) Ushbu

$$x^2+px+6=0$$

tenglama ildizlari ayirmasining kvadrati 40 ga teng. p ning qiymatini toping.
A) $-8;8$ B) 8 C) -8 D) $4+\sqrt{10}$ E) $4-\sqrt{10}$

17. (98-12-84) Agar

$$x^2-x+q=0$$

tenglamaning x_1 va x_2 ildizlari $x_1^3+x_2^3=19$ shartni qanoatlantirsa, q ning qiymati qanchaga teng?
A) -5 B) -2 C) -12 D) -1 E) -6

18. (99-1-18) $x^2+px-35=0$ tenglamaning ildizlaridan biri 7 ga teng. Ikkinchi ildizining va p ning qiymatini toping.
A) $-5;-2$ B) $-5;2$ C) $5;2$ D) $5;-2$ E) $5;1$

19. (99-9-20) $x^2+px+q=0$ tenglamaning ildizlari $x^2-3x+2=0$ tenglamaning ildizlaridan ikki marta katta. $p+q$ ning qiymatini toping.
A) 14 B) 2 C) -2 D) -14 E) 10

20. (00-4-9) Ushbu
$$x^2-5x+a=0$$
tenglamaning ildizlaridan biri ikkinchisidan 9 marta katta bo'lsa a ning qiymatini toping.
A) $2,5$ B) $2,4$ C) $2,25$ D) $3,5$ E) $4,5$

21. (00-7-12) Ildizlari $x^2+px+q=0$ tenglamaning ildizlariga teskari bo'lgan tenglamani ko'rsating.
A) $px^2+qx+1=0$ B) $qx^2+px-1=0$
C) $qx^2+px+1=0$ D) $qx^2-px+1=0$
E) $qx^2-px-1=0$

22. (00-7-47) m ning qanday qiymatlarida
$$x^2-4mx+48=0$$
tenglamaning ildizlaridan biri boshqasidan 3 marta katta bo'ladi?
A) 2 B) ±4 C) ±3 D) 4 E) ±2

23. (00-8-9) x_1 va x_2 sonlari
$$3x^2+2x+b=0$$
tenglamaning ildizlari bo'lib, $2x_1=-3x_2$ ekanligi ma'lum bo'lsa, b ning qiymatini toping.
A) -8 B) 6 C) 4 D) -3 E) 2

24. (01-11-9) Ushbu
$$x^2+2ax+a=0$$
tenglamaning ildizlaridan biri 1 ga teng. Tenglamaning ikkinchi ildizini toping.
A) $-\frac{4}{3}$ B) $-\frac{1}{2}$ C) $\frac{1}{3}$ D) $-\frac{1}{3}$ E) $-\frac{2}{3}$

25. (98-11-23) a ning qanday qiymatlarida
$$x^2+2(1-a)x+a+5=0$$
tenglamaning echimlari o'zaro teng bo'ladi?
A) $-1;2$ B) -1 C) 2 D) 4 E) $-1;4$

26. (99-4-19) a ning qanday qiymatlarida
$$ax^2-(a+1)x+2a-1=0$$
tenglama bitta ildizga ega bo'ladi?
A) $-1;\frac{1}{7}$ B) $0;-1$ C) $1;-\frac{1}{7}$;
D) $-1;-\frac{1}{7}$ E) $1;0;-\frac{1}{7}$

27. (99-6-18) k ning qanday musbat qiymatida
$$25x^2+kx+2=0$$
tenglama bitta ildizga ega bo'ladi?
A) $10\sqrt{2}$ B) 10 C) $5\sqrt{2}$ D) 5 E) $3\sqrt{2}$

28. (00-1-10) Ushbu
$$x^2-\frac{1}{2}kx+k^2-11k+24=0 \quad (k=const)$$
tenglamaning ildizlaridan biri 0 ga teng. Shu shartni qanoatlantiruvchi ildizlarning yig'indisini toping.
A) $4,5$ B) $5,5$ C) 6 D) $6,5$ E) 5

29. (96-6-24) a ning qanday qiymatlarida
$$a^2x^2-2x+1=0$$
tenglama bitta ildizga ega bo'ladi?
A) $a=1$ B) $a=-1$ C) $a=\pm1$
D) $a=0$ va $a=1$ E) $a=\pm1$ va $a=0$

30. (97-4-22) $ax^2=|a|$ tenglama yagona yechimga ega bo'ladigan a ning barcha qiymatlarini toping.
A) $a<0$ B) $a>0$ C) $a=0$ D)$a\geq0$ E) $\emptyset$

31. (99-4-18) Agar $\frac{4b+a}{5a-7b}=2$ bo'lsa,
$$\frac{3a^2-2ab+b^2}{5a^2+2b^2}$$
ifodaning qiymati nimaga teng bo'ladi.
A) 2 B) $\frac{1}{3}$ C) $0,5$ D)$\frac{9}{22}$ E) $\frac{5}{11}$

32. (99-5-23) Agar $a,b\epsilon N$ va $(a\cdot b)^{\frac{1}{2}}=10$ bo'lsa, $a+b$ ning qiymati quyidagilardan qaysi biriga teng bo'la olmaydi?
A) 29 B) 101 C) 52 D)50 E) 25

33. (01-1-9) k ning qanday qiymatida
$$kx^2+12x-3=0$$
tenglamaning ildizlaridan biri 0,2 ga teng bo'ladi.
A) 135 B) 60 C) -135 D)15 E) -15

34. (00-8-37) Ko'paytuvchilarga ajrating.
$$3x^2-6xm-9m^2$$
A) $3(x+m)(x-3m)$ B) $(x-3m)^2$
C) $3(x-m)(x+3m)$ D) $(3x-m)^2$
E) $3(x-m)(x-3m)$

35. (01-1-15) a ning qanday qiymatida
$$5(a+4)x^2-10x+a=0$$
tenglamaning ildizlari turli ishorali bo'ladi?
A) $(-1;5)$ B) $(-4;0)$ C) $(-5;1)$
D) $(-5;-4)\cup(0;1)$ E) $(0;1)$

36. (01-1-71) k ning qanday qiymatida
$$x^2-2k(x+1)-k^2=0$$
tenglama 0 dan farqli o'zaro teng ildizlarga ega?
A) 2 B) -2 C) 1 D) -1 E) $0,5$

37. (01-2-62) a ning qanday qiymatlarida son o'qida
$$x^2+ax+12=0$$
tenglamaning ildizlari orasidagi masofa 1 ga teng bo'ladi?
A) ±5 B) ±6 C) ±7 D) ±8 E) 7

38. (01-5-20) a ning qanday musbat qiymatida

$$8x^2 - 30x + a^3 = 0$$

tenglamaning ildizlaridan biri ikkinchisining kvadratiga teng bo'ladi?
A) 3 B) 1 C) 2 D) 4 E) 5

39. (01-5-21) Ushbu

$$x^2 + px + 12 = 0$$

tenglamaning yechimlari x_1 va x_2 bo'lsa, $|x_1 - x_2| = 1$ munosabat p ning nechta qiymatida bajariladi?
A) 2 ta B) 1 ta C) 3 ta D) 4 ta
E) bunday son yo'q

40. (01-7-16) m ning qanday qiymatida

$$x^2 + (m-1)x + m^2 - 1,5 = 0$$

tenglama ildizlari kvadratlarining yig'indisi eng katta bo'ladi?
A) $1,5$ B) $-1,5$ C) 1 D) -1 E) -2

41. (01-8-16) m ning qanday qiymatida

$$x^2 + (2-m)x - m - 3 = 0$$

tenglama ildizlari kvadratlarining yig'indisi eng kichik bo'ladi?
A) 2 B) 1 C) -1 D) -3 E) $\emptyset$

42. (01-11-11) Ushbu

$$y^2 - 2ty + t + 2 = 0$$

tenglama faqat bitta ildizga ega bo'ladigan t ning barcha qiymatlari yig'indisini toping.
A) 2 B) $1,5$ C) -1 D) $-1,5$ E) 1

43. (01-12-8) S - kvadratning yuzi.

$$x^2 - Sx + 9 = 0$$

tenglama hech bo'lmaganda bitta ildizga ega bo'lishi uchun kvadratning a tomoni qanday bo'lishi kerak?
A) $a \geq \sqrt{6}$ B) $a = \sqrt{6}$ C) $a \geq 6$
D) $|a| \geq \sqrt{6}$ E) $|a| = \sqrt{6}$

44. (01-12-25) a ning qanday qiymatida

$$x^2 + (a+2)x + a = 3$$

tenglama ildizlari kvadratlarining yig'indisi eng kichik bo'ladi?
A) 0 B) -1 C) 1 D) 3 E) -2

45. (01-12-39) k ning qanday qiymatlarida

$$(k-2)x^2 + 7x - 2k^2 = 0$$

tenglama $x = 2$ yechimga ega?
A) $1; 3$ B) $1; -3$ C) $-1; 3$
D) $-2; 3$ E) $-2; -3$

46. (02-1-50) a ning qanday qiymatlarida

$$ax^2 - 2x + 3 = 0$$

tenglama bitta ildizga ega bo'ladi?
A) $\frac{1}{3}$ B) 0 va 1 C) 3 va $1,5$
D) $\frac{1}{3}$ va 0 E) $\frac{1}{3}$ va 1

47. (02-3-21) Agar $x^2 - 4ax + 7a^2 = 0$ tenglamaning ildizlari x_1 va x_2 lar uchun $x_1^2 + x_2^2 = 2$ tenglik o'rinli bo'lsa, a^2 ning qiymatini toping.
A) 1 B) $\frac{1}{4}$ C) $2,25$ D) $\frac{1}{9}$ E) $\frac{4}{9}$

48. (02-5-17)

$$x^2 - 4x - (a-1)(a-5) = 0$$

tenglamaning ildizlaridan biri 2 ga teng bo'ladigan a ning barcha qiymatlarini toping.
A) $(-\infty; \infty)$ B) $(-\infty; -2) \cup (2; +\infty)$
C) $(-\infty; -4) \cup (4; +\infty)$ D) $\{3\}$ E) $(2; 4)$

49. (02-7-1) m ning qanday qiymatlarida

$$x^2 + (m+2)x + m + 5 = 0$$

tenglamaning ildizlari haqiqiy va o'zaro teng bo'ladi?
A) $m = \pm 4$ B) $m = \pm 3$ C) $m = \pm 2$
D) $m = \pm 1$ E) $m = \pm 5$

50. (02-7-2)

$$x^2 - 3ax + 2a^2 - ab - b^2 = 0$$

tenglamani yeching.
A) $a - b; 2a + b$ B) $-a + b; -2a + b$
C) $-a - b; 2a - b$ D) $a + b; 2a + b$
E) $a - b; 2a - b$

51. (02-7-3)

$$\frac{15x^2 - 8bx + b^2}{12x^2 - bx - b^2}$$

kasrni qisqartiring.
A) $\frac{5x-b}{4x+b}$ B) $\frac{5x-b}{3x+b}$ C) $\frac{3x-b}{4x+b}$ D) $\frac{4x-b}{3x+b}$ E) -1

52. (98-12-27) Soddalashtiring.

$$\frac{2a^2 + 4ab - 6b^2}{a^2 + 5ab + 6b^2}$$

A) $\frac{2(a-b)}{a+2b}$ B) $\frac{a-b}{a+2b}$ C) $\frac{2a-b}{a+2b}$
D) $\frac{a+2b}{2(a-b)}$ E) $\frac{2(a-b)}{a+b}$

53. (98-7-28) Soddalashtiring.

$$\frac{4a^2 - 12ab + 9b^2}{2a^2 - ab - 3b^2}$$

A) $\frac{3a-2b}{a+b}$ B) $\frac{3b-2a}{a+b}$ C) $\frac{2a-3b}{a+b}$
D) $\frac{2a-3b}{a-b}$ E) $\frac{3a-2b}{a-b}$

54. (02-7-4) n ning qanday qiymatlarida

$$x^2 - 12x + n = 0$$

tenglama ildizlaridan biri ikkinchisidan $2\sqrt{5}$ ga ortiq bo'ladi?
A) 31 B) 30 C) 3 D) 29 E) 1

55. (02-7-8) 2 va -3 sonlari x^3+mx+n ko'phadning ildizlari. Bu ko'phadning uchinchi ildizi topilsin.
A) 1 B) 4 C) -1 D) -2 E) 3

56. (02-8-21) a ning qanday qiymatlarida
$$x^2+(a+2)x+a$$
uchhad ildizlari kvadratlarining yig'indisi 3ga teng bo'ladi?
A) -1 B) 1 C) -2 D) 3 E) 2

57. (02-9-13)
$$kx^2+3kx+2k-1=0$$
tenglama yechimga ega bo'lmaydigan k ning butun qiymatlari o'rta arifmetigini toping.
A) -3 B) -2 C) $-1,5$ D) 3 E) $1,5$

58. (02-10-46) k ning qanday qiymatlarida
$$x^2+(k^2-4k-5)x+k=0$$
tenglamaning ildizlari o'zaro qarama-qarshi bo'ladi?
A) -1 B) $-1;1$ C) $-5;1$ D) $-2;2$ E) -5

59. (02-11-15) q ning qanday qiymatida
$$x^2-8x+q=0$$
tenglamaning ildizlaridan biri boshqasidan uch marta katta bo'ladi?
A) 6 B) 8 C) 12 D) 16 E) 18

60. (02-12-9)
$$5x^2+bx-28=0$$
tenglamaning ildizlari x_1 va x_2 uchun $5x_1+2x_2=1$ munosabat o'rinli. Agar b butun son ekanligi ma'lum bo'lsa, uning qiymatini toping.
A) 9 va -13 B) 13 C) -9 va 13
D) -9 E) -13

61. (02-12-27)
$$x^2-(a+14)x+a^2=0 \ \ (a>0)$$
tenglamaning ildizlari orasida $x_1=9x_2$ munosabat o'rinli. Berilgan tenglamaning katta ildizini toping.
A) 9 B) 18 C) 24 D) 6 E) 12

62. (96-3-77) x_1 va x_2 lar
$$x^2+|a|x+6=0$$
tenglamaning ildizlari bo'lib, $x_1^2+x_2^2=13$ tenglikni qanoatlantirsa, x_1+x_2 nechaga teng?
A) 5 B) -6 C) 6 D) -7 E) -5

63. (98-2-11) y_1 va y_2
$$y^2+my+n=0$$
tenglamaning ildizlari, y_1 va y_2 ning har birini 4 taga orttirib, ildizlari hosil bo'lgan sonlarga teng kvadrat tenglama tuzildi. Agar uning ozod hadi $n-24$ (n dastlabki tenglamaning ozod hadi) ga teng bo'lsa, m nechaga teng?
A) 9 B) 10 C) 11 D) 12 E) 8

64. (98-9-10) Ushbu
$$z^2+pz+q=0$$
tenglamaning har bir ildizini 4 taga orttirib, ildizlari hosil bo'lgan sonlarga teng bo'lgan kvadrat tenglama tuzildi. Agar uning ozod hadi $q+64$ ga teng bo'lsa, p nechaga teng bo'ladi?
A) -10 B) -11 C) -13 D) -14 E) -12

65. (99-2-16) x_1 va x_2
$$x^2-px+p-1=0$$
tenglamaning ildizlari, p ning qanday qiymatida $x_1^2+x_2^2$ yig'indi eng kichik qiymatni qabul qiladi?
A) 2 B) -2 C) 1 D) -1 E) 3

66. (00-1-13) y_1 va y_2
$$y^2-by+b-1=0$$
tenglamaning ildizlari bo'lsa, b ning qanday qiymatida $y_1^2+y_2^2$ ifodaning qiymati eng kichik bo'ladi?
A) $1,2$ B) $0,85$ C) 1 D) $1,5$ E) 2

67. (01-8-22) a ning nechta qiymatida
$$\frac{3x-a}{3-x}+\frac{x+a}{x+1}=2$$
tenglama bitta yechimga ega?
A) 4 B) 3 C) 2 D) 1
E) birorta qiymatida ham ega emas

68. (03-1-3)
$$ax^2+bx+c=0$$
tenglamaning koeffisientlari $b=a+c$ tenglikni qanoatlantiradi. Agar x_1 va x_2 berilgan kvadrat tenglamaning ildizlari bo'lsa, $\frac{x_2}{x_1}+\frac{x_1}{x_2}$ ning qiymatini hisoblang.
A) $\frac{a^2-c^2}{ac}$ B) $\frac{a}{c}+\frac{c}{a}$ C) $\frac{1}{a}+\frac{1}{c}$
D) $\frac{1}{a}-\frac{1}{c}$ E) $\frac{2(a+c)}{ac}$

69. (03-1-58)
$$9x^2+kx=2x-k+6$$
tenglamaning ildizlari bir-biriga teng bo'ladigan k ning barcha qiymatlari ko'paytmasini toping.
A) 100 B) -120 C) 220 D) -196 E) 180

70. (03-3-11)
$$x^2-3x+m=0$$
tenglamaning x_1 va x_2 ildizlari uchun $3x_1-2x_2=14$ munosabat o'rinli bo'lsa, m ning qiymatini toping.
A) -4 B) 4 C) 6 D) -6 E) 3

71. (03-3-12) p ning qanday qiymatida
$$x^2-px+5=0$$
tenglamaning ildizlaridan biri boshqasidan 4 ga katta?
A) 6 B) 4 C) -4 D) ± 6 E) ± 4

72. (03-3-14) m ning qanday qiymatlarida

$$(m-1)x^2+2mx+3m-2$$

kvadrat uchhadni to'la kvadrat shaklida tasvirlash mumkin?
A) $2;\frac{1}{2}$ B) -2 C) 2 D) $\frac{1}{2}$ E) $-\frac{1}{2}$

73. (03-3-15) k ning qanday qiymatlarida

$$kx^2-(k-7)x+9=0$$

tenglama ikkita teng manfiy ildizga ega?
A) $49;1$ B) 1 C) $-49;-1$ D) 49 E) -1

74. (03-3-25) a ning qanday qiymatlarida

$$x+4=\frac{a}{x}$$

tenglama ikkita turli haqiqiy ildizga ega?
A) $(-4;\infty)$ B) $(-4;0)\cup(0;\infty)$ C) $[-4;\infty)$
D) $[-4;0)\cup(0;\infty)$ E) $(-4;4)$

75. (03-4-12) a ning qanday qiymatlarida

$$x^2+3x+a+0,75=0$$

tenglamaning ikkala ildizi ham manfiy bo'ladi?
A) $0,5<a<2$ B) $-0,75<a<1,5$
C) $0,6<a<1,8$ D) $0,8<a<1,2$
E) $0,9<a<1,4$

76. (03-5-11) Agar $2a^2+2b^2=5ab$ va $b>a>0$ bo'lsa, $\frac{a+b}{a-b}$ kasrning qiymati nechaga teng?
A) -3 B) 3 C) 2 D) 4 E) -2

77. (03-5-16) a ning qanday qiymatida

$$x^2-(a-2)x-a-1=0$$

tenglama ildizlari kvadratlarining yig'indisi eng kichik qiymatga ega bo'ladi?
A) 1 B) 2 C) $\frac{1}{2}$ D) 4 E) 3

78. (03-5-21)

$$x^2-(a+2)x+a+7=0$$

tenglama ildizlariga teskari sonlar yig'indisi $\frac{7}{12}$ ga teng bo'lsa, a ni toping.
A) 5 B) 6 C) 7 D) $\frac{5}{12}$ E) 2

79. (03-5-29) x_1 va x_2 sonlar

$$x^2+3x+k=0$$

tenglamaning ildizlari va $\frac{x_1}{x_2}=-\frac{2}{5}$ bo'lsa, k ning qiymatini toping.
A) -10 B) -7 C) -12 D) -8 E) -6

80. (03-7-62) q ning qanday qiymatida

$$x^2-8x+q=0$$

tenglama ildizlari kvadratlarining yig'indisi 34 ga teng bo'ladi?
A) 15 B) -12 C) 12 D) -15 E) 9

81. (03-7-78) m ning qanday qiymatlarida

$$4x^2-(3+2m)x+2=0$$

tenglamaning ildizlaridan biri ikkinchisidan sakkiz marta kichik bo'ladi?
A) 3 B) -6 C) $-6;3$ D) $3;5$ E) $-6;-3$

82. (03-8-16) a ning qanday qiymatlarida

$$4x^2-15x+4a^2=0$$

tenglamaning ildizlaridan biri ikkinchi ildizining kvadratiga teng bo'ladi?
A) $2\sqrt{2}$ B) $\pm2\sqrt{2}$ C) $1,5\sqrt{1,5}$
D) $\pm1,5\sqrt{1,5}$ E) $3\sqrt{2}$

83. (03-9-4) m ning qanday qiymatida

$$3x^2-21x+m=0$$

tenglama ildizlari kvadratlarining yig'indisi 25 ga teng bo'ladi?
A) 36 B) -36 C) 24 D) 42 E) -42

84. (03-9-5) $x^2-2ax+a^2-1=0$ tenglamaning ikkala ildizi -2 va 4 orasida joylashgan bo'lsa, a ning qiymati qaysi oraliqda o'zgaradi?
A) $(-3;3)$ B) $(-1;5)$ C) $(-3;-1)\cup(3;5)$
D) $(-1;3)$ E) $(0;3)$

85. (03-10-9) n natural son

$$n^2x^2+3n^3x+4=0$$

tenglama ldizlarining o'rta arifmetigining o'rta geometrigiga nisbati -3 ga teng bo'lsa, n ning qiymatini toping.
A) 2 B) 1 C) 3 D) 4 E) 5

86. (03-10-14) q ning qanday qiymatida

$$x^2-x-q=0$$

tenglama ildizlari kublarining yig'indisi 19 ga teng bo'ladi?
A) 6 B) 5 C) 7 D) 4 E) 3

87. (03-10-28)

$$7x^2+(5k^2-8k-13)x-k^4=0$$

tenglamaning ildizlari qarama-qarshi sonlar bo'ladigan k ning barcha qiymatlari yig'indisini aniqlang.
A) $1,2$ B) $1,4$ C) $1,6$ D) $1,8$ E) $2,4$

88. (03-11-1) a parametrining qanday butun qiymatida

$$2x^2+6ax+a=0$$

tenglama ildizlari kvadratlarining yig'indisi 38 ga teng bo'ladi?
A) -2 B) 2 C) -3 D) -1 E) 4

89. (03-11-2) p ning qanday qiymatlarida

$$x^2+2(p+1)x+9p-5=0$$

tenglamaning ikkala ildizi manfiy va turli bo'ladi?
A) $(\frac{5}{9};1)\cup(6;\infty)$ B) $(\frac{5}{9};6)$ C) $(\frac{5}{9};\infty)$
D) $(6;\infty)$ E) $(\frac{5}{9};1)$

90. (03-11-6) Agar m va n sonlar

$$x^2 + 3mx - 5n = 0 \ \ (m \cdot n \neq 0)$$

tenglamaning ildizlari bo'lsa, $n - m$ ning qiymati nechaga teng bo'ladi?
A) 25 B) 24 C) 18 D) 12 E) 15

91. (03-11-67)

$$x^2 + x + a = 0$$

tenglamaning x_1 va x_2 ildizlari orasida

$$\frac{1}{x_1} + \frac{1}{x_2} = \frac{1}{2}$$

munosabat o'rinli, a ning qiymatini toping.
A) $-2,5$ B) -2 C) -1 D) $-1,5$ E) $-0,5$

92. (03-12-1) $2x^2 - 7x + q = 0$ tenglamaning ildizlaridan biri $0,5$ ga teng. Shu tenglamaning ikkinchi ildizini toping.
A) 4 B) 3 C) 0 D) $6,5$ E) $5,5$

93. (03-12-4) $x^4 - 7a^2x^2 - 9a^4 = 0 \ \ (a \neq 0)$ tenglamaning haqiqiy ildizlari nechta?
A) a ga bog'liq B) ildizi yo'q
C) 1 ta D) 2 ta E) 4 ta

94. (03-12-68) m ning

$$(m-2)x^2 - 2mx + 2m - 3 = 0$$

tenglama bitta ildizga ega bo'ladigan qiymatlarining o'rta arifmetigini toping.
A) 4 B) 5 C) $4,5$ D) $3,5$ E) 3

1.6 Tenglamalar sisitemasi.

1.6.1 Chiziqli tenglamalar sistemasi.

(96-6-17) Agar

$$\begin{cases} 3x + y = 45 \\ z + 3y = -15 \\ 3z + x = 6 \end{cases}$$

bo'lsa, $x + y + z$ nimaga teng?
A) 12 B) 10 C) 15 D) 9 E) 7
Yechish: Tengliklarni qo'shamiz:

$$4x + 4y + 4z = 45 - 15 + 6$$

Bu yerdan

$$4(x + y + z) = 36 \ \ va \ \ x + y + z = 9$$

ekanini hosil qilamiz. J: 9 (D)

1. (96-1-21) $(x; y)$ sonlar jufti

$$\begin{cases} 2x - y = 5 \\ 3x + 2y = 4 \end{cases}$$

sistemaning yechimi bo'lsa, $x - y$ ni toping.
A) 1 B) -1 C) 3 D) 0 E) 5

2. (96-3-24) Tenglamalar sistemasini qanoatlantiruvchi sonlar juftligini aniqlang.

$$\begin{cases} x + y = 5 \\ x - y = 1 \end{cases}$$

A) $(2; 3)$ B) $(-2; 3)$ C) $(3; 2)$
D) $(-2; -3)$ E) $(-3; 2)$

3. (96-3-76) x ni toping.

$$\begin{cases} 2x - 3y = 3 \\ x + 2y = 5 \end{cases}$$

A) 1 B) 2 C) 3 D) -2 E) -1

4. (96-7-21) Agar

$$\begin{cases} y - 3x = -5 \\ 5x + 2y = 23 \end{cases}$$

bo'lsa, $x^2 + y^2$ ning qiymatini toping.
A) 16 B) 25 C) 9 D) 10 E) 36

5. (96-9-17) x ni toping.

$$\begin{cases} 3x - 4y = 3 \\ x + 2y = 1 \end{cases}$$

A) 1 B) 0 C) -1 D) 2 E) -2

6. (96-9-72) $(x; y)$ sonlari jufti

$$\begin{cases} 3x - 2y = -8 \\ x + 3y = 1 \end{cases}$$

sistemaning yechimi bo'lsa, $y - x$ ni toping.
A) 0 B) -1 C) $-2,5$ D) 1 E) 3

7. (96-10-22) $(x; y)$ sonlar jufti

$$\begin{cases} 2x - 3y = 5 \\ 3x + y = 2 \end{cases}$$

sistemaning yechimi bo'lsa, $x + y$ ni toping.
A) 3 B) -3 C) 4 D) -1 E) 0

8. (96-11-25) Quyidagi juftliklardan qaysi biri tenglamalar sistemasini qanoatlantiradi?

$$\begin{cases} x + y = 5 \\ x - y = -1 \end{cases}$$

A) $(2; 3)$ B) $(1; 4)$ C) $(4; 1)$ D) $(3; 2)$ E) $(5; 6)$

9. (96-12-25) Quyidagi sonlarning qaysi jufti

$$\begin{cases} x + y = 7 \\ x - y = -1 \end{cases}$$

tenglamalar sistemasini qanoatlantiradi?
A) $(4; 3)$ B) $(1; 6)$ C) $(2; 5)$ D) $(5; 2)$ E) $(3; 4)$

10. (96-12-74) Sistemani yeching va y ning qiymatini toping?

$$\begin{cases} 2x - 3y = 3 \\ x + 2y = 5 \end{cases}$$

A) 2 B) 1 C) 3 D) $1,5$ E) -1

11. (96-13-17) Sistemadan x ni toping.

$$\begin{cases} 3x-4y=3 \\ x+2y=1 \end{cases}$$

A) -1 B) 3 C) 2 D) -2 E) 1

12. (97-1-11) $(x;y)$ sonlari jufti tenglamalar sistemasining yechimi, $x\cdot y$ ni toping.

$$\begin{cases} 2x+y-8=0 \\ 3x+4y-7=0 \end{cases}$$

A) -90 B) 12 C) -10 D) 80 E) -16

13. (97-3-21) Agar

$$\begin{cases} 5x+2y=-3 \\ x-3y=-4 \end{cases}$$

bo'lsa, x^2-y^2 ning qiymatini toping.
A) 2 B) 1 C) 0 D) 2,5 E) -2

14. (97-6-11) $(x;y)$ sonlari jufti

$$\begin{cases} x+2y-3=0 \\ 2x-3y+8=0 \end{cases}$$

tenglamalar sistemasining yechimi, $x+y$ ni hisoblang.
A) -1 B) 1 C) 3 D) 4,5 E) 0,5

15. (97-7-21) Agar

$$\begin{cases} 2x+3y=3 \\ x-2y=5 \end{cases}$$

bo'lsa, x^2+y^2 ning qiymatini toping.
A) 2 B) 4 C) 8 D) 10 E) 13

16. (97-10-21) Agar

$$\begin{cases} 3x-2y=1 \\ 4x-y=-2 \end{cases}$$

bo'lsa, y^2-x^2 ning qiymatini toping.
A) -1 B) -3 C) 3 D) 5 E) 2

17. (97-11-11) Agar

$$\begin{cases} 6x-2y-6=0 \\ 5x-y-17=0 \end{cases}$$

bo'lsa, $y-x$ ning qiymatini toping.
A) 11 B) -9 C) -25 D) 25 E) 18

18. (98-3-16) x ni toping.

$$\begin{cases} 3x+4y=11 \\ 5x-2y=1 \end{cases}$$

A) 2 B) $\frac{3}{2}$ C) $\frac{5}{2}$ D) 1 E) -1

19. (98-7-33) Tenglamalar sistemasini yeching.

$$\begin{cases} \frac{x+y}{2}-\frac{2y}{3}=\frac{5}{2} \\ \frac{3x}{2}+2y=0 \end{cases}$$

A) $(-4;3)$ B) $(4;3)$ C) $(3;-4)$
D) $(4;-3)$ E) yechimga ega emas

20. (98-10-64) y ni toping.

$$\begin{cases} 3x+4y=11 \\ 5x-2y=1 \end{cases}$$

A) 0 B) 1 C) 2 D) -2 E) -1

21. (98-12-31) Tenglamalar sistemasini yeching.

$$\begin{cases} \frac{x}{4}+\frac{y}{4}=2 \\ \frac{x}{6}+\frac{y}{3}=2 \end{cases}$$

A) $(4;4)$ B) $(-4;-4)$ C) $(-4;4)$
D) $(4;-4)$ E) cheksiz ko'p yechimga ega

22. (00-4-8) Sistema nechta yechimga ega?

$$\begin{cases} \frac{2x+5y}{y}=31 \\ \frac{x-2y}{y}=11 \end{cases}$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) cheksiz ko'p

23. (98-2-10) Agar

$$(ax^2-bx)+(bx^2+ax)=-12x$$

ayniyat bo'lsa, a va b ning qiymatini toping.
A) $a=-6;b=-6$ B) $a=8;b=-8$
C) $a=-6;b=6$ D) $a=6;b=-6$
E) $a=6;b=6$

24. (96-9-12) Ushbu

$$(\alpha x+2y)(3x+\beta y)=\gamma x^2+7xy+y^2$$

ayniyatdagi noma'lum koeffisentlardan biri α ni toping.
A) 3 B) 2 C) 4 D) $\frac{3}{2}$ E) $\frac{5}{2}$

25. (97-2-17) Agar $3a-b=7$, $b-c=5$ va $3c-a=2$ bo'lsa, $a+c$ ni toping.
A) 10 B) 14 C) 8 D) 6 E) 7

26. (97-4-7) $a=4b$ va $c+3b=0$ $(b\neq 0)$ bo'lsa, $\frac{a}{c}$ ni toping.
A) $-\frac{1}{3}$ B) $1\frac{1}{3}$ C) $1\frac{2}{3}$ D) $-1\frac{1}{3}$ E) $-\frac{2}{3}$

27. (97-8-17) Agar $2m+n=2$, $2n+p=6$ va $2p+m=4$ bo'lsa, $m+n+p$ ni toping.
A) 6 B) 4 C) 5 D) 3 E) 8

28. (97-12-16) Agar $2q-4p=-9$, $2t-4q=-7$ va $2p-4t=2$ bo'lsa, $p+q+t$ ning qiymatini toping.
A) -7 B) 8 C) 7 D) -8 E) 6

29. (00-4-39) Agar $3a+4b=16$ va $2c-b=1$ bo'lsa, $3a+8c$ ning qiymatini toping.
A) 18 B) 4 C) 20 D) 23
E) aniqlab bo'lmaydi

30. (00-7-11) Agar $x+y+2z=13$, $x+2y+z=12$ va $2x+y+z=11$ bo'lsa, $x+y$ ning qiymati nechaga teng bo'ladi.
A) 4 B) 6 C) 5 D) 3 E) 7

31. (00-1-11) Agar

$$a^2 - 4a + 5 + b^2 - 2b = 0$$

bo'lsa, $(a+b)^3$ ning qiymatini toping.
A) 26 B) 27 C) 28 D) 25 E) 21

32. (98-10-58) $x^3 + 2nx^2 + mx + 5$ ko'phad $x^2 - x - 2$ ga qoldiqsiz bo'linadi. n ni toping.
A) $\frac{21}{12}$ B) $-\frac{21}{12}$ C) $\frac{12}{21}$ D) $-\frac{12}{21}$ E) -2

33. (98-9-9) Agar $ax^2 + kx + kx^2 - ax = x^2 - 17x$ ayniyat bo'lsa, k ning qiymati qanchaga teng bo'ladi?
A) -6 B) -8 C) -7 D) -9 E) 8

34. (98-3-11) $x^3 + 2nx^2 + mx + 5$ ko'phad $x^2 - 1$ ga qoldiqsiz bo'linadi. $m + n$ ni toping.
A) 5 B) $\frac{7}{2}$ C) $-\frac{7}{2}$ D) -7 E) -6

35. (98-1-19) a va b ning qanday qiymatida quyidagi tenglik ayniyat bo'ladi?

$$\frac{1}{x^2 - 5x - 6} = \frac{a}{x-6} + \frac{b}{x+1}$$

A) $a = 7,\ b = -1$ B) $a = \frac{1}{7},\ b = -\frac{1}{7}$
C) $a = 1,\ b = 1$ D) $a = -\frac{1}{7},\ b = \frac{1}{7}$
E) $a = -1,\ b = 7$

36. (98-8-19) a va b ning qanday qiymatida quyidagi tenglik ayniyat bo'ladi?

$$\frac{2}{x^2 + x - 6} = \frac{a}{x-2} + \frac{b}{x+3}$$

A) $a = 1,\ b = 1$ B) $a = \frac{2}{5},\ b = -\frac{2}{5}$
C) $a = 5,\ b = -5$ D) $a = -\frac{2}{5},\ b = \frac{2}{5}$
E) $a = -\frac{1}{5},\ b = \frac{3}{5}$

37. (00-3-14) a va b ning qanday qiymatilarda

$$\frac{1}{4x^2 - 1} = \frac{a}{2x-1} - \frac{b}{2x+1}$$

munosabat ayniyat bo'ladi?
A) $a = -\frac{1}{2},\ b = \frac{1}{2}$ B) $a = 1,\ b = -1$
C) $a = -1,\ b = 1$ D) $a = \frac{1}{2},\ b = -\frac{1}{2}$
E) $a = \frac{1}{2},\ b = \frac{1}{2}$

38. (01-6-11) Agar $x + y + z = 6$, $x - y + z = 4$ va $z + y - x = 0$ bo'lsa, xyz ning qiymatini toping.
A) 5 B) 7 C) 4 D) 8 E) 6

39. (02-3-9) Agar $a(x-1)^2 + b(x-1) + c = 2x^2 - 3x + 5$ ayniyat bo'lsa, $a + b + c$ yig'indi nechaga teng bo'ladi?
A) 7 B) 8 C) 6 D) 4 E) 5

40. (02-5-18) x, y va z sonlari orasida $\frac{x + \frac{y}{2} + \frac{z}{4}}{z} = 1$ va $\frac{\frac{x}{2} + \frac{3}{8}y + \frac{z}{4}}{y} = 1$ munosabat o'rinli bo'lsa, $\frac{y}{z}$ ning qiymatini toping.
A) $\frac{3}{4}$ B) 2 C) $\frac{1}{2}$ D) $\frac{5}{7}$ E) $\frac{4}{3}$

41. (02-10-6) a, b va c ning qanday qiymatida

$$\frac{1}{(x+1)^2 \cdot (x+2)} = \frac{a}{x+1} + \frac{b}{(x+1)^2} + \frac{c}{x+2}$$

tenglik ayniyat bo'ladi?
A) $-1;\ 1;\ 1$ B) $0;\ 1;\ 2$ C) $1;\ -1;\ \frac{1}{2}$
D) $2;\ -2;\ \frac{1}{2}$ E) $1;\ \frac{1}{2};\ -1$

42. (02-11-10) Agar

$$\begin{cases} \frac{3x-y+2}{7} + \frac{x+4y}{2} = 4 \\ \frac{3x-y+2}{7} - \frac{x+4y}{3} = -1 \end{cases}$$

bo'lsa, $x(y+7)$ ning qiymatini toping.
A) 16 B) 18 C) 20 D) 14 E) 22

43. (02-12-2) Agar $x + y = 4$, $y + z = 8$ va $x + z = 6$ bo'lsa, $x - y + 2z$ ning qiymatini hisoblang.
A) 8 B) 6 C) 7 D) 10 E) 9

44. (02-12-19) Nechta natural sonlar jufti

$$x^2 - y^2 = 105$$

tenglikni qanoatlantiradi?
A) 3 B) 4 C) 2 D) 5 E) 8

45. (03-6-41)

$$\begin{cases} 2x + 3y = 7 \\ 4x + 6y = 14 \end{cases}$$

tenglamalar sistemasi nechta yechimga ega?
A) 1 B) 2 C) yechimga ega emas
D) to'g'ri javob yo'q
E) cheksiz ko'p yechimga ega

1.6.2 Chiziqli va ikkinchi darajali tenglamalar sistemasi.

(98-12-64) Agar

$$\begin{cases} x + y = 3 \\ x \cdot y = 1 \end{cases}$$

bo'lsa, $x^5 \cdot y + x \cdot y^5$ ni hisoblang.
A) 47 B) 29 C) 51 D) 24 E) 18

Yechish: $x+y = 3$, $xy = 1$ tengliklardan $x^2+y^2 = (x+y)^2 - 2xy = 9 - 2 = 7$ ekani kelib chiqadi. Shuning uchun

$$x^5y + xy^5 = xy(x^4 + y^4) = x^4 + y^4 =$$

$$= (x^2 + y^2)^2 - 2x^2y^2 = 7^2 - 2 = 47$$

Javob: 47 (A)

1. (96-1-19) Sistemaning yechimini toping.

$$\begin{cases} x^2 + y^2 - 2xy = 1 \\ x + y = 3 \end{cases}$$

A) $(2;1)$ B) $(1;2)$ C) $(1,5;1,5)$
D) $(2;1)$ va $(1;2)$ E) $(4;-1)$

2. (96-3-75) Ushbu

$$\begin{cases} x + y = 3 \\ x^2 - y^2 = 6 \end{cases}$$

tenglamalar sistemasidan x ni toping.
A) 1,5 B) 2,5 C) 3 D) 1 E) 2

3. (96-6-20) Tenglamalar sistemasini yeching.

$$\begin{cases} x^2 - y^2 - 3x = 12 \\ x - y = 0 \end{cases}$$

A) $(-4;4)$ B) $(4;-4)$ C) $(4;4)$ D) $(-4;-4)$
E) javob ko'rsatilganlardan farqli

4. (96-7-23) Tenglamalar sistemasi nechta yechimga ega?

$$\begin{cases} x^2 + y^2 = 9 \\ y - x = -3 \end{cases}$$

A) 1 B) 2 C) 3 D) 4
E) yechimga ega emas.

5. (96-9-16) Sistemadan $x \cdot y$ ni toping.

$$\begin{cases} x^2 + y^2 = 10 \\ x + y = 4 \end{cases}$$

A) 4 B) 5 C) 6 D) 7 E) 3

6. (96-9-70) Sistemaning yechimini toping.

$$\begin{cases} x^2 + y^2 - 2xy = 16 \\ x + y = -2 \end{cases}$$

A) $(1;-3)$ B) $(-3;1)$ C) $(0;-2)$
D) $(1;-3)$ va $(-3;1)$ E) $(2;-4)$ va $(-4;2)$

7. (96-10-20) Sistemaning yechimini toping.

$$\begin{cases} x - y = 4 \\ x^2 + y^2 + 2xy = 4 \end{cases}$$

A) $(3;1)$ B) $(3;-1)$ C) $(3;-1)$ va $(1;-3)$
D) $(2;-2)$ E) $(5;1)$ va $(2;-2)$

8. (96-12-73) Sistemani yeching va $x \cdot y$ ning qiymatini toping?

$$\begin{cases} x^2 + y^2 = 3 \\ x - y = 1 \end{cases}$$

A) 2 B) 3 C) $1,5$ D) $2,5$ E) 1

9. (96-13-16) Sistemadan $x \cdot y$ ni toping.

$$\begin{cases} x^2 + y^2 + xy = 8 \\ x + y = 3 \end{cases}$$

A) 4 B) 1 C) 2 D) $0,5$ E) 5

10. (97-2-20) Tenglamalar sistemasini yeching.

$$\begin{cases} x + 2 = 0 \\ xy^2 = -8 \end{cases}$$

A) $(-2;-2)$ B) $(-2;2)$
C) $(-2;2)$ va $(-2;-2)$
D) $(2;2)$ E) $(2;2)$ va $(-2;-2)$

11. (97-3-23) Tenglamalar sistemasi

$$\begin{cases} x^2 + y^2 = 25 \\ x - y = 5 \end{cases}$$

nechta yechimga ega?
A) 4 B) 3 C) 2 D) 1
E) yechimga ega emas

12. (97-7-23) Tenglamalar sistemasi nechta yechimga ega?

$$\begin{cases} x^2 + y^2 = 16 \\ y - x = 4 \end{cases}$$

A) 1 B) 2 C) 3 D) 4
E) yechimga ega emas

13. (97-8-20) Tenglamalar sistemasini yeching.

$$\begin{cases} y + 4 = 2 \\ x^2 y = -2 \end{cases}$$

A) $(1;-2)$ B) $(-1;-2)$ C) $(1;2)$
D) $(-1;-2)$ va $(1;-2)$ E) $(-1;2)$ va $(1;-2)$

14. (97-10-23) Ushbu

$$\begin{cases} x^2 + y^2 = 4 \\ x - y = -2 \end{cases}$$

tenglamalar sistemasi nechta yechimga ega?
A) 4 B) 3 C) 2 D) 1
E) yechimga ega emas

15. (97-12-19) Tenglamalar sistemasini yeching.

$$\begin{cases} x^2 - y^2 + 2x + 4 = 0 \\ x - y = 0 \end{cases}$$

A) $(2;2)$ B) $(-2;-2)$ C) $(-1;-1)$
D) $(1;1)$ E) $(-2;2)$

16. (98-3-17) Sistemadan $(x+y)^2$ ni toping.

$$\begin{cases} x^2 + y^2 = 20 \\ xy = 8 \end{cases}$$

A) 30 B) 34 C) 42 D) 40 E) 36

17. (98-4-5) Agar $x - y = 5$ va $xy = 7$ bo'lsa, $x^3y + xy^3$ ning qiymati qancha bo'ladi?
A) 162 B) 271 C) 354 D) 216 E) 273

18. (98-11-60) Agar $x^2 + y^2 = 281$ va $x - y = 11$ bo'lsa, xy qanchaga teng bo'ladi?
A) 80 B) 160 C) -80 D) 40 E) -160

19. (98-12-19) Agar $a - b = 12$ va $-ab + a^2 = 144$ bo'lsa, a ning qiymati qanchaga teng bo'ladi?
A) 12 B) -12 C) 36 D) 6 E) $\sqrt{12}$

20. (00-6-19) Agar $a + b = 7$ va $ab = 2$ bo'lsa, $a^2b^4 + a^4b^2$ ning qiymatini toping.
A) 196 B) 180 C) 112 D) 98
E) to'g'ri javob keltirilmagan

21. (97-9-67) Agar $ab = 9$ va $3b = 8c$ $(b \neq 0)$ bo'lsa, ac ni hisoblang.
A) $3\frac{1}{3}$ B) $3\frac{5}{8}$ C) $3\frac{4}{9}$ D) $3\frac{5}{7}$ E) $3\frac{3}{8}$

22. (96-12-70) Ushbu

$$(ax + 2y)(3x + by) = cx^2 + 7xy + y^2$$

ayniyatdagi noma'lum koeffisiyentlardan biri c ni toping.
A) 5 B) 6 C) 7 D) 4 E) 2

23. (96-13-12) Ushbu

$$(-3x+\alpha y)(\beta x-2y)=\gamma x^2+7xy+2y^2$$

ayniyatdagi noma'lum koeffisientlardan biri β ni toping.
A) 1 B) -1 C) 2 D) -2 E) 3

24. (99-8-28) Ildizlari $x_1^2+x_2^2=13$ va $x_1+x_2=5(x_1-x_2)$ shartni qanoatlantiruvchi kvadrat tenglamani tuzing (Bunda $x_1>x_2$).
A) $x^2-5x+6=0$ B) $5x^2-x-4=0$
C) $3x^2+2x-5=0$ D) $2x^2-3x+1=0$
E) $x^2-6x+5=0$

25. (01-3-32) x ni toping.

$$\begin{cases} x+y=6 \\ x^2-y^2=12 \end{cases}$$

A) 4 B) 2 C) 1 D) 3 E) 5

26. (01-3-33) $3xy$ ni toping.

$$\begin{cases} x^2+y^2-xy=1 \\ x+y=-2 \end{cases}$$

A) 1 B) -1 C) 3 D) -3 E) 2

27. (01-3-34) Ushbu

$$\begin{cases} x+3=0 \\ xy^2=-12 \end{cases}$$

tenglamalar sistemasining yechimini toping.
A)$(-3;2)$ B) $(-3;-2)$
C)$(-3;-2),(-3;2)$ D) $\emptyset$ E)$(3;-2)$

28. (01-4-23) Agar

$$\begin{cases} x^2-y^2=6 \\ x+y=1 \end{cases}$$

bo'lsa, $x-y$ ning qiymatini toping.
A)1 B) -1 C)6 D) -6 E)0

29. (02-2-5) Agar $a+b=10$ va $a^2+b^2=60$ bo'lsa, $a^4+b^4=$?
A)2800 B) 3400 C)3000 D) 2600 E)2900

30. (02-6-3) Agar $x+y=-p$ va $xy=q$ bo'lsa, $x(1+y)-y(xy-1)-x^2y$ ko'phadning qiymatini toping.
A) $pq+q-p$ B) $p-q+pq$
C) $p+q-pq$ D) $p+q+pq$
E) $-p-q-pq$

31. (02-12-30) Agar $x^2-4xy+y^2=4-2xy$ va $x+y=12$ bo'lsa, xy ning qiymatini toping.
A)32 B)35 C)30 D) 34 E)36

32. (03-12-3) $b+a=18$, $a^2+b^2=170$. $ab=$?
A)45 B)72 C)77 D) 80 E)84

1.6.3 Ikkinchi va undan yuqori darajali tenglamalar sistemasi.

(97-4-25) Agar

$$\begin{cases} x^3-y^3=3x^2y+5 \\ xy^2=1 \end{cases}$$

bo'lsa, $\frac{x-y}{2}$ ni hisoblang.
A) 2 B) 1 C) 3 D) 4,5 E) 1,5

Yechish: Berilgan tengliklardan foydalanib

$$(x-y)^3=x^3-3x^2y+3xy^2-y^3=5+3\cdot 1=8$$

ni hosil qilamiz. U holda $x-y=2$ va

$$\frac{x-y}{2}=\frac{2}{2}=1$$

bo'ladi. Javob: 1 (B)
(00-8-14) Agar

$$\begin{cases} xy=6 \\ yz=12 \\ zx=8 \end{cases}$$

bo'lsa, $x+y+z$ ning qiymatini toping.
A) -9 yoki 9 B) 18 C) 0 D) 36 E) 26

Yechish: Tengliklarni ko'paytirib, $x^2y^2z^2=576$ ekanini hosil qilamiz. Ikkita hol bo'lishi mumkin:
1. $xyz=24$. Bu tenglikni sistemaning birinchi, ikkinchi va uchinchi tengliklariga ketma - ket bo'lib, $x=4$ $y=2$ $z=3$ ni hosil qilamiz. Bu holda $x+y+z=4+2+3=9$.
2. $xyz=-24$. Bu tenglikni ham sistemaning birinchi, ikkinchi va uchinchi tengliklariga bo'lib, $x=-4$; $y=-2$; $z=-3$ ni hosil qilamiz. Bu holda $x+y+z=-9$
Javob: -9 yoki 9 (A)

1. (98-2-16) Agar $m^2-mn=48$ va $n^2-mn=52$ bo'lsa, $m-n$ nechaga teng?
A)10 B) 8 C)± 10 D) ± 8 E)9

2. (98-5-22) Agar

$$\begin{cases} x^2-2xy+y^2=9 \\ xy=10 \end{cases}$$

bo'lsa, $|x+y|$ ni hisoblang.
A)7 B) 6 C)5 D) 8 E)4

3. (98-6-2) Agar $xy=6$, $yz=2$ va $xz=3$ $(x>0)$ bo'lsa, xyz ni toping.
A)-6 B) 6 C)5 D) 12 E)-12

4. (98-6-10) Agar $x^2+y^2=225$ va $x^2-y^2=63$ bo'lsa, $|x|-|y|$ ni toping.
A)3 B) 4 C)5 D) 6 E) 7

5. (98-9-16) Agar $p^2+pq=96$ va $q^2+pq=48$ bo'lsa, $p+q$ ning qiymati qanchaga teng bo'ladi?
A)12 B) 14 C)$\pm 12\sqrt{2}$ D) ± 12 E)$\pm 14\sqrt{2}$

6. (98-10-17) Tenglamalar sistemasini yeching.

$$\begin{cases} x^2-1=0 \\ xy^2=-4 \end{cases}$$

A) $(-1;2)$ B) $(2;-1)$ C) $(2;1)$
D) $(-1;2)$ va $(-1;-2)$ E) $(-1;-2)$

7. (98-10-65) $(x+y)^2$ ni toping.

$$\begin{cases} x^2+y^2=10 \\ xy=3 \end{cases}$$

A)13 B) 7 C)16 D) 19 E) 22

8. (98-11-52) Agar $xy=4$, $yz=7$ va $xz=28$ $(y>0)$ bo'lsa, xyz ni toping.
A)-28 B) 28 C)27 D) 56 E)-56

9. (99-1-19) Tenglamalar sistemasini yeching.

$$\begin{cases} y-x^3=0 \\ y=16x \end{cases}$$

A) $(0;0)$, $(4;64)$ va $(-4;-64)$
B) $(0;0)$, $(8;2)$ va $(27;3)$
C)$\emptyset$ D) $(0;0)$, $(2;8)$ va $(64;4)$
E) $(16;1)$, $(16;2)$ va $(48;3)$

10. (99-6-37) Agar $ab=18$, $bc=25$ va $ac=8$ bo'lsa, $\sqrt{abc}$ nimaga teng.
A)$2\sqrt{15}$ B) $15\sqrt{2}$ C)$6\sqrt{5}$ D) $8\sqrt{3}$ E)$3\sqrt{15}$

11. (99-9-23) Agar $a^2+b^2+ab=91$ va $a^2+b^2=61$ bo'lsa, $|a+b|$ ning qiymati qanchaga teng bo'ladi?
A)10 B) 9 C)11 D) 12 E)13

12. (99-10-11) Agar $x^2\cdot y=50$, $x\cdot y^2=20$ bo'lsa, xy ning qiymatini hisoblang.
A)8 B) 10 C)6 D) 12 E)15

13. (00-1-23) Agar $a-b=1$ va $(a^2-b^2)\cdot(a-b)=9$ bo'lsa, ab ning qiymatini toping.
A)19 B) 22 C)21 D) 20 E)24

14. (01-1-11) Agar

$$\begin{cases} x^2-5xy+y^2=-47 \\ xy=21 \end{cases}$$

bo'lsa, $|x+y|+|x-y|$ ning qiymatini toping.
A) 8 B) 10 C) 12 D) 14 E) 9

15. (01-11-12) Agar $x^2-xy=28$ va $y^2-xy=-12$ bo'lsa, $|x-y|$ ning qiymatini aniqlang.
A)7 B) 5 C)6 D) 4 E) 8

16. (97-8-11) Agar $(x-4)^2+(x-y^2)^2=0$ bo'lsa, $x+2y$ nechaga teng?
A)0 B) 4 C)6 D) 8 E) 0 yoki 8

17. (01-10-8) Nechta butun x va y sonlar jufti $x^2-y^2=31$ tenglikni qanoatlantiradi?
A)$\emptyset$ B) 1 C)2 D) 3 E) 4

18. (98-6-11) Agar m va n natural sonlar

$$\sqrt{2}(n-5)+n^2-6mn+5m=0$$

tenglikni qanoatlantirsa. $n-m$ ni toping.
A)2 B) 5 C)6 D) 3 E) 4

19. (99-10-22) Agar $x^2\cdot y+x\cdot y^2=48$ va $x^2\cdot y-x\cdot y^2=16$ bo'lsa, $\frac{x}{y}$ ning qiymatini hisoblang.
A)$\frac{1}{4}$ B) -2 C)2 D) $-\frac{1}{2}$ E) $\frac{1}{2}$

20. (01-7-18) Agar

$$\begin{cases} x^3+2x^2y+xy^2-x-y=2 \\ y^3+2xy^2+x^2y+x+y=6 \end{cases}$$

bo'lsa, $x+y$ ning qiymatini toping.
A) 1 B) 2 C) -1 D) -2 E) 3

21. (02-6-32)

$$\begin{cases} x^3+y^3=35 \\ x+y=5 \end{cases}$$

$x\cdot y=$?
A) 3 B) 4 C) 5 D) 6 E) 7

22. (02-7-54) Agar $8a^3-b^3=37$ va $ab^2-2a^2b=-6$ bo'lsa, $2a-b$ ning qiymatini toping.
A)1 B) -1 C)2 D) -2 E) -3

23. (02-8-1) $a=\frac{25}{a}-b$ va $b=\frac{144}{b}-a$ bo'lsa, $|a+b|$ ni hisoblang.
A) 13 B) 12 C)5 D) $\sqrt{119}$ E) 14

24. (02-8-11)

$$\begin{cases} xy+x+y=11 \\ x^2y+y^2x=30 \end{cases}$$

tenglamalar sistemasi uchun $x+y$ ning eng katta qiymatini toping.
A) 6 B) 5 C) 7 D) 4 E) 8

25. (02-9-11)

$$\begin{cases} y=\frac{4}{x} \\ y=-x^2+6x-5 \end{cases}$$

tenglamalar sistemasi nechta yechimga ega?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

26. (02-9-27) Agar

$$\begin{cases} \frac{7}{\sqrt{x-7}}-\frac{4}{\sqrt{y+6}}=\frac{5}{3} \\ \frac{5}{\sqrt{x-7}}+\frac{3}{\sqrt{y+6}}=\frac{13}{6} \end{cases}$$

bo'lsa, $x+y$ ning qiymatini toping.
A) 19 B) 45 C) 9 D) 36 E) 46

27. (02-11-27) x ning

$$\begin{cases} x^5\cdot y^7=32 \\ x^7\cdot y^5=128 \end{cases}$$

tenglamalar sistemasining yechimidan iborat barcha qiymatlari yig'indisini toping.
A) 0 B) 4 C) 8 D) 12 E) 16

28. (02-12-26) Agar $\frac{1}{n}+\frac{1}{m}=\frac{1}{7}$ va $m+n=-4$ bo'lsa, mn ning qiymatini toping.
A) $20,5$ B) $-20,5$ C) 21 D) -28 E) 28

29. (02-12-29) Agar $x^3+3xy^2=185$ va $y^3+3x^2y=158$ bo'lsa, $x-y$ ning qiymatini toping.
A) 4 B) $3,5$ C) 2 D) 3 E) $2,5$

30. (03-1-65) Agar

$$\begin{cases} x^2y+xy^2=120 \\ x^2y-xy^2=30 \end{cases}$$

bo'lsa, x^2-y^2 ning qiymatini hisoblang.
A) 16 B) 20 C) 25 D) 34 E) 42

31. (03-8-34) Agar

$$\begin{cases} x+y-\sqrt{xy}=7 \\ x^2+y^2+xy=133 \end{cases}$$

bo'lsa, xy ning qiymatini toping.
A) 36 B) 42 C) 25 D) 81 E) 16

32. (03-8-40) Agar

$$\begin{cases} \frac{xy}{x+y}=\frac{10}{7} \\ \frac{yz}{y+z}=\frac{40}{13} \\ \frac{zx}{x+z}=\frac{5}{8} \end{cases}$$

tenglamalar sistemasidan x ni toping.
A) $\frac{80}{79}$ B) $\frac{5}{7}$ C) $\frac{7}{13}$ D) $\frac{79}{80}$ E) $\frac{7}{5}$

33. (03-9-6) Agar

$$\begin{cases} x^3+y^3=35 \\ x^2y+xy^2=30 \end{cases}$$

tenglamalar sistemasining yechimlaridan iborat barcha x va y larning yig'indisini toping.
A) 0 B) 2 C) 6 D) 10 E) 12

34. (03-10-33)

$$x^2+y^2=17;\ \ x^3y^3=343;\ \ x^4+y^4=?$$

A) 167 B) 176 C) 187 D) 191 E) 205

35. (03-11-3) Agar

$$\begin{cases} \frac{1}{\sqrt{x}}+\frac{1}{\sqrt{y}}=\frac{4}{3} \\ xy=9 \end{cases}$$

bo'lsa, $x+y$ ning qiymatini toping.
A) 10 B) 9 C) 8 D) 12 E) 11

36. (03-11-65) Agar

$$\begin{cases} \frac{x+3y+1}{y}-\frac{y-x+3}{2(x-2)}=2 \\ y-x=1 \end{cases}$$

bo'lsa, $x\cdot y$ ning qiymatini toping.
A) 15 B) -6 C) -8 D) 6 E) 12

37. (03-12-18) $x^{-4}+y^{-4}=162$ va $x^{-3}+y^{-3}=0$ shartlarini qanoatlantiradigan $(x;y)$ nuqtalar orasidagi kesmaning uzunligini aniqlang.
A) $\frac{3\sqrt{2}}{4}$ B) $\frac{2\sqrt{3}}{3}$ C) $\frac{3\sqrt{2}}{8}$ D) $\frac{2\sqrt{3}}{5}$ E) $\frac{2\sqrt{2}}{3}$

1.6.4 Parametrli tenglamalar sistemasi.

$\begin{cases} a_1x+b_1y=c_1 \\ a_2x+b_2y=c_2 \end{cases}$ tenlamalar sistemasi

1. $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$ bo'lganda 1 ta yechimga ega.
2. $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$ bo'lganda cheksiz ko'p yechimga ega.
3. $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$ bo'lganda yechimga ega emas.

(98-3-24) k ning qanday qiymatlarida

$$\begin{cases} (k^2-k-1)x+2,5y-5=0 \\ 2x+y+k=0 \end{cases}$$

sistemaning birorta ham yechimi bo'lmaydi?
A) -2 B) -2 va 3 C) 3 D) 4 va 3 E) 5
Yechish: Sistemaning 2– tenglamasidan $y=-2x-k$ ni hosil qilamiz. Uni sistemaning 1– tenglamasiga qo'yamiz:

$$(k^2-k-1)x+2,5(-2x-k)-5=0$$

$$(k^2-k-6)x=2,5k+5.$$

Bu tenglama yechimga ega bo'lmasligi uchun

$$\begin{cases} k^2-k-6=0 \\ 2,5k+5\neq 0 \end{cases}$$

bo'lishi kerak. Birinchi tenglamadan $k_1=-2$, $k_2=3$ ni topamiz. Ikkinchi munosabatdan $k\neq -2$ ni hosil qilamiz. Demak $k=3$ (C).

1. (98-5-20) a ning qanday qiymatlarida

$$\begin{cases} ax-y=0 \\ x+y=10 \end{cases}$$

tenglamalar sistemasi yechimga ega bo'lmaydi?
A) -1 B) 2 C) 1 D) -2 E) 3

2. (98-10-71) k ning qanday qiymatlarida

$$\begin{cases} (k^2+k+1)x+3y-6=0 \\ x+y+k=0 \end{cases}$$

sistema birorta ham yechimga ega bo'lmaydi?
A) -2 B) 1 C) -2 va 1 D) 2 va 3 E) 3

3. (97-4-23) Agar

$$\begin{cases} x+2y=2 \\ 2x+y=k \end{cases}$$

bo'lsa, k ning qanday qiymatida $x+y=2$ tenglik o'rinli bo'ladi?
A) 2 B) 4 C) 1 D) 5 E) 3

4. (97-9-83) Agar

$$\begin{cases} x+3y=6 \\ 2x+ky=8 \end{cases}$$

bo'lsa, k ning qanday qiymatida $x+y=2$ tenglik o'rinli bo'ladi?
A) 0 B) 1 C) 2 D) 3 E) 4

5. (99-1-17) Tenglamalar sistemasi a ning qanday qiymatlarida yechimga ega emas?

$$\begin{cases} a^2x+3y=3 \\ 3x+y=4 \end{cases}$$

A) ± 3 B) ± 1 C) $\pm\sqrt{3}$ D) 0 E) $\emptyset$

6. (99-2-17) a ning qanday qiymatida tenglamalar sistemasi yechimga ega bo'lmaydi?

$$\begin{cases} 2x+ay=2 \\ ax+2y=3 \end{cases}$$

A) 3 B) ± 3 C) 4 D) ± 2 E) -4

7. (99-7-22) a ning qanday qiymatida

$$\begin{cases} ax+2y=4 \\ 2x+y=3 \end{cases}$$

tenglamalar sistemasi yechimga ega bo'lmaydi?
A) 4 B) -4 C) 2 D) -2 E) 3

8. (99-9-16) k ning qanday qiymatida

$$\begin{cases} 3x+6y=k \\ 9x+18y=k+1 \end{cases}$$

sistemasi cheksiz ko'p yechimga ega?
A) $\frac{1}{3}$ B) 1 C) $\frac{1}{2}$ D) $\frac{2}{3}$ E) $\frac{4}{5}$

9. (00-5-27) k ning qanday qiymatida

$$\begin{cases} kx+4y=4 \\ 3x+y=1 \end{cases}$$

tenglamalar sistemasi yagona yechimga ega bo'ladi?
A) $k \neq 12$ B) $k=9$ C) $k \neq 19$
D) $k=12$ E) $k=1$

10. (00-3-12) a ning qanday qiymatida

$$\begin{cases} (6+a)x-6y=2 \\ -2ax+3y=a-3 \end{cases}$$

tenglamalar sistemasi cheksiz ko'p yechimga ega bo'ladi?
A) 2 B) -2 C) -6 D) 4 E) -13

11. (01-2-15) k ning qanday qiymatida

$$\begin{cases} 3x+(k-1)y=k+1 \\ (k+1)x+y=3 \end{cases}$$

tenglamalar sistemasi cheksiz ko'p yechimga ega bo'ladi?
A) -1 B) -2 C) 0 D) 2 E) 1

12. (01-7-19) a ning qanday qiymatida

$$\begin{cases} x+y=a \\ xy=9 \end{cases}$$

tenglamalar sistemasi yagona yechimga ega?
A) 3 B) 6 C) -3 D) $-3;3$ E) $-6;6$

13. (01-10-28) a ning qanday qiymatida

$$\begin{cases} 2x+3y=5 \\ x-y=2 \\ x+4y=a \end{cases}$$

tenglamalar sistemasi yechimga ega?
A) 0 B) 1 C) 2 D) 3 E) 4

14. (02-1-46)

$$\begin{cases} ax+by=3 \\ bx+ay=2 \end{cases}$$

tenglamalar sistemasi $x=3$, $y=2$
yechimga ega bo'lsa, a ning qiymatini toping.
A) 4 B) 5 C) 3 D) 6 E) 1

15. (02-5-10) m ning qanday qiymatlarida

$$\begin{cases} mx+2y+4=0 \\ 2x+my-8=0 \end{cases}$$

tenglamalar sistemasi yechimga ega emas?
A) 4 B) -4 C) 2 D) -2 E) $-2;2$

16. (02-6-33) a ning qanday qiymatlarida

$$\begin{cases} x+ay=1 \\ ax+y=2a \end{cases}$$

tenglamalar sistemasi yechimga ega emas?
A) 1 B) -1 C) 2 D) ± 1 E) ± 2

17. (02-9-15) Agar $y-x=2$ va $a>0$ bo'lsa,

$$\begin{cases} y^2-x^2=8a \\ y+x=a^2 \end{cases}$$

tenglamalar sistemasini yeching.
A) $(5;7)$ B) $(7;9)$ C) $(4;6)$
D) $(-6;-4)$ E) $(-10;-8)$

18. (03-8-15) a va b ning qanday qiymatlarida

$$\begin{cases} ax-5y=-1 \\ 6x+15y=b+3 \end{cases}$$

tenglamalar sistemasi yechimga ega emas?
A) $a=2;\ \ b \neq 1$ B) $a=2;\ \ b \neq 0$
C) $a \neq 1;\ \ b=3$ D) $a=-2;\ \ b \neq 1$
E) $a=-2;\ \ b \neq 0$

19. (03-10-30) a ning nechta qiymatida

$$\begin{cases} (a-2)x+3y=5 \\ 7x-18y=1 \end{cases}$$

tenglamalar sistemasi yechimga ega emas?
A) 1 B) 2 C) 4 D) birorta ham qiymatida
E) cheksiz ko'p

20. (03-12-7) k parametrining qanday qiymatlarida

$$\begin{cases} kx-3y=6 \\ 2x-y=2 \end{cases}$$

tenglamalar sistemasi yechimga ega emas?
A) bunday qiymatlari yo'q
B) 2 C) 3 D) 6 E) 1

1.7 Tengsizliklar.

1.7.1 Chiziqli tengsizliklar.

(00-8-33) k ning $4y^2-3y+k=0$ tenglama haqiqiy ildizlarga ega bo'lmaydigan eng kichik butun qiymatini toping.
A) 1 B) 3 C) 4 D) 5 E) 12
Yechish: $4y^2-3y+k=0$ tenglama haqiqiy ildizga ega bo'lmasligi uchun $D<0$ bo'lishi kerak:

$$9-16k<0. \;\Rightarrow k>\frac{9}{16}$$

Uni qanoatlantiruvchi eng kichik butun son $k=1$.
J: 1 (A).

1. (01-8-10) Tengsizlikni yeching.

$$\frac{1-x}{2}+3<3x-\frac{2x+1}{4}$$

A) $(1\frac{1}{3};\infty)$ B) $(1\frac{1}{13};\infty)$ C) $(-\infty;\frac{1}{4})$
D) $(1,5;\infty)$ E) $(1\frac{1}{4};\infty)$

2. (00-6-10) Tengsizlikni yeching.

$$1-\frac{17-3x}{2}>1,5x$$

A) $(-2,5;0)$ B) $(-\infty;-2,5)$ C) $(-\infty;0)$
D) $x\in R$ E) $\emptyset$

3. (98-10-16) Ushbu $f(x)=\frac{\sqrt{8+x}}{x+2}$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty;8)$ B) $(-\infty;8]$
C) $(-\infty;-2)\cup(-2;8)$
D) $(-\infty;-2)\cup(-2;8]$
E) $[-8;-2)\cup(-2;\infty)$

4. (98-12-20) Tenglamada x ning qabul qilishi mumkin bo'lgan qiymatlar to'plamini ko'rsating.

$$\frac{4}{x+3}+\frac{7}{\sqrt{x+3}}=\frac{1}{x^2+5x+6}$$

A) $(-3;-2)\cup(-2;\infty)$
B) $(-3;-2)$ C) $(-2;\infty)$
D) $(-\infty;-2)$ E) $[-3;-2)\cup(-2;\infty)$

5. (01-8-1) Ushbu

$$1\le\frac{x+3}{4}\le 4$$

tengsizlikning tub sonlardan iborat nechta yechimi bor?
A) 6 B) 5 C) 4 D) 3 E) 7

6. (02-11-4) a ning qanday qiymatida

$$8^{\frac{2}{3}}\cdot a-\sqrt[3]{(-8)^2}$$

ifoda musbat bo'ladi?
A) $a>1$ B) $a>\frac{1}{16}$ C) $a>-\frac{1}{16}$
D) $a<\frac{1}{16}$ E) $\emptyset$

7. (98-2-17) Quyida keltirilgan tengsizliklardan qaysi biri

$$3x-a>b-2x$$

tengsizlikka teng kuchli emas?
A) $5x-a>b$ B) $6x-2a>2b-4x$
C) $3x>a+b-2x$ D) $5x>a+b$
E) $a-3x>2x-b$

8. (02-2-10)

$$(x+1)^2>(x+2)^2$$

tengsizlikni qanoatlantiruvchi eng katta butun sonni toping.
A) -2 B) -1 C) -3 D) -4 E) 3

9. (02-3-18)

$$8+\frac{6x-8}{10}>\frac{x-2}{6}+\frac{1-5x}{8}+\frac{1}{4}$$

tengsizlikni qanoatlantiruvchi eng kichik butun manfiy son nechaga teng?
A) -6 B) -7 C) -5 D) -4 E) -8

10. (01-7-15) m ning qanday qiymatlarida

$$\begin{cases} x-y=m-1 \\ 2x-y=3-m \end{cases}$$

tenglamalar sistemasining yechimida y musbat bo'ladi?
A) $(\frac{5}{3};2)$ B) $(-\infty;\frac{5}{2})\cup(2;\infty)$ C) $(2;\infty)$
D) $(-\infty;\frac{5}{3})$ E) $(-\infty;\infty)$

11. (03-11-64)

$$\frac{2x-7}{6}+\frac{7x-2}{3}<3-\frac{1-x}{2}$$

tengsizlikning butun sonlardan iborat yechimlaridan eng kattasini ko'rsating.
A) 2 B) -1 C) 1 D) 0 E) -2

1.7.2 Chiziqli tengsizliklar sistemasi.

(97-7-25) Tengsizliklar sistemasini yeching.

$$\begin{cases} 3x+7\ge 5(x+1)+6 \\ (x-2)^2-8<x(x-2)+10 \end{cases}$$

A) $(-11;2]$ B) $[-2;7)$ C) $(-7;-2]$
D) $[2;11)$ E) $(-\infty;-7)$

Yechish: Qavsrlarni ochamiz:

$$\begin{cases} 3x+7\ge 5x+5+6 \\ x^2-4x+4-8<x^2-2x+10 \end{cases}$$

Bu yerdan $\begin{cases} -2x\ge 4 \\ -2x<14, \end{cases}$ ya'ni $\begin{cases} x\le -2 \\ x>-7. \end{cases}$
Demak, $x\in(-7;-2]$. J: (C).

1. (96-1-22) Tengsizliklar sistemasi nechta butun yechimga ega?

$$\begin{cases} 3+4x\ge 5 \\ 2x-3(x-1)>-1 \end{cases}$$

A) 5 B) 3 C) 4 D) 2 E) 6

2. (00-6-22) y ning qanday qiymatlarida $\frac{2y-1}{3}$ kasrning qiymati $(-1;1)$ oraliqqa tegishli?
A) $(-1;2)$ B) $(0;2)$ C) $(-\frac{1}{2};1)$ D) $(-2;2)$
E) To'g'ri javob keltirilmagan

3. (97-3-25) Tengsizliklar sistemasini yeching.
$$\begin{cases} 2x-3(x-5)>10-3x \\ x(x+2)-4\le (x-1)^2+7 \end{cases}$$
A) $[2;12,5)$ B) $[2,5;\infty)$ C) $[-3;2)$ D) $(-2,5;3]$
E) Yechimga ega emas

4. (97-6-14) Tengsizliklar
$$\begin{cases} 7x+3\le 9x-1 \\ 20-3x\ge 4x-15 \end{cases}$$
sistemasi butun yechimlarining o'rta arifmetigini toping.
A) $3,5$ B) 7 C) 4 D) 3 E) $4\frac{1}{3}$

5. (96-6-16) Tengsizliklar sistemasining eng katta butun yechimini toping.
$$\begin{cases} -2x<22 \\ x+4<8 \end{cases}$$
A) 4 B) 3 C) -11 D) -12 E) -10

6. (96-7-25) Tengsizliklar sistemasini yeching.
$$\begin{cases} x(x+1)+10>(x+1)^2+3 \\ 3x-4(x-7)\ge 16-3x \end{cases}$$
A) $[-3;5)$ B) $(2;4]$ C) $[-6;6)$ D) $[6,\infty)$
E) Yechimga ega emas

7. (96-9-73) Tengsizliklar sistemasi nechta butun yechimga ega?
$$\begin{cases} 3-4x>5 \\ 2+3(x-1)\le 4x+3 \end{cases}$$
A) 1 B) 2 C) 4 D) 6 E) 3

8. (96-10-23) Tengsizliklar sistemasi nechta butun yechimga ega?
$$\begin{cases} 2-3x>1 \\ 5x+1\ge 3(x-2) \end{cases}$$
A) 4 B) 5 C) 3 D) 8 E) 2

9. (97-1-14) Tengsizliklar sistemasi butun yechimlarining o'rta arifmetigini toping.
$$\begin{cases} 5x-2\ge 2x+1 \\ 2x+3\le 18-3x \end{cases}$$
A) 3 B) $2,5$ C) 2 D) $1,5$ E) $1\frac{2}{3}$

10. (97-2-16) Tengsizliklar sistemasining eng kichik butun yechimimini toping?
$$\begin{cases} x+8<12 \\ -3x<15 \end{cases}$$
A) -5 B) -3 C) -6 D) -4 E) 3

11. (97-8-16) Tengsizliklar sistemasining barcha butun yechimlari ko'paytmasini toping.
$$\begin{cases} -4y<12 \\ y+6<6 \end{cases}$$
A) 2 B) 6 C) -6 D) -2 E) 0

12. (97-10-25) Tengsizliklar sistemasini yeching.
$$\begin{cases} 4(x-3)-3>8x+1 \\ 2+x(x+3)\le (x+2)^2+5 \end{cases}$$
A) $(4;7]$ B) $(-\infty;-7)$ C) $(-4;\infty)$
D) $[-7;-4)$ E) $\emptyset$

13. (97-11-14) Tengsizliklar sistemasi butun yechimlarining o'rta arifmetigini toping.
$$\begin{cases} 2x-1\ge 3x-4 \\ 8x+7>5x+4 \end{cases}$$
A) 2 B) $2,5$ C) $1,5$ D) $0,75$ E) 3

14. (97-12-15) Tengsizliklar sistemasining eng katta va eng kichik butun yechimlari yig'indisini toping.
$$\begin{cases} -2x>-26 \\ x-3>1 \end{cases}$$
A) 17 B) 16 C) 18 D) 19 E) 15

15. (98-1-1) Tengsizlikning barcha natural yechimlarini toping.
$$6798:103<54+6x<9156:109$$
A) $2;3;4$ B) $4;5;6$ C) $3;4$ D) $4;5$ E) $3;4;5$

16. (98-1-6) Qo'sh tengsizlikni yeching.
$$-3<2-5x<1$$
A) $(-1;0,2)$ B) $(-1;-0,2)$ C) $(-0,2;1)$
D) $(0,2;1)$ E) $(1;2)$

17. (98-1-22) Tengsizliklar sistemasi nechta butun yechimga ega?
$$\begin{cases} \frac{y-5}{4}<\frac{2y+3}{3} \\ \frac{4y+1}{2}<\frac{y-4}{3} \end{cases}$$
A) 6 B) 5 C) 4 D) 3 E) 1

18. (98-3-15) Tengsizliklar sistemasining butun yechimlari yig'indisini toping?
$$\begin{cases} x+1<2x-4 \\ 3x+1<2x+10 \end{cases}$$
A) 9 B) 5 C) 20 D) 21 E) 19

19. (98-7-37) Tengsizliklar sistemasi butun yechimlari yig'indisini toping?
$$\begin{cases} \frac{x-1}{4}\le\frac{x}{5} \\ \frac{x}{3}>\frac{x+4}{7} \end{cases}$$
A) 12 B) 9 C) 7 D) 8 E) 1

20. (98-8-1) Ushbu

$$1256 : 314 < 9x - 32 \leq 2976 : 96$$

tengsizlikning barcha natural yechimlarini toping.
A) $4; 5; 6$ B) $5; 6; 7$ C) $6; 7; 8$
D) $7; 8$ E) $4; 5; 6; 7$

21. (98-8-6) Qo'sh tengsizlikni yeching.

$$-4 < 2 - 4x < -2$$

A) $(-1,5; -1)$ B) $(1; 2)$ C) $(0; 1)$
D) $(1; 1,5)$ E) $(-1,5; 0)$

22. (98-8-22) Tengsizliklar sistemasi nechta butun yechimga ega?

$$\begin{cases} \frac{y+3}{2} \leq \frac{y-5}{3} \\ \frac{y+1}{4} > \frac{y-4}{5} \end{cases}$$

A) 5 B) 4 C) 3 D) 2 E) 1

23. (99-5-9) Ushbu $y = \frac{1}{\sqrt{x-5}-\sqrt{9-x}}$ funksiyaning aniqlanish sohasiga tegishli barcha butun sonlar yig'indisini toping.
A) 35 B) 28 C) 32 D) 30 E) 21

24. (00-9-18) Ushbu $y = \frac{\sqrt{x+1}+\sqrt{x-2}}{\sqrt{x-3}-\sqrt{5-x}}$ funksiyaning aniqlanish sohasiga tegishli barcha butun sonlarning yig'indisini toping.
A) 12 B) 8 C) 7 D) 4 E) $\emptyset$

25. (98-10-40) Sistemaning eng katta butun va eng kichik butun yechimlari yig'indisini toping.

$$\begin{cases} 2x - 3 < 17 \\ 4x + 6 > 8 \end{cases}$$

A) 8 B) 11 C) 12 D) 9 E) 10

26. (98-10-63) Tengsizliklar sistemasining butun yechimlari yig'indisini toping.

$$\begin{cases} -x - 5 < -2x - 2 \\ -2x + 2 > 3 - 3x \end{cases}$$

A) 0 B) 1 C) 2 D) 3 E) 4

27. (98-11-25) Tengsizliklar sistemasining butun yechimlari yig'indisini aniqlang.

$$\begin{cases} 0,4(2x - 3) > x - 2 \\ 3x - 7 \geq x - 6 \end{cases}$$

A) 10 B) 5 C) 6 D) 8 E) 7

28. (01-1-67) Tengsizliklar sistemasining barcha butun yechimlari yig'indisini aniqlang.

$$\begin{cases} 4x - 1 > x \\ x + 6 > 2x + 1 \end{cases}$$

A) 8 B) 10 C) 12 D) 14 E) 16

29. (01-8-14) Ushbu

$$\begin{cases} \frac{3x-2}{4} > \frac{1-5x}{6} \\ 3x - 1 \leq 3 - 2x \end{cases}$$

tengsizliklar sistemasini yeching.
A) $(\frac{8}{19}; \infty)$ B) $(\frac{8}{19}; \frac{4}{5}]$ C) $(-\infty; \frac{4}{5}]$
D) $x \epsilon R$ E) $\emptyset$

30. (98-12-35) Tengsizliklar sistemasi butun yechimlari yig'indisini toping.

$$\begin{cases} \frac{x-1}{2} < \frac{x}{3} \\ \frac{x+1}{2} \geq \frac{x}{5} \end{cases}$$

A) 2 B) 3 C) -1 D) -3 E) 1

31. (99-4-14) Tengsizliklar sistemasining eng katta butun yechimini ko'rsating.

$$\begin{cases} \frac{x+5}{4} - 2x \geq 0 \\ x - \frac{2x-8}{5} \geq 1 - 2x \end{cases}$$

A) -1 B) 1 C) 2 D) -2 E) 0

32. (99-8-9) Quyidagi

$$5 < x < 98$$

tengsizlikni qanoatlantiruvchi va bo'luvchisi 12 ga teng bo'lgan nechta natural son mavjud?
A) 8 B) 10 C) 12 D) 6 E) 14

33. (99-8-79) Tengsizlik nechta natural yechimga ega?

$$17,556 : 5,7 \leq y < 31,465 : 3,5$$

A) 1 B) 2 C) 4 D) 5 E) 6

34. (99-9-24) Tengsizlikning eng katta butun yechimi, eng kichik butun yechimidan qanchaga katta?

$$\begin{cases} 2x - 3 \leq 17 \\ 14 + 3x > -13 \end{cases}$$

A) 17 B) 19 C) 16 D) 12 E) 18

35. (99-10-12) Tengsizlikning eng katta va eng kichik butun yechimlarining o'rta proportsional qiymatini toping.

$$\begin{cases} 2x + 5 \geq x + 7 \\ 3x - 4 \leq 2x + 4 \end{cases}$$

A) 2 B) 10 C) 4 D) 6 E) 8

36. (02-9-23)

$$\begin{cases} x(9x - 5) \geq (1 - 3x)^2 \\ \frac{5x-3}{12} + \frac{7-2x}{8} \leq 1\frac{1}{3} \end{cases}$$

tengsizliklar sistemasining yechimlari to'plamidan iborat kesmaning uzunligini toping.
A) 3 B) 4 C) $3,25$ D) $4,25$ E) $3,5$

37. (02-12-7)

$$\begin{cases} x + 3 < 4 + 2x \\ 5x - 3 < 4x - 1 \end{cases}$$

tengsizliklar sistemasining natural sonlarda nechta yechimi bor?
A) 1 B) 2 C) 3 D) 4 E) 0

38. (02-12-8) x ning

$$\begin{cases} 0,5(2x-5) > \frac{2-x}{2} + 1 \\ 0,2(3x-2) + 3 > \frac{4x}{3} - 0,5(x-1) \end{cases}$$

tengsizliklar sistemasini qanoatlantiruvchi eng katta butun qiymatini toping.
A) -9 B) -8 C) 7 D) 9 E) 8

39. (02-2-11)

$$\begin{cases} 2x - 10 > 0 \\ 27 - x > 0 \end{cases}$$

tengsizliklar sistemasi butun yechimlarining o'rta arifmetigini toping.
A) 16 B) 18 C) 17 D) 15 E) 14

40. (03-3-9)

$$\begin{cases} 12x^2 - (2x-3)(6x+1) > x \\ (5x-1)(5x+1) - 25x^2 \geq x - 6 \end{cases}$$

tengsizliklar sistemasining butun sonlardan iborat yechimlari yig'indisini toping.
A) 6 B) 7 C) 9 D) 12 E) 15

41. (03-11-66)

$$\begin{cases} (x+2)(2-x) < (x+3)(4-x). \\ \frac{3+x}{4} + \frac{1-2x}{6} \geq 1 \end{cases}$$

tengsizliklar sistemasining butun sonlardan iborat yechimlari nechta?
A) 7 B) 8 C) 6 D) 9 E) 12

1.7.3 Oraliqlar usuli.

(96-9-10) Ushbu $y = \sqrt{\frac{x(x+1)}{(x-2)(4-x)}}$ funksiyaning aniqlanish sohasini toping.
A) $[-1;0] \cup (2;4)$
B) $(-1;0) \cup [2;4]$
C) $(-1;0] \cup [2;4)$
D) $(-\infty;-1) \cup (0;2) \cup (4;\infty)$
E) $(-\infty;-1] \cup [0;2) \cup (4;\infty)$

Yechish: Berilgan funksiya aniqlangan bo'lishi uchun ildiz ostidagi ifoda manfiy bo'lmasligi kerak ya'ni

$$\frac{x(x+1)}{(x-2)(4-x)} \geq 0.$$

Uni oraliqlar usuli bilan yechib $x \epsilon [-1;0] \cup (2;4)$ ekanini hosil qilamiz. J: $[-1;0] \cup (2;4)$ (A).

A.Oraliqlar usuli.

1. (96-3-25) Tengsizlikni yeching.

$$(x-2)(x+3) > 0$$

A) $(-\infty;2) \cup (3;\infty)$ B) $(-\infty;-3) \cup (2;\infty)$
C) $(-\infty;-2) \cup (3;\infty)$ D) $(-\infty;\infty)$ E) $(0;\infty)$

2. (96-6-23) Ushbu

$$(y+6)(y+2) < 0$$

tengsizlikning barcha butun yechimlari yig'indisini toping.
A) 12 B) 20 C) -12 D) -20 E) -9

3. (96-11-26) Tengsizlikni yeching.

$$(x-1)(x+2) > 0$$

A) $(-\infty;1) \cup (2;\infty)$ B) $(0;\infty)$
C) $(-\infty;-2) \cup (1;\infty)$ D) $(-\infty;\infty)$
E) $(-\infty;-1) \cup (2;\infty)$

4. (96-12-26) Tengsizlikni yeching.

$$(x+2)(x-3) > 0$$

A) $(-\infty;\infty)$ B) $(-\infty;-3) \cup (2;\infty)$
C) $(0;\infty)$ D) $(-\infty;-2) \cup (3;\infty)$
E) $(-\infty;2) \cup (3;\infty)$

5. (97-2-23) Tengsizlikning manfiy butun yechimlari yig'indisini toping.

$$\frac{(x-5)(x+3)}{(x+1)^2} \leq 0$$

A) -9 B) -12 C) -5 D)-6 E) -4

6. (97-5-23) Tengsizlikni yeching.

$$\frac{x-1}{x-2} \geq 0$$

A) $(-\infty;1) \cup (2;\infty)$ B) $[1;2)$ C) $(1;2)$
D) $(2;\infty)$ E) $(-\infty;1] \cup (2;\infty)$

7. (97-5-24) Tengsizlikni yeching.

$$\frac{(x+2)(x-1)}{x+3} \leq 0$$

A) $(-\infty;3) \cup [-2;1]$ B) $(-2;1)$
C)$(-\infty;-3]$ D)$(-\infty;-3] \cup (-2;1]$
E) $(-\infty;-3) \cup (-2;1)$

8. (97-8-22) Tengsizlikning eng katta va eng kichik butun yechimlari ayirmasini toping.

$$\frac{(x-4)(x+2)}{(x-1)^2} < 0$$

A) 6 B) 4 C)5 D)2 E) 3

9. (97-9-23) Tengsizlikni yeching.

$$\frac{x-2}{x-1} \leq 0$$

A) $(1;2]$ B) $[1;2)$ C)$[1;2]$
D)$(-\infty;1)$ E) $(-\infty;1]$

10. (97-9-24) Tengsizlikni yeching.

$$\frac{(x+3)(x-5)}{x+1} \geq 0$$

A) $(3;-1] \cup [5;\infty)$ B) $(-3;-1) \cup [5;\infty)$
C)$[-3;-1) \cup [5;\infty)$ D)$[-3;-1)$ E) $[5;\infty)$

11. (97-12-22) Tengsizlikning eng katta va eng kichik butun yechimlari yig'indisini toping.

$$\frac{(x+4)(3-x)}{(x-2)^2} > 0$$

A) 1 B) -1 C)-2 D)2 E) 7

12. (98-9-14) Tengsizliklar sistemasining butun yechimlari yig'indisini toping.

$$\begin{cases} \frac{(x+4)(x-5)}{(x-1)^2} \le 0 \\ x \ge -6 \end{cases}$$

A) 3 B) 4 C) -2 D) -1 E) 5

13. (99-1-21) Quyidagi tengsizliklardan qaysilari o'zaro teng kuchli?

$$1)\frac{x-3}{x+1} \ge 0; \quad 2)\frac{x-3}{x^2+1} \ge 0;$$

$$3)\frac{x-3}{x^2} \ge 0; \quad 4)x-3 \ge 0;$$

A) $2;3;4$ B) $1;2;4$ C) $1;4$
D) hammasi E) $2;3$

14. (99-5-13) Tengsizlikning barcha butun yechimlari yig'indisini toping.

$$(x-1)(x+1)^2(x-3)^3(x-4)^4 \le 0$$

A) 6 B) 7 C) 8 D) 9 E) 11

15. (00-9-21) Ushbu

$$(x+3)(x-2)^2(x+1)^3(x-5)^4 \le 0$$

tengsizlikning barcha butun yechimlari yig'indisini toping.
A) 1 B) 2 C) 3 D) 4 E) 5

16. (01-3-35) Tengsizlikni yeching.

$$\frac{x+1}{x-2} \le 0$$

A) $(-\infty;1]$ B) $[-1;2)$ C) $(-1;2]$
D) $(2;\infty)$ E) $(-\infty;-1)\cup[2;\infty)$

17. (01-6-15) Ushbu

$$\frac{x-4}{2x+6} \le 0$$

tengsizlikning barcha butun sonlardagi yechimlari yig'indisini toping.
A) 7 B) 6 C) 8 D) 5 E) 4

18. (02-4-12) x ning

$$\frac{x+5}{(x+6)^2} < 0$$

tengsizlikni qanoatlantiruvchi eng katta butun qiymatini toping.
A) 6 B) -6 C) 5 D) -5 E) -7

19. (02-5-13)

$$\frac{x^2(x-1)}{x+3} \ge 0$$

tengsizlikni yeching.
A) $(-3;1]$ B) $(-3;0)\cup(0;1]$
C) $(-\infty;-3)\cup\{0\}\cup(1;\infty)$
D) $(-\infty;-3)\cup\{0\}\cup[1;\infty)$
E) $(-\infty;-3)\cup[1;\infty)$

20. (03-1-7)

$$\frac{x(x-1)^2}{(x+2)^3} \le 0$$

tengsizlikni yeching.
A) $(-1;0]$ B) $(-2;1]$ C) $(-2;0]$
D) $(-2;0)\cup\{1\}$ E) $(-2;1)\cup\{0\}$

B. Oraliqlar usuliga keltiring.

21. (00-6-21) Funksiyaning aniqlanish sohasini toping.

$$y=\sqrt{\frac{x^2-4x+4}{1-x^2}}$$

A) $(-1;1)$ B) $(-1;1)\cup\{2\}$ C) $(-1;2)$
D) $(-\infty;-1)\cup\{2\}$ E) $(-\infty;-1)\cup(1;\infty)$

22. (00-7-21) Funksiyaning aniqlanish sohasini toping.

$$y=\frac{\sqrt{x^2-3x+2}+\sqrt{x}}{\sqrt{3-x}}$$

A) $(0;1)\cup[2;3]$ B) $[0;1)\cup(2;3)$
C) $(0;1)\cup(2;3)$ D) $[0;1]\cup[2;3)$ E) $[2;3)$

23. (96-3-70) Ushbu

$$y=\sqrt{\frac{(x-1)(3-x)}{x(4-x)}}$$

funksiyaning aniqlanish sohasini toping.
A) $[0;1)\cup[3;4)$ B) $(0;1]\cup[3;4)$
C) $(0;1]\cup(3;4)$ D) $(-\infty;0)\cup(1;3]\cup(4;\infty)$
E) $(-\infty;0)\cup[1;3]\cup(4;\infty)$

24. (96-12-68) Funksiyaning aniqlanish sohasini toping.

$$y=\sqrt{\frac{(x-2)(5-x)}{(x-3)(x-4)}}$$

A) $(2;3)\cup(4;5)$ B) $[2;3)\cup(4;5]$ C) $(2;3]\cup[4;5)$
D) $(-\infty;2]\cup(3;4)\cup[5;\infty)$
E) $(-\infty;2)\cup[3;4]\cup(5;\infty)$

25. (96-13-10) Ushbu

$$y=\sqrt{\frac{(x-2)(4-x)}{x(x+1)}}$$

funksiyaning aniqlanish sohasini toping.
A) $(-1;0)\cup[2;4]$ B) $[-1;0]\cup(2;4)$
C) $(-1;0]\cup[2;4)$ D) $(-\infty;-1)\cup(0;2]\cup[4;\infty)$
E) $(-\infty;-1]\cup[0;2)\cup(4;\infty)$

26. (99-4-23) Funksiyaning aniqlanish sohasini toping.
$$y = \sqrt{x^2 - 9} + \frac{2}{\sqrt{-x}}$$
A) $(0;3)$ B) $[-3;0)$ C) $(-\infty;0)$
D) $(-\infty;-3]$ E) $\emptyset$

27. (99-6-46) Ushbu $y = \sqrt{3x - x^3}$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty;-\sqrt{3}] \cup [0;\sqrt{3}]$
B) $(-\infty;-\sqrt{3}) \cup (0;\sqrt{3})$ C) $[0;\sqrt{3})$
D) $(-\infty;\sqrt{3}) \cup (\sqrt{3};\infty)$ E) $[0;\infty)$

28. (01-2-27) Ushbu
$$\frac{x^2 - 4x + 3}{x^2 - 7x + 10} \le 0$$
tengsizlikning butun musbat yechimlari yig'indisini toping.
A) 15 B) 10 C) 6 D) 8 E) 13

29. (98-2-13) Ushbu
$$x^5 - 16x > 0$$
tengsizlikning eng kichik butun musbat va eng katta butun manfiy yechimlari ko'paytmasini toping.
A) -5 B) -4 C) -6 D) -2 E) -3

30. (98-3-12) Tengsizlikning butun musbat yechimlari nechta?
$$\frac{(-x^2 + x - 1)(x^2 + x - 2)}{x^2 - 7x + 12} \ge 0$$
A) 4 B) 1 C) 2 D) 3 E) cheksiz ko'p

31. (98-6-23) Tengsizlikni yeching.
$$\frac{x^2 - 2x + 3}{x - 1} \ge 0$$
A) $(1;\infty)$ B) $[1;\infty)$ C) $(-\infty;1)$
D) $(-\infty;1]$ E) $x \in \emptyset$

32. (98-10-60) Tengsizlikning butun yechimlari nechta?
$$\frac{(x^2 + x + 1)(x^2 + 2x - 3)}{x^2 + 3x + 2} \le 0$$
A) 5 B) 4 C) 3 D) cheksiz ko'p E) 2

33. (99-3-13) Tengsizlikni yeching.
$$\frac{x + 2 - x^2}{x^3 + 1} \ge 0$$
A) $(-\infty;2]$ B) $[2;\infty)$
C) $(-\infty;-1) \cup (-1;2]$ D) $(-1;2)$
E) $(-\infty;-1) \cup (-1;2)$

34. (99-9-7) Tengsizlikning eng katta va eng kichik butun yechimlari ayirmasini toping.
$$\frac{(x + 3)(x - 7)}{2x^2 - x + 4} < 0$$
A) 10 B) 9 C) 8 D) 7 E) 11

35. (00-4-33) Tengsizlikning eng katta butun manfiy va eng kichik butun musbat yechimlari ko'paytmasini toping.
$$\frac{x^4 - 3x^3 + 2x^2}{30 - x^2 - x} < 0$$
A) -30 B) -35 C) -36 D) -42 E) -48

36. (00-6-13) Tengsizlikni yeching.
$$\frac{-3x^2 + 4x - 5}{2x + 3} > 0$$
A) $(-\infty;-1,5)$ B) $(-1,5;2)$ C) $(-4;-1,5)$
D) $(-1,5;-1,2)$ E) $(-\infty;-2,5)$

37. (00-7-19) Tengsizlik o'rinli bo'ladigan n ning barcha natural qiymatlari yig'indisini aniqlang.
$$n^2(n^2 - n - 6) \le 0$$
A) 4 B) 2 C) 5 D) 3 E) 6

38. (00-7-46) Tengsizliklar sistemasining eng katta va eng kichik yechimlari yig'indisini toping.
$$\begin{cases} x^2 - 3x - 4 \le 0 \\ x^2 - 6x + 8 \le 0 \end{cases}$$
A) 3 B) 4 C) 5 D) 6 E) 7

39. (01-3-36) Tengsizlikni yeching.
$$\frac{x^2 - 4x + 5}{x - 2} \ge 0$$
A) $[2;\infty)$ B) $(-\infty;2)$ C) $(-\infty;2]$
D) $(2;\infty)$ E) $\emptyset$

40. (01-5-26) Ushbu $f(x) = \dfrac{\sqrt{12 + x - x^2}}{x(x - 2)}$ funksiyaning aniqlanish sohasini toping.
A) $[-3;0) \cup (0;2) \cup (2;4]$ B) $(0;2)$
C) $[-4;3)$ D) $(-\infty;3] \cup [4;\infty)$
E) $(-\infty;0) \cup (2;\infty)$

41. (01-6-17) Ushbu
$$\begin{cases} \frac{(x+6)(x-3)}{3x^2-2x+7} \le 0 \\ x^2 \le 25 \end{cases}$$
tengsizliklar sistemasining eng katta va eng kichik yechimlari ayirmasini toping.
A) 7 B) 8 C) 9 D) 6 E) 10

42. (01-7-22) Nechta tub son
$$x^2 - 50 > 0$$
tengsizlikning yechimi bo'la olmaydi?
A) 2 B) 3 C) 4 D) 5 E) cheksiz ko'p

43. (01-10-18) Ushbu
$$\frac{x^2 - 4x - 5}{2x - 5}$$
kasrning qiymati manfiy bo'ladigan x ning barcha qiymatlarini ko'rsating.
A) $(2,5;5)$ B) $(-\infty;-1)$ C) $(-\infty;-1] \cup (2,5;5]$
D) $(-\infty;-1) \cup (2,5;5)$ E) $(-\infty;2,5)$

44. (01-12-47) Ushbu

$$y=\sqrt{\frac{20-x-x^2}{x-2}}$$

funksiyaning aniqlanish sohasidagi barcha natural sonlar yig'indisini shu sohadagi eng katta manfiy butun songa nisbatini aniqlang.
A) -2 B) $-1,4$ C) 0 D) $-2,4$ E) -3

45. (01-12-48)* Ushbu

$$y=\sqrt{\frac{2x^2+x-6}{2x-5}}$$

funksiyaning aniqlanish sohasiga tegishli eng kichik natural sonni va funksiyaning shu nuqtadagi qiymatini toping.
A) $y(2)=\sqrt{3}$ B) $y(1)=1$ C) $y(4)=4$
D) $y(3)=\sqrt{5}$ E) $y(5)=\sqrt{2}$

46. (02-1-51)

$$y=\frac{\sqrt{x^2-x-30}}{\sqrt{|x^2-x-42|}}$$

funksiyaning aniqlanish sohasini toping.
A) $(-\infty;-5]\cup[6;\infty)$
B) $(-\infty;-6]\cup(-6;7)\cup(7;\infty)$
C) $(7;\infty)$ D) $(-6;7)\cup(7;\infty)$
E) $(-\infty;-6)\cup(-6;-5]\cup[6;7)\cup(7;\infty)$

47. (02-2-2)

$$(n^2-3)(n^2-21)<0$$

tengsizlikni qanoatlantiruvchi n ning nechta butun qiymati bor?
A) 6 B) 5 C) 3 D) 4 E) 8

48. (02-2-27) $y=\sqrt{25-x^2}+\frac{2x-3}{x+1}$ funksiyaning aniqlanish sohasini toping.
A) $[-5;-1)\cup(-1;5]$ B) $(-1;5]$ C) $[-5;-1)$
D) $[5;\infty)$ E) $[-5;5]$

49. (02-5-39) Nehcta tub son

$$y=\sqrt{(x-2)(10+3x-x^2)}$$

funksiyaning aniqlanish sohasiga tegishli?
A) 1 B) 2 C) 3 D) 4 E) cheksiz ko'p

50. (02-6-21) $\frac{1-2x-3x^2}{3x-x^2-5}$ ifoda musbat bo'ladigan x ning barcha qiymatlarini toping.
A) $(-\infty;-\frac{1}{2})\cup(\frac{5}{6};\infty)$ B) $(-\infty;\frac{1}{2})\cup(\frac{5}{6};\infty)$
C) $(-\infty;-\frac{5}{6})\cup(\frac{1}{2};\infty)$ D) $(-\frac{1}{2};\frac{5}{6})$
E) $(-\infty;-1)\cup(\frac{1}{3};\infty)$

51. (02-8-18) $y=\frac{\sqrt{4-3x-x^2}}{x+4}$ funksiyaning aniqlanish sohasini toping.
A) $(-4;1]$ B) $(-4;4)$ C) $(-\infty;-4)$
D) $(-1;1)$ E) $[1;\infty)$

52. (02-10-15) $y=\sqrt[4]{\frac{x^2-6x-16}{x^2-12x+11}}+\frac{2}{x^2-49}$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty;-7)\cup(-7;-2]\cup(1;7)\cup(7;8]\cup(11;\infty)$
B) $x\neq\pm7$ C) $(-\infty;-2]\cup(1;8]\cup(11;\infty)$
D) $[-2;8]\cup(11;\infty)$
E) $(-\infty;-7)\cup(-7;-2]\cup[1;7)\cup(7;8]\cup[11;\infty)$

53. (02-10-48)

$$(9x^2+12x+4)(x-2)<0$$

tengsizlikni yeching.
A) $(-\infty;-\frac{2}{3})\cup(-\frac{2}{3};2)$ B) $(-\infty;-2)$
C) $(2;\infty)$ D) $(-\frac{2}{3};2)$ E) $(-1;2)$

54. (02-10-49) $y=\sqrt{\frac{4-\sqrt{17}}{3-2x}}$ funksiyaning aniqlanish sohasini toping.
A) $(1,5;\infty)$ B) $(-\infty;1,5)$
C) $(-\infty;\infty)$ D) $(0;3)$
E) $(-\infty;1,5)\cup(1,5;\infty)$

55. (02-10-51)

$$\begin{cases}\frac{x^2+10x+25}{4x-5}\geq 0\\ (x-2)(x^2-6x+9)\leq 0\end{cases}$$

tengsizliklar sistemasini yeching.
A) $\{-5;3\}\cup(1,25;2]$ B) $(1,25;2]$
C) $(1,25;\infty)$ D) $(-\infty;2]$ E) $[-5;3]\cup(1,25;2]$

56. (03-3-24)

$$\frac{(x-1)^2+2x-2}{(x-5)^3}\geq 0$$

tengsizlikning $[-3;8]$ kesmadagi butun sonlardan iborat yechimlari sonini aniqlang.
A) 3 B) 4 C) 5 D) 6 E) 7

57. (03-4-14)

$$\frac{x^2-13x+36}{x^4+25}\leq 0$$

tengsizlikning eng katta va eng kichik yechim-lari ayirmasini toping.
A) 6 B) 4 C) 5 D) 7 E) 8

58. (03-7-63)

$$\frac{x^2-x-12}{x^2-2x-35}\leq 0$$

tengsizlikning butun sonlardan iborat yechimlaridan eng kattasidan eng kichigining ayirmasini toping.
A) 10 B) 12 C) 11 D) 9 E) 7

59. (03-8-56)

$$\frac{x^2-5x-14}{x+4}\leq 0$$

tengsizlikni qanoatlantiruvchi natural sonlar nechta?
A) 7 B) 8 C) 9 D) 5 E) 6

60. (03-11-75)

$$\frac{(x+4)^2-8x-25}{(x-6)^2}>0$$

tengsizlikning butun sonlardan iborat yechimlaridan nechtasi $[-5;6]$ kesmada joylashgan?
A) 2 B) 3 C) 4 D) 5 E) 6

C. Kvadrat tengsizliklar.

61. (96-7-20) Tengsizlikning butun yechimlari ko'paytmasini toping.

$$2x^2 - 9x + 4 < 0$$

A) 0 B) 4 C) 24 D) 8 E) 6

62. (97-1-10) Tengsizlikni yeching.

$$(x-2)^2 + 3(x-2) \geq 7 - x$$

A) $[0;1] \cup [3;\infty)$ B) $[-2;1]$ C) $[-3;3]$
D) $[3;\infty)$ E) $(-\infty;-3] \cup [3;\infty)$

63. (97-3-20) Tengsizlikning butun yechimlari yig'indisini toping.

$$2x^2 \leq 5x + 12$$

A) 4 B) 9 C) 7 D) 5 E) 6

64. (97-6-10) Tengsizlikni yeching.

$$(x+2)(x-2) - 2(x-1) \leq 23 - 2x$$

A) $(-\infty;5]$ B) $(0;25]$ C) $[-5;5]$
D) $[-\sqrt{21};\sqrt{21}]$ E) $\emptyset$

65. (97-7-20) Tengsizlikning butun yechimlari ko'paytmasini toping.

$$3x^2 \leq 13x - 4$$

A) 12 B) 6 C) 30 D) 24 E) 0

66. (97-10-20) Tengsizlikning butun yechimlari yig'indisini toping.

$$2x^2 - 3x \leq 9$$

A) 3 B) 4 C) 5 D) 6 E) 8

67. (97-11-10) Tengsizlikni yeching.

$$2 \cdot (x-1) \cdot (x+1) - x(x+3) < 2 - 3x$$

A) $(-\infty;2)$ B) $(-2;2)$ C) $(0;4)$
D) $(1;\infty)$ E) $(4;\infty)$

68. (01-2-26) Ushbu

$$x^2 + 2x - 15 < 0$$

tengsizlikning natural sonlardagi yechimlari ko'paytmasini toping.
A) 0 B) 2 C) 4 D) 6 E) 24

69. (00-5-39) Tengsizlikni yeching.

$$x^2 - x + 1 > 0$$

A) $\emptyset$ B) $[0;\infty)$ C) $(-\infty;\infty)$
D) $(-\infty;0)$ E) $(0;\infty)$

70. (01-5-25) Ushbu

$$2 - x - x^2 \geq 0$$

tengsizlikning eng katta butun yechimini toping.
A) 1 B) 2 C) -1 D) -2 E) 0

71. (02-1-52)

$$9x^2 - 6x + 1 > 0$$

tengsizlikni yeching.
A) $(-\infty;-\frac{1}{3}) \cup (-\frac{1}{3};\infty)$
B) $(-\frac{1}{3};\infty)$ C) $(\frac{1}{3};\infty)$
D) $(-\infty;\frac{1}{3})$ E) $(-\infty;\frac{1}{3}) \cup (\frac{1}{3};\infty)$

D. Tengsizlikning bir qismiga o'tkazing.

72. (01-1-72) Ushbu $x \geq \frac{6}{x-5}$ tengsizlikni qanoatlantiruvchi eng kichik butun musbat yechimining eng kichik butun manfiy yechimga nisbatini toping.
A) -1 B) -2 C) $-0,5$ D) -4 E) $-1,25$

73. (01-2-21) Ushbu $\frac{x-1}{x} > \frac{1}{2}$ tengsizlikning eng kichik butun musbat yechimi 10 dan nechtaga kam?
A) 3 B) 8 C) 7 D) 10 E) 9

74. (01-2-68) Ushbu

$$(x^2 - x - 1)(x^2 - x - 7) \leq -5$$

tengsizlikning eng katta butun va eng kichik butun ildizlari ayirmasini toping.
A) 2 B) 3 C) 4 D) 5 E) 6

75. (01-2-77) Agar $f(x) = \frac{1}{1-x^2}$ bo'lsa, $f(f(x)) \leq 0$ tengsizlikning butun sonlardan iborat nechta yechimi bor?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

76. (97-1-58) Tengsizlikning butun sonlardagi yechimi nechta?

$$x^4 < 9x$$

A) 1 B) 2 C) 3 D) 4 E) cheksiz ko'p

77. (97-6-58) Tengsizlikning nechta butun yechimi bor?

$$x^6 < 6x$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) cheksiz ko'p

78. (98-9-29) $b^{-5} > b^{-4}$ va $(4b)^5 < (4b)^7$ tengsizliklar bir vaqtda o'rinli bo'ladigan b ning barcha qiymatlarini toping.
A) $(0;1)$ B) $[\frac{1}{4};1]$ C) $(\frac{1}{4};1)$
D) $(0;1]$ E) $[0;1)$

79. (99-1-20) Tengsizlikni yeching.

$$\frac{1}{x} > x$$

A) $(-\infty;-1) \cup (0;1)$ B) $[0;1)$
C) $(-1;1)$ D) $\emptyset$ E) $(-\infty;1)$

80. (99-6-30) Tengsizlikni yeching.

$$\frac{x^2}{x+3} < x - 3$$

A) $(-\infty;-3)$ B) $(-3;3)$ C) $(0;3)$
D) $\emptyset$ E) $(-\infty;\infty)$

81. (99-6-45) Tengsizlikni yeching.

$$\frac{5x+8}{4-x} < 2$$

A) $(-\infty;-0)\cup(4;\infty)$ B) $(-\infty;-4)\cup(0;4)$
C) $[-4;4]$ D) $\emptyset$ E) $(-\infty;\infty)$

82. (00-3-23) Qo'sh tengsizlikni yeching.

$$0 < \frac{3x-1}{2x+5} < 1$$

A) $(-\frac{5}{2};6)$ B) $(\frac{1}{3};\infty)$
C) $(-\infty;-\frac{5}{2})\cup(\frac{1}{3};6)$
D) $(\frac{1}{3};6)$ E) $(-\frac{5}{2};\infty)$

83. (00-4-32) Tengsizlikni yeching.

$$1-\frac{6}{x} > \frac{2}{1-x}$$

A) $(0;1)\cup(2;3)$ B) $(-\infty;0)\cup(1;2)\cup(3;\infty)$
C) $(0;1)\cup(3;\infty)$ D) $(-\infty;1)\cup(2;3)\cup(5;\infty)$
E) $(-\infty;2)\cup(3;\infty)$

84. (01-1-12) Nechta tub son

$$3 < \frac{5x-1}{2x-3} < 5$$

tengsizlikning yechimi bo'ladi?
A) 0 B) 1 C) 2 D) 3 E) cheksiz ko'p

85. (01-5-22) Tengsizlikni yeching.

$$\frac{1}{x-1} \le 2$$

A) $(-\infty;1)\cup[1,5;\infty)$ B) $(1;2]$ C) $(1;2)$
D) $(1;1,5]$ E) $(1;1,5)$

86. (01-10-17) Nechta butun son

$$x^4-8x^2+7 \le 0$$

tengsizlikni qanoatlantiradi?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

87. (02-1-21) $x > 1$ va $x^2 > x$ tengsizliklar teng kuchli bo'ladigan sonli oraliqni ko'rsating.
A) $(1;\infty)$ B) $(-\infty;0)$ C) $(-\infty;\infty)$
D) $\emptyset$ E) $(-\infty;0)\cup(0;\infty)$

88. (02-1-63) Nechta tub son

$$2 < \frac{x+7}{2x-19} < 4$$

tengsizlikning yechimi bo'ladi?
A) 1 B) 13 C) 7 D) 3 E) 5

89. (02-4-11) $\frac{1}{x} < 1$ tengsizlikning $(-3;3)$ oraliqdagi butun yechimlari sonini toping.
A) 7 B) 5 C) 3 D) 4 E) 2

90. (02-7-42)

$$(x^2+3x+1)(x^2+3x-3) \ge 5$$

tengsizlikni yeching.
A) $(\infty;-4]\cup[-2;-1]\cup[1;\infty)$
B) $(-\infty;-4]\cup[1;\infty)$
C) $(-4;-2]\cup[-1;\infty)$
D) $(-2;-1]\cup[1;\infty)$
E) $(-\infty;-4]\cup[-2;-1]$

91. (02-8-7)

$$\frac{x-10}{2-x} > 1$$

tengsizlikning eng kichik butun yechimini toping.
A) 3 B) 4 C) 1 D) -2 E) 2

92. (02-10-13) x ning

$$\frac{x+3}{x^2-4} - \frac{1}{x+2} < \frac{2x}{2x-x^2}$$

tengsizlikni qanoatlantiruvchi manfiy bo'lmagan butun qiymatlarini toping.
A) 1 B) $0;1;2$ C) $1;2;3$ D) $1;2$ E) $2;3$

93. (02-12-12)

$$\frac{x^2-5x+2}{x-3} > x$$

tengsizlikni yeching.
A) $(-3;1)$ B) $(1;3)$ C) $(-1;3)$
D) $(-\infty;1)$ E) $(3;\infty)$

94. (03-1-6)

$$(x^2+3x)^2 < 16$$

tengsizlikni yeching.
A) $(-1;4)$ B) $(-4;1)$ C) $(-2;3)$
D) $(-3;2)$ E) $(-2;1)\cup(2;3)$

95. (03-1-14)

$$x^4-10x^2+9 \le 0$$

tengsizlikning butun yechimlari nechta?
A) 2 B) 3 C) 4 D) 5 E) 6

96. (03-1-31)*

$$x(x+1)(x+2)(x+3) \le 24$$

tengsizlikning yechimlari orasida nechta butun son bor?
A) 2 B) 3 C) 4 D) 5 E) 6

97. (03-1-66) Tengsizlikni yeching.

$$\frac{2}{x^2-9} < \frac{3}{x^2-16}$$

A) $(-\infty;\infty)$ B) $(-4;-3)\cup(3;4)$
C) $(-\infty;-4)\cup(-3;3)\cup(4;\infty)$
D) $(-\infty;-4)\cup(4;\infty)$
E) $(-\infty;-4)\cup(3;4)\cup(6;\infty)$

98. (03-3-19)

$$\frac{x^2-12x+23}{(x+1)(x-4)} \le -\frac{2}{x-4}$$

tengsizlikning butun sonlardan iborat yechimlari nechta?
A) 2 B) 3 C) 4 D) 5 E) 7

99. (03-5-17) Tengsizlikni yeching.

$$\frac{1}{x-2002} \le \frac{x}{x-2002}$$

A) $(-\infty;1]\cup(2002;\infty)$ B) $(-\infty;1]$
C) $(2002;\infty)$ D) $[1;2002)$ E) $(-\infty;0)$

100. (03-6-42)

$$\frac{x+1}{x} \le 1$$

tengsizlikni qanoatlantiruvchi x ning barcha qiymatlarini toping.
A) $-1 \le x < 0$ B) $x < 0$ C) $-1 < x < 0$
D) $x > 0$ E) $x \ge 0$

101. (03-9-1)

$$\frac{8x+19}{(x+3)^2(x^2+5x)} \ge \frac{1}{x^2+3x}$$

tengsizlikning butun sonlardan iborat yechimlari nechta?
A) 2 B) 3 C) 4 D) 5 E) 6

102. (03-9-2)

$$4 < \frac{16x^2-4x+16}{x^2+1} < 15$$

tengsizlikning tub sonlardan iborat yechimlari nechta?
A) 1 B) 2 C) 3 D) 4 E) cheksiz ko'p

103. (03-10-36)

$$x^3 \ge \frac{x^6+8}{9}$$

tengsizlik nechta butun sonlarda o'rinli bo'ladi?
A) 1 B) 2 C) 3 D) 4 E) cheksiz ko'p

104. (03-11-8) Agar sonli ketma-ketlikning umumiy hadi $a_n = \frac{3n-8}{n+2}$ formula bilan ifodalansa, bu ketma-ketlikning $\frac{4}{5}$ dan kichik nechta hadi bor?
A) 4 B) 3 C) 5 D) 6 E) 2

E. Tengsizliklarning qo'llanilishi.

105. (97-1-16) k ning qanday qiymatlarida $k(x+1) = 5$ tenglamaning ildizi musbat bo'ladi?
A) $(0;\infty)$ B) $(0;5)$ C) $(-5;0)$
D) $(5;\infty)$ E) $(-\infty;\infty)$

106. (99-5-3) Ushbu

$$\frac{z-8}{k-10} = \frac{k}{z}$$

tenglama ildizga ega bo'lmaydigan k ning barcha natural qiymatlari yig'indisini toping.
A) 20 B) 25 C) 30 D) 35 E) 40

107. (00-9-12) Tenglama ildizga ega bo'lmaydigan m ning barcha natural qiymatlari yig'indisini hisoblang.

$$\frac{t-6}{m-8} = \frac{m}{t}$$

A) 20 B) 25 C) 28 D) 30 E)32

108. (99-2-18) k ning qanday eng katta butun qiymatida

$$kz^2 + 2(k-12)z + 2 = 0$$

tenglama yechimga ega bo'lmaydi?
A) 16 B) 18 C) 20 D) 17 E) 21

109. (97-6-16) a ning qanday qiymatlarida $ax-2a = 2$ tenglama birdan kichik ildizga ega bo'ladi?
A) $a \in (-2;0)$ B) $a \in (-\infty;0)$ C) $a \in (0;1)$
D) $a \in [1;2]$ E) $a \in R$

110. (97-11-16) b ning qanday qiymatlarida $b(2-x) = 6$ tenglamaning ildizi manfiy?
A) $b \in (-\infty;0)$ B) $b \in (0;3)$ C) $b \in (-3;0)$
D) $b \in [3;\infty)$ E) $b \in R$

111. (99-10-4) Ushbu

$$(k-2)^2 \cdot y = k^2 - 25$$

tenglamaning ildizlari manfiy bo'ladigan k ning barcha butun musbat qiymatlari yig'indisini toping.
A) 10 B) 13 C) 11 D) 8 E) 9

112. (00-1-14)* $(m-3)(m-7)$ ifodaning qiymati m ning har qanday qiymatida musbat bo'lishi uchun, unga qanday eng kichik butun sonni qo'shish kerak?
A) 4 B) 8 C) 3 D) 6 E) 5

113. (00-3-19) k ning qanday eng kichik butun qiymatida

$$x^2 - 2(k+2)x + 6 + k^2 = 0$$

tenglama ikkita turli haqiqiy ildizlarga ega bo'ladi?
A) -2 B) -1 C) 2 D) 1 E) 3

114. (00-7-14) $x^2 + px + q^2 = 0$ $(q \ne 0)$ tenglama $\frac{p}{q}$ ning qanday qiymatlarida haqiqiy ildizlarga ega emas?
A) $[0;2]$ B) $(0;2]$ C) $[-2;2]$
D) $(-2;0)$ E) $(-2;2)$

115. (00-3-13) k ning qanday qiymatlarida

$$\frac{4x-1}{x-1} = k+3$$

tenglama manfiy yechimga ega bo'ladi?
A) $(-\infty;-2)$ B) $(-\infty;-2)\cup(1;\infty)$
C) $(1;\infty)$ D) $(-2;1)$
E) $(-\infty;-2)\cup(2;\infty)$

116. (01-11-10) p ning nechta natural qiymatida

$$x^2 + px + 16 = 0$$

tenglama haqiqiy ildizga ega emas?
A) 8 B) 14 C) 7 D) 15 E) 9

117. (02-12-6) m ning qanday qiymatlarida

$$4 - m = \frac{2}{x-1}$$

tenglamaning ildizlari musbat bo'ladi?
A) $(4;6)$ B) $(-\infty;1)\cup(1;4)$
C) $(-\infty;4)\cup(6;\infty)$ D) $(-\infty;2)\cup(4;\infty)$
E) $(2;4)$

118. (02-9-20) t ning qanday qiymatlarida

$$3x - 4 = 2(x - t)$$

tenglama musbat ildiziga ega?
A) $t > -2$ B) $t < 2$ C) $t \le 1$
D) $t \ge 2$ E) $0 < t < 2$

119. (02-11-7) a ning qanday qiymatlarida

$$3(x+1) = 4 + ax$$

tenglamaning ildizi -1 dan katta bo'ladi?
A) $(0;\infty)$ B) $(4;\infty)$ C) $(-\infty;0)$
D) $(-\infty;3)$ E) $(-\infty;3)\cup(4;\infty)$

120. (03-3-6) k ning qanday qiymatlarida

$$\frac{3x+1}{x+1} = k - 2$$

tenglama manfiy ildizga ega?
A) $(3;5)$ B) $(-\infty;3)\cup(5;\infty)$ C) $(2;4)$
D) $(1;3)$ E) $(-\infty;1)\cup(3;\infty)$

121. (03-5-18) a ning qanday qiymatlarida

$$1 < \frac{3a+10}{a+4} < 2$$

tengsizlik o'rinli bo'ladi?
A) $(-1,5;4)$ B) $(-7;-1,5)$ C) $(-7;4)$
D) $\emptyset$ E) $(-3;2)$

1.7.4 Parametrli tengsizliklar.

(96-3-78) Ushbu

$$\begin{cases} ax > 5a - 1 \\ ax < 3a + 1 \end{cases}$$

tengsizliklar sistemasi a ning qanday qiymatlarida yechimga ega bo'lmaydi?
A) $\{1\}$ B) $(-\infty;0)$ C) $(-\infty;0)\cup[1;\infty)$
D) $[1;\infty)$ E) $\emptyset$

Yechish: 1) $a = 0$ va 2) $a \neq 0$ hollarni qaraymiz. 1-holda $-1 < 0 \cdot x < 1$ tengsizlikni hosil qilamiz va yx ning barcha qiymatlarida bajariladi. Demak, bu holda yechim bor. Endi $a \neq 0$ bo'lsin. U holda berilgan sistema

$$5a - 1 < ax < 3a + 1$$

qo'sh tengsizlikka ekvivalent. Ma'lumki, $a < x < b$ oraliq bo'sh to'plam bo'lishi uchun $b \le a$ bo'lishi kerak. Berilgan sistema yechimga ega bo'lmasligi uchun esa

$$5a - 1 \ge 3a + 1$$

bo'lishi kerak. Bu yerdan

$$5a - 3a \ge 2,\ 2a \ge 2,\ a \ge 1$$

ekani kelib chiqadi. Demak $x \in [1;\infty)$. J:$[1;\infty)$ (D).

1. (98-10-61) $kx^2+2x+k+2 > 0$ tengsizlik yechimga ega bo'lmaydigan k ning butun qiymatlari orasidan eng kattasini toping.
A) -1 B) -2 C) eng kattasi yo'q
D) -4 E) -3

2. (00-6-20) a ning qanday qiymatlarida

$$\begin{cases} 3 - 7x < 3x - 7 \\ 1 + 2x < a + x \end{cases}$$

tengsizliklar sistemasi yechimga ega emas?
A) $a < 4$ B) $a \le 1$ C) $a < 2$
D) $a > 1$ E) $a \le 2$

3. (99-2-21) Ushbu

$$(x-a)(x-b) \le 0$$

tengsizlikning yechimlari to'plami $[2;6]$ oraliqdan iborat. ab ning qiymatini toping.
A) 10 B) 11 C) 13 D) 12 E) 8

4. (99-9-17) a ning qanday qiymatlarida

$$ax^2 + 8x + a < 0$$

tengsizlik x ning barcha qiymatlarida o'rinli bo'ladi?
A) $(0;4)$ B) $(4;0)$ C) $(-4;4)$
D) $(-\infty;-4)$ E) $(4;\infty)$

5. (96-9-19) Tengsizliklar sistemasi a ning qanday qiymatlarida yechimga ega bo'lmaydi?

$$\begin{cases} ax > 7a - 3 \\ ax \le 3a + 3 \end{cases}$$

A) $(1,5;\infty)$ B) $[1,5;\infty)$
C)$(-\infty;0)\cup(1,5;\infty)$ D) $(-\infty;0)$
E) $(-\infty;0)\cup[1,5;\infty)$

6. (96-12-76) b ning qaysi qiymatlarida yechimga ega emas?

$$\begin{cases} bx \ge 6b - 2 \\ bx \le 4b + 2 \end{cases}$$

A) $(-\infty;0)\cup[2;\infty)$ B) 2 C) $(0;2)$
D) $(2;\infty)$ E) $(-\infty;0)$

7. (96-13-19) Tengsizliklar sistemasi b ning qanday qiymatlarida yechimga ega bo'lmaydi?

$$\begin{cases} bx \ge 5b - 3 \\ bx \le 4b + 3 \end{cases}$$

A) $(6;\infty)$ B) $[6;\infty)$ C) $(-\infty;0)\cup(6;\infty)$
D) $(-\infty;0)$ E) $(-\infty;0)\cup[6;\infty)$

8. (98-3-13) k ning

$$kx^2 + 4x + k + 1 > 0$$

tengsizlik yechimga ega bo'lmaydigan butun qiymatlari orasidan eng kattasini toping.
A) eng kattasi yo'q B) bu munosabat k ning biror qiymatida ham o'rinli emas.
C) -3 D) -2 E) -1

9. (00-5-33) a ning qanday qiymatida

$$a(x-1) > x-2$$

tengsizlik x ning barcha qiymatlarida o'rinli bo'ladi?
A) 0 B) 1 C) 2 D) 3 E) 4

10. (00-5-34) Tengsizlikni yeching. ($a < 0$ shartda)

$$ax > \frac{1}{x}$$

A) $(-\infty; 0)$ B) $(-\frac{1}{\sqrt{-a}}; \infty)$ C) $(\frac{1}{\sqrt{-a}}; \infty)$
D) $(-\frac{1}{\sqrt{a}}; 0)$ E) $(0; \frac{1}{\sqrt{a}})$

11. (01-2-78) n ning 10 dan oshmaydigan nechta natural qiymatida $nx^2+4x > 1-3n$ tengsizlik x ning ixtiyoriy qiymatida o'rinli bo'ladi?
A) 10 B) 9 C) 8 D) 7 E) 6

12. (01-6-12) t ning qanday qiymatlarida $tx^2 - 6x - 1 < 0$ tengsizlik x ning barcha qiymatlarida o'rinli bo'ladi?
A) $t < -12$ B) $t < -9$ C) $t < -13$
D) $t < -8$ E) $t < -7$

13. (03-8-12) m ning qanday qiymatida

$$\frac{mx+9}{x} \geq -10$$

tengsizlikning eng katta manfiy yechimi -3 ga teng bo'ladi?
A) -9 B) -8 C) -7 D) -6 E) -5

1.7.5 Tengsizliklarni isbotlash.

1. $a > b \Leftrightarrow a + c > b + c$

2. $a > b \Leftrightarrow ac > bc,\ c > 0.$

3. $a > b \Leftrightarrow ac < bc,\ c < 0.$

4. $a > b,\ b > c \Rightarrow a > c.$

5. $a > b,\ c > d \Rightarrow a + c > b + d.$

6. $a > b > 0,\ c > d > 0 \Rightarrow ac > bd.$

7. $a > b > 0 \Leftrightarrow$

a) $a^p > b^p,\ p > 0$

b) $a^p < b^p,\ p < 0$

8. $a + b \geq 2\sqrt{ab}.\ a, b \geq 0.$

(97-9-68) Agar $a < 0 < b$ va $|a| > |b|$ bo'lsa,

$$\frac{1}{a^3+b^3},\quad \frac{1}{a^4+b^3},\quad \frac{1}{a^3}$$

larni taqqoslang.
A) $\frac{1}{a^3} > \frac{1}{a^3+b^3} > \frac{1}{a^4+b^3}$
B) $\frac{1}{a^4+b^3} > \frac{1}{a^3} > \frac{1}{a^3+b^3}$
C) $\frac{1}{a^4+b^3} > \frac{1}{a^3+b^3} > \frac{1}{a^3}$
D) $\frac{1}{a^3+b^3} > \frac{1}{a^3} > \frac{1}{a^4+b^3}$
E) $\frac{1}{a^3+b^3} > \frac{1}{a^4+b^3} > \frac{1}{a^3}$

Yechish: $a < 0 < b$, $|a| > |b|$ ekanidan $a^3 < a^3 + b^3 < 0 < a^4 + b^3$ tengsizliklarni hosil qilamiz. Shuning uchun

$$\frac{1}{a^4+b^3} > \frac{1}{a^3} > \frac{1}{a^3+b^3}.$$

J: (B)

1. (96-6-11) Ushbu
1) $a^2 > 0$, 2) $a^2 - 10 < 0$
3) $(a-5)^2 \geq 0$, 4) $\frac{1}{a^2} + a^2 > 2$
tengsizliklarning qaysilari a ning barcha qiymatlarida o'rinli?
A) 1 B) 2 C) 1; 3 va 4 D) 3 E) 2

2. (97-4-8) $a > b > c > 0$ bo'lsa, $\frac{1}{a}$, $\frac{1}{a+b}$ va $\frac{1}{a+c}$ larni taqqoslang.
A) $\frac{1}{a} < \frac{1}{a+c} < \frac{1}{a+b}$ B) $\frac{1}{a} < \frac{1}{a+b} < \frac{1}{a+c}$
C) $\frac{1}{a+b} < \frac{1}{a+c} < \frac{1}{a}$ D) $\frac{1}{a+b} \leq \frac{1}{a} \leq \frac{1}{a+c}$
E) $\frac{1}{a+c} < \frac{1}{a+b} \leq \frac{1}{a}$

3. (98-12-34) $a > b > 0$ shartni qanoatlantiruvchi a va b sonlar uchun quyidagi munosabatlardan qaysilari o'rinli?
1) $a^3 > ab^2$; 2) $a^4 \geq a^2b^2$
3) $a^2b^2 < b^4$; 4) $\frac{2}{a} > \frac{2}{b}$
A) 1 B) 1; 2 C) 3 D) 4 E) 2; 4

4. (99-5-17) Agar $a, b \in N$, $a > 10$, $b > 16$ bo'lsa, quyidagilardan qaysi biri har doim o'rinli bo'ladi?
A) $a - b < 6$ B) $\frac{3a-b}{b} > 0$ C) $\frac{b-2a}{a} < 0$
D) $\frac{b}{a} > 1,5$ E) $a + b \geq 28$

5. (99-5-24) Agar x va y sonlari uchun $x \cdot y = 20$ va $0 < x < 0,8$ munosabat o'rinli bo'lsa, quyidagi tengsizliklardan qaysi biri doimo o'rinli bo'ladi?
A) $\frac{x}{y} < 20$ B) $x + y < 20$
C)$y < 16$ D) $y > 25$
E) Keltirilgan javoblar ichida to'g'risi yo'q.

6. (99-5-34) Agar $2 < a < 3$ va $-3 < b < -2$ bo'lsa, quyidagilarning qaysi biri doim o'rinli bo'ladi?
A) $a^2b^2 - 50 < 0$ B) $\frac{(a+b)^2-2ab}{a-b} < 0$
C) $b^3a^2 - 5 < 0$ D) $a^3b^2 - 2 < 0$
E) $a^3b^3 + 3 > 0$

7. (01-6-16) Agar

$$\begin{cases} p^2 + q^2 < 20 \\ pq < 22 \end{cases}$$

bo'lsa, $|p + q|$ ning butun qiymatlari nechta?
A) 5 B) 6 C) 7 D) 8 E) 9

8. (99-8-15) Agar $-2 < a < -1$ va $-3 < b < -2,5$ bo'lsa, $a - b$ ayirma qaysi sonlar orasida bo'ladi?
A) $(0,5; 2)$ B) $(1; 1,5)$ C) $(-1,5; -1)$
D) $(-1,5; 1)$ E) $(-1; 1,5)$

9. (00-4-31) Agar $a < -1$ bo'lsa, quyidagi keltirilgan ifodalardan qaysi birining qiymati eng katta bo'ladi?
A) a^{-1} B) a^{-3} C) a^{-5} D) a^3 E) a^5

10. (97-5-17) Taqqoslang.
$a = \sqrt{1995} + \sqrt{1997}$ va $b = 2\sqrt{1996}$
A) $a < b$ B) $a > b$ C) $a = b$
D) $a = b + 1$ E) $a = b - 1$

11. (97-9-17) $a = \sqrt{1996} + \sqrt{1998}$ va $b = 2 \cdot \sqrt{1997}$ ni taqqoslang.
A) $a > b$ B) $a < b$ C) $a = b$
D) $a = b + 1$ E) $a = b - 1$

12. (98-7-16) $c = \sqrt{13} - \sqrt{12}$ va $d = \sqrt{14} - \sqrt{13}$ sonlar uchun qaysi munosabat o'rinli?
A) $c > d$ B) $c < d$ C) $c = d$
D) $c = d - 1$ E) $c^2 + \sqrt{27} = d^2$

13. (01-1-5) Sonlarni kamayish tartibida joylashtiring.
$a = \sqrt{101} + \sqrt{103}$, $b = \sqrt{99} + \sqrt{105}$, $c = 19,9$
A)$a > b > c$ B) $c > b > a$ C) $a > c > b$
D) $c > a > b$ E) $b > a > c$

14. (98-12-15) Ushbu
$c = \sqrt{12} + \sqrt{15}$, $d = \sqrt{11} + \sqrt{17}$
sonlar uchun qaysi munosabat o'rinli?
A) $c < d$ B) $c > d$ C) $c + 1 = d$
D) $c = d$ E) $c^2 + 1 + \sqrt{7} = d^2$

15. (99-10-16) Ushbu
$m = \sqrt[3]{3}$, $n = \sqrt{2}$, $p = \sqrt[6]{10}$
sonlarni o'sish tartibida joylashtiring.
A) $p < n < m$ B) $n < p < m$
C) $m < p < n$ D) $n < m < p$
E) $p < m < n$

16. (97-2-11) Quyidagi tengsizliklardan qaysi biri x va y ning $xy > 0$ shartini qanoatlantiradigan barcha qiymatlarida o'rinli?
A) $(x-y)^2 > 0$ B) $\frac{x}{y} + \frac{y}{x} \geq 2$ C) $x^2 - y^2 > 0$
D) $x^2 - 6xy + 9y^2 < 0$ E) $x^3 - y^3 > 0$

17. (97-9-66) Quyidagi munosabatlardan qaysi biri noto'g'ri?
A) $|a^2 + b^2| \leq a^2 + b^2$ B) $|a^5 + b^5| \geq a^5 + b^5$
C) $|a^3 + b^4| \geq a^3 + b^4$ D) $\sqrt{a^2} = |a|$
E) $(\sqrt{a})^2 = a$

18. (98-7-36) $a > 2b > 0$ shartni qanoatlantiruvchi a va b sonlar uchun quyidagi munosabatlardan qaysilari o'rinli?

$$1)\ a^3 > 7b^3;\ \ 2)\ \frac{a-b}{2} > \frac{b}{2};$$
$$3)\ \frac{6b-a}{a} < 2;\ \ 4)\ \frac{6b-3a}{a} > 0.$$

A) hammasi B) 2; 3; 4 C) 1; 2; 4
D) 1; 4 E) 1; 2; 3

19. (00-9-66) Agar $3 \leq x \leq 6$ va $15 \leq y \leq 60$ bo'lsa, $\frac{y}{x}$ ning qiymati qaysi kesmaga tegishli?
A) [5; 10] B) [0,5; 20] C) [5; 20]
D) [2,5; 20] E) [0,1; 0,2]

20. (98-10-15) Agar $a < b$ va $ab \neq 0$ bo'lsa, quyidagi tengsizliklardan qaysi biri har doim o'rinli?
A) $\frac{1}{a} > \frac{1}{b}$ B) $a^2 > b^2$ C) $-a > -b$
D) $2a < 3a + b$ E) $2a > a + b$

21. (00-4-20) Agar $x > y$ va $z > t$ bo'lsa, quyidagi tengsizliklardan qaysi biri har doim o'rinli bo'ladi?
A) $x \cdot z > y \cdot t$ B) $\frac{x}{z} > \frac{y}{t}$
C) $(x+y)^4 > (z+t)^4$
D) $7t - 13x < 7z - 13y$
E) $x - z > y - t$

22. (00-4-37) Agar $\frac{1}{a} < -1$ bo'lsa, quyidagi ifodalardan qaysi birining qiymati eng katta bo'ladi?
A) $(a-1)^2$ B) $(a-1)^3$ C) $a^3 - 1$
D) $a^2 - 1$ E) $1 - a$

23. (00-9-26) Agar $x > y$; $t = \frac{1}{z}$ bo'lsa, quyidagilardan qaysi biri doimo o'rinli bo'ladi?
A) $t + \frac{1}{x} = z + \frac{1}{y}$ B) $x + \frac{1}{t} < y + z$
C) $x + \frac{1}{t} > y + z$ D) $x + \frac{1}{z} > y$
E) $x + \frac{1}{t} > y + \frac{1}{z}$

24. (97-5-19) $a = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot 29$ va $b = 15^{29}$ ni taqqoslang.
A) $a = b$ B) $a > b$ C) $a < b$
D) $a = b + 1$ E) $a = b - 1$

25. (97-9-19) $a = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot 59$ va $b = 30^{59}$ ni taqqoslang.
A) $a = b + 1$ B) $a = b - 1$ C) $a = b$
D) $a > b$ E) $a < b$

26. (01-2-76) Agar $x > 3$ va $y < -3$ bo'lsa, quyidagi tengsizliklardan qaysi biri doimo o'rinli bo'ladi?
A) $(x+y)^2 > 3$ B) $xy < -9$ C) $\frac{x}{y} > -1$
D) $\frac{2x+y^2}{y} > 6$ E) $\frac{x-y}{x^2+y^2} > \frac{1}{2}$

27. (01-10-26) Agar $x \in [2; 5]$ va $y \in [2; 5]$ bo'lsa,

$$\frac{3x-1}{12+y} + \frac{18+x^2}{y^2+y+1}$$

ifodaning eng katta qiymati nechaga teng bo'lishi mumkin?
A) $7\frac{1}{7}$ B) $6\frac{2}{7}$ C) $5\frac{3}{8}$ D) $7\frac{2}{7}$ E) $6\frac{3}{7}$

28. (02-10-47) Agar $2 < x \leq 5$ va $3 \leq y < 6$ bo'lsa, $xy - x$ ning qiymati qaysi oraliqqa tegishli bo'ladi?
A) (1; 28) B) (2; 25) C) (6; 30)
D) (4; 25) E) (1; 25]

29. (00-10-53) Agar $16 \leq x \leq y \leq z \leq t \leq 100$ bo'lsa, $\frac{x}{y} + \frac{z}{t}$ ifodaning eng kichik qiymatini toping?
A) 0,9 B) 200 C) 0,8 D) 0,2
E) topib bo'lmaydi

30. (02-1-7) Agar $9 \leq x \leq y \leq z \leq t \leq 81$ bo'lsa, $\frac{x}{y} + \frac{z}{t}$ ifodaning eng kichik qiymatini toping?
A) $\frac{2}{3}$ B) $\frac{3}{2}$ C) $\frac{1}{5}$ D) $\frac{1}{3}$
E) topib bo'lmaydi

31. (02-1-15) Agar $25 \le x \le y \le z \le t \le 64$ bo'lsa, $\frac{x}{y} + \frac{z}{t}$ ifodaning eng kichik qiymatini toping?
A) $1,25$ B) $1,6$ C) $\frac{25}{32}$ D) $0,2$
E) topib bo'lmaydi

32. (02-2-15) Agar $7 \le x \le y \le z \le t \le 112$ bo'lsa, $\frac{x}{y} + \frac{z}{t}$ ifodaning eng kichik qiymatini toping?
A) $0,5$ B) $0,2$ C) $0,7$ D) $0,8$
E) topib bo'lmaydi

33. (02-2-62) Agar $16 \le x \le y \le z \le t \le 121$ bo'lsa, $\frac{x}{y} + \frac{z}{t}$ ifodaning eng kichik qiymatini toping?
A) $\frac{8}{11}$ B) $\frac{11}{8}$ C) $\frac{4}{11}$ D) $\frac{2}{11}$
E) topib bo'lmaydi

34. (02-3-23) Agar $8 \le x \le y \le z \le t \le 200$ bo'lsa, $\frac{x}{y} + \frac{z}{t}$ ifodaning eng kichik qiymatini toping?
A) $0,4$ B) $0,9$ C) $0,7$ D) $0,2$
E) topib bo'lmaydi

35. (02-3-55) Agar $5 \le x \le y \le z \le t \le 320$ bo'lsa, $\frac{x}{y} + \frac{z}{t}$ ifodaning eng kichik qiymatini toping?
A) $0,25$ B) $0,5$ C) $1,6$ D) $0,16$
E) topib bo'lmaydi

36. (02-1-25) $\frac{1}{x^2+11}$ ifodaning eng katta qiymati bilan $x^4 - 5$ ning eng kichik qiymati ko'paytmasini toping?
A) $-0,(45)$ B) $-0,45$ C) $0,(45)$
D) $0,5$ E) $-0,5$

37. (03-5-13) $xy = \frac{5}{12}$ va $36 < \frac{5}{y} < 84$ bo'lsa, x ning butun qiymatlari ko'paytmasini toping?
A) 120 B) 60 C) 90 D) 180 E) 210

1.8 Modul.

1.8.1 Modulli ifodalar.

1. Haqiqiy sonning absolyut qiymati (moduli)

$$|a| = \begin{cases} a, \ agar \ a \ge 0, \\ -a, \ agar \ a < 0. \end{cases}$$

2. $|a| \ge 0$,
3. $|-a| = |a|$,
4. $|a| = |b| \Rightarrow a = \pm b$,
5. $|a \cdot b| = |a| \cdot |b|$,
6. $|\frac{a}{b}| = \frac{|a|}{|b|}$, $(b \ne 0)$
7. $|a|^2 = a^2$,
8. $|a+b| \le |a| + |b|$,
9. $|a| - |b| \le |a-b|$,
10. $|a| < c$, $(c > 0) \Leftrightarrow -c < a < c$,
11. $|a| > c$, $(c > 0) \Leftrightarrow \left[\begin{array}{c} a > c \\ a < -c \end{array} \right.$

(97-12-13) Agar $m > n > k > 0$ bo'lsa,

$$|n-m| + |n+k| - |m-k|$$

ni soddalashtiring.
A) $2k - 2m$ B) $2k - 2n$ C) $2k$
D) $2m - 2k$ E) $2m - 2n$

Yechish: Ma'lumki $|x| = \begin{cases} x \ agar \ x \ge 0 \\ -x \ agar x < 0 \end{cases}$
$m > n > k > 0$ bo'lgani uchun $n - m < 0$ shu sababli $|n-m| = -(n-m)$, $n+k > 0$ shu sababli $|n+k| = n+k$; $m-k > 0$ shu sababli $|m-k| = m-k$ bo'ladi. U holda

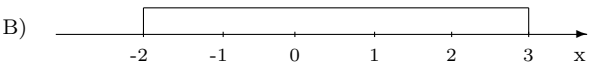
$$|n-m| + |n+k| - |m-k| = (n-m) + n + k -$$

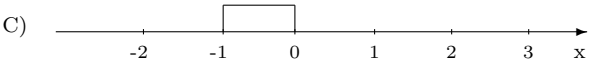
$$-(m-k) = -n + m + n + k - m + k = 2k.$$

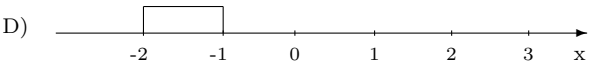
J: $2k$ (C).

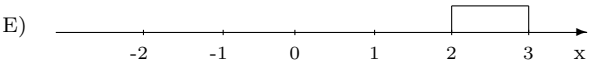
1. (96-3-7) Agar $a = -2$ va $b = 3$ bo'lsa, rasmda $|a-b|$ ga mos to'g'ri javobni ko'rsating.

A)

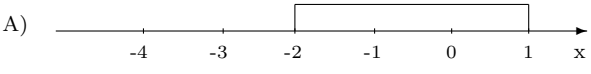

B)


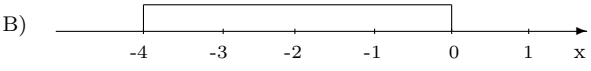
C)


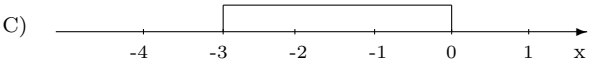
D)


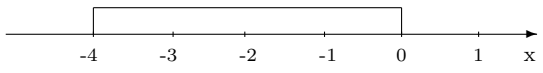
E)


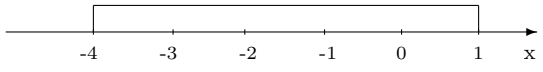
2. (96-11-7) Agar $a = -4$ va $b = 1$ bo'lsa, rasmda $|a-b|$ ga mos to'g'ri javobni ko'rsating.

A)


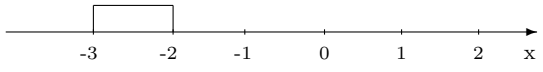
B)


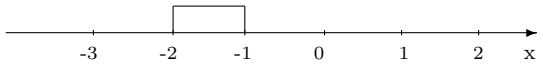
C)


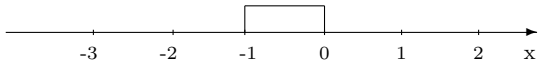
D)


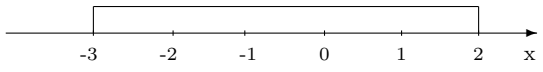
E)


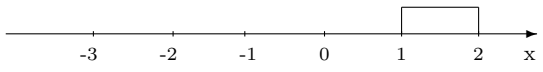
3. (96-12-7) Agar $a = -3$ va $b = 2$ bo'lsa, rasmda $|a - b|$ ga mos to'g'ri javobni ko'rsating.

A)


B)


C)


D)


E)


4. (97-4-9) Sonlarni kamayish tartibida yozing. $m = |4, 8|$; $n = |-4, (8)|$; $p = |4\frac{3}{5}|$ va $q = |-3, 2|$
A) $n > m > p > q$ B) $m > n > p > q$
C) $m > p > q > n$ D) $p > m > q > n$
E) $m > p > n > q$

5. (97-9-69) Sonlarni kamayish tartibida yozing. $m = |8, (8)|$; $n = |-8, 8|$; $p = |8\frac{7}{9}|$ va $q = |-8\frac{6}{7}|$
A) $n > m > p > q$ B) $m > n > p > q$
C) $m > q > n > p$ D) $q > m > n > p$
E) $q > n > m > p$

6. (98-5-9) Hisoblang.

$$\frac{|4-5|4-6|+4|3-6||}{|3-4|7-5||}$$

A) 1 B) $\frac{1}{2}$ C) $1\frac{2}{5}$ D) $\frac{5}{6}$ E) $1\frac{1}{5}$

7. (99-7-11) Hisoblang.

$$\frac{|4-4\cdot|3-6|-8|}{|4-|3-8|-7|}$$

A) 2 B) 1 C) 3 D) 4 E) 2,5

8. (96-6-14) Agar $a > b > c$ bo'lsa,

$$|a-b|+|c-a|-|b-c|$$

ni soddalashtiring.
A) $a - 2b$ B) $2c$ C) $2a$
D) $2a - 2b$ E) $b - 2c$

9. (97-2-14) Agar $x > y > z$ bo'lsa,

$$|x-y|-|z-y|-|z-x|$$

ni soddalashtiring.
A) $2x$ B) $2y - 2x$ C) $2z - 2y$
D) $2y$ E) $2y - 2z$

10. (97-4-6) Quyidagi munosabatlardan qaysi biri noto'g'ri?
A) $|a^2 + b^2| = a^2 + b^2$
B) $a > 0$ bo'sa, $|a + b^4| = a + b^4$
C) $a < 0$ bo'sa, $|a^3 + b^2| \geq a^3 + b^2$
D) $a < 0$, $b < 0$ bo'sa, $|a + b| = -a - b$
E) $a < 0$, $b > 0$ bo'sa, $|a + b| = b - a$

11. (97-8-14) Agar $p > q > k > 0$ bo'lsa,

$$|p+q|-|k-q|+|k-p|$$

ni soddalashtiring.
A) $2p$ B) $2p + 2q - 2k$ C) $2p + 2q + 2k$
D) $2p + 2k$ E) $2q - 2k$

12. (98-4-8) Agar $a \neq 0$ bo'lsa, $|a + b| - |b|$ ifodaning qiymati.
A) $a > b$ bo'lganda musbat bo'ladi
B) $a < b$ bo'lganda manfiy bo'ladi
C) $a = b$ bo'lganda musbat bo'ladi
D) $a < 0$ bo'lganda manfiy bo'ladi
E) To'g'ri javob berilmagan

13. (99-10-23) Agar $x > y > 0$ bo'lsa,

$$\left|\sqrt{xy}-\frac{x+y}{2}\right|+\left|\frac{x+y}{2}+\sqrt{xy}\right|$$

ni soddalashtiring.
A) $x - y$ B) $2\sqrt{xy}$ C) $-2\sqrt{xy}$
D) $x + y$ E) $y - x$

14. (03-2-63) $a > 0$; $b < 0$; $|a| \neq |b|$. Quyidagi ifodalardan qaysi birining qiymati musbat bo'lmasligi mumkin?
A) $a - b$ B) $|a + b|$ C) a^3b^2
D) $|a - b|$ E) $|a| - |b|$

1.8.2 Modulli tenglamalar.

1. $|f(x)| = f(x) \Leftrightarrow f(x) \geq 0$.

2. $|f(x)| = -f(x) \Leftrightarrow f(x) \leq 0$.

3. $|f(x)| = |g(x)| \Leftrightarrow \left[\begin{array}{c} f(x) = g(x) \\ f(x) = -g(x) \end{array}\right.$

4. $|f(x)| = a\ (a \geq 0) \Leftrightarrow \left[\begin{array}{c} f(x) = a \\ f(x) = -a \end{array}\right.$

(99-6-48) Tenglamani yeching.

$$|2 - 3x| - |5 - 2x| = 0$$

A) $-3; \frac{7}{5}$ B) $3; \frac{7}{5}$ C) $3; -1$ D) $-3; 0$ E) $-1; -3$

Yechish: Berilgan tenglamani

$$|2 - 3x| = |5 - 2x|$$

ko'rinishida yozamiz. Bu tenglama 2 ta tenglamaga ajraladi. 1) $2 - 3x = 5 - 2x$, $x = -3$ 2) $2 - 3x = -(5 - 2x)$, $x = \frac{7}{5}$. J: $-3; \frac{7}{5}$ (A).

1. (96-1-11) Ushbu $|b| : (-0,5) = -2,5$ tenglamani qanoatlantiradigan b ning barcha qiymatlarini toping.
   A) $0,5$ B) 5 va -5 C) $\frac{5}{4}$ va $-\frac{5}{4}$ D) 5 E) $\emptyset$

2. (96-9-61) $-4,8 : |a| = -0,5$ tenglikni qanoatlantiruvchi a ning barcha qiymatlarini toping.
   A) $2,4$ B) $2,4$ va $-2,4$ C) $9,6$ va $-9,6$
   D) $9,6$ E) $\emptyset$

3. (96-10-11) Ushbu

   $$|m| \cdot (-0,6) = -5,4$$

   tenglamani qanoatlantiradigan m ning barcha qiymatlarini toping.
   A) 9 B) 9 va -9 C) $0,9$ va $-0,9$
   D) bo'sh to'plam E) $3,24$

4. (97-1-75) Tengsizlikning nechta ildizi bor?

   $$|x + 1| = |2x - 1|$$

   A) 4 B) 3 C) 2 D) 1 E) $\emptyset$

5. (97-6-71) Tenglamaning nechta ildizi bor?

   $$|x| = |2x - 5|$$

   A) 1 B) 2 C) 3
   D) cheksiz ko'p E) ildizi yo'q

6. (97-9-82) $-ax = |a|$ Tenglama yagona musbat yechimga ega bo'ladigan a ning barcha qiymatlarini toping.
   A) $a \neq 0$ B) $a > 0$ C) $a \leq 0$
   D) $a \geq 0$ E) $a < 0$

7. (98-1-8) m ning qanday qiymatlarida $|m + 1| = m + 1$ tenglik o'rinli bo'ladi?
   A) $m = -1$ B) $m \in R$ C) $m = 0$
   D) $m > -1$ E) $m \geq -1$

8. (98-4-24) Ushbu

   $$|x^2 - 8x + 7| = -7 + 8x - x^2$$

   tenglamaning barcha natural yechimlari yig'indisini toping.
   A) 8 B) 40 C) 25 D) 28
   E) aniqlab bo'lmaydi

9. (98-8-8) a ning qanday qiymatlarida

   $$|a + 2| = -a - 2$$

   tenglik o'rinli bo'ladi?
   A) $a = -2$ B) $a \in \emptyset$ C) $a < -2$
   D) $a \leq -2$ E) $a = -3$

10. (98-12-83) Tenglamaning barcha natural yechimlari yig'indisini toping.

    $$\left|\frac{x^5}{x^4 - 16}\right| = \frac{x^5}{16 - x^4}$$

    A) 3 B) 1 C) 6 D) 10 E) 15

11. (99-2-14) Tenglamaning ildizlari ko'paytmasini toping.

    $$(x - 2)^2 - 4|x - 2| + 3 = 0$$

    A) 3 B) 15 C) -3 D) -15 E) -9

12. (99-4-24) Tenglamaning nechta butun ildizi bor?

    $$|x^2 - 2x| = 2x - x^2$$

    A) 1 B) 2 C) 3 D) birorta ham ildizi yo'q
    E) cheksiz ko'p

13. (99-6-47) Tenglamaning ildizlari yig'indisini toping?

    $$|x^2 + 5x| = 6$$

    A) 10 B) -6 C) -3 D) -10 E) 1

14. (99-10-9) Tenglamaning manfiy ildizlari nechta?

    $$\left(\frac{y}{6} + \frac{y}{3} + \frac{y}{2}\right)(y^2 - 3|y| + 2) = 0$$

    A) 1 B) 2 C) 3 D) 4 E) 5

15. (00-4-10) x ning qanday qiymatlarida $|x^{13}| = |x|^{13}$ tenglik o'rinli bo'ladi?
    A) $x > 0$ B) 0 C) $x < 0$ D) $x \in R$ E) $\emptyset$

16. (00-4-11) Ushbu

    $$x^2 - 3|x| - 40 = 0$$

    tenglamaning ildizlari ko'paytmasini toping.
    A) -40 B) 40 C) -32 D) -64 E) -56

17. (00-5-22) Tenglamani yeching.

    $$|2x - 3| = 3 - 2x$$

    A) $\frac{3}{2}$ B) $(-\infty; \frac{3}{2}]$ C) $(-\infty; \frac{3}{2})$
    D) $(-\infty; \infty)$ E) $(0; \frac{3}{2}]$

18. (00-6-12) Tenglamaning ildizlari yig'indisini toping?

    $$|1 - |1 - x|| = 0,5$$

    A) 0 B) 4 C) 3 D) 1 E) $2,5$

19. (96-3-79) Tenglama ildizlari yig'indisini toping?

    $$|x + 3| + |x - 1| + |x - 4| = 6$$

    A) ildizi yo'q B) 0 C) -4
    D) 1 E) -2

20. (96-9-20) Tenglama nechta ildizga ega?

$$|x+2|+|x|+|x-2|=4$$

A) ildizi yo'q B) cheksiz ko'p
C) 1 D) 2 E) 4

21. (96-12-77) Tenglama yechimlarining yig'indisini toping?

$$|x+4|+|x-2|+|x-3|=7$$

A) 2 B) ildizi yo'q
C) 0 D) -2 E) 1

22. (96-13-20) Tenglamaning ildizlari nechta?

$$|x-4|+|x-1|+|x+2|=6$$

A) ildizi yo'q B) 2 C) 3 D) 1
E) cheksiz ko'p

23. (97-4-13) a ning qanday qiymatlarida $a^2+1=2|a|$ tenglik o'rinli bo'ladi?
A) $a\geq 0$ B) $a\leq 0$ C) $a\,\epsilon\,(-\infty;\infty)$
D) $a=\pm 1$ E) $a=1$

24. (98-3-19) Tenglamaning nechta ildizi bor?

$$x^2+|x|-2=0$$

A) 0 B) 1 C) 2 D) 3 E) 4

25. (98-12-97) Tenglamaning ildizlari ko'paytmasini toping?

$$|x-1|^2-8=2|x-1|$$

A) 15 B) -3 C) 5 D) -8 E) -15

26. (97-9-73) a ning qanday qiymatlarida

$$a^2|a|-a^2+2|a|-1=2a^2-|a|$$

tenglik o'rinli bo'ladi?
A) 1 B) -1 C) 3 D) $-1;3$ E) $-1;1$

27. (98-9-17) Agar $y^2>x>0$ bo'lsa,

$$|x-y^2|+|x+9|-25=0$$

tenglik y ning qanday qiymatlarida o'rinli bo'ladi?
A) 4 B) ± 3 C) ± 4 D) 3 E) ± 2

28. (01-3-5) Tenglamaning ildizlari yig'indisini toping?

$$|x|=x^2+x-4$$

A) $2-\sqrt{5}$ B) $1-2\sqrt{5}$ C) $-1-\sqrt{5}$
D) $1+\sqrt{5}$ E) $1-\sqrt{5}$

29. (01-7-17) Ushbu

$$|x^2+5x-4|=3x-1$$

tenglamaning ildizlari yig'indisini toping.
A) -10 B) -8 C) $-1+\sqrt{21}$
D) $-3+\sqrt{21}$ E) 1

30. (01-8-13) Ushbu

$$|3-|2+x||=1$$

tenglamaning ildizlari ko'paytmasini toping.
A) 24 B) 48 C) -12 D) -6 E) 0

31. (98-2-15) Tenglamani yeching.

$$|z|z^4-27|z^2|=0$$

A) $0;3$ B) $3;-3$ C) $0;\pm 9$
D) $-3;0;3$ E) ± 9

32. (01-9-42) Tenglamani yeching.

$$2|x|=\frac{1}{2}x-1$$

A) 1 B) $\frac{2}{5}$ C) $-\frac{2}{3}$ D) -1 E) $\emptyset$

33. (02-2-16) Agar $|x-2|+3x=-6$ bo'lsa, $|x|$ ni toping.
A) 4 B) 3 C) 2 D) 6 E) 8

34. (02-3-24)

$$1+x-x^2=|x|^3$$

tenglama nechta xaqiqiy ildizga ega?
A) 2 B) 1 C) 3 D) $\emptyset$ E) aniqlab bo'lmaydi

35. (02-5-9)

$$(2|x|-1)^2=|x|$$

tenglamaning barcha ildizlari ko'paytmasini toping?
A) $\frac{1}{16}$ B) $-\frac{1}{16}$ C) $\frac{1}{4}$ D) $-\frac{1}{4}$ E) 1

36. (02-8-8) $|5-x|=2(2x-5)$ bo'lsa, $5+x$ ning qiymati nechaga teng?
A) 8 B) 7 C) 9 D) 11 E) 10

37. (02-9-21)

$$|1-|1-x||=0,5$$

tenglamaning ildizlari yig'indisini toping.
A) 1 B) 2 C) 2,5 D) 4 E) 4,5

38. (02-10-10)

$$|x-2|=3\cdot|3-x|$$

tenglamani yeching.
A) $2,75;3,5$ B) 2,75 C) 2 D) 2.5 E) 3,75

39. (02-11-21)

$$x^2+|x|=\frac{7}{4}$$

tenglamaning eng katta va eng kichik ildizlari ayirmasini toping.
A) $\sqrt{2}$ B) $2\sqrt{2}-1$ C) $2\sqrt{2}$ D) 2 E) $\sqrt{2}-1$

40. (02-11-26)

$$|x+1|=2|x-2|$$

tenglamaning ildizlari yig'indisini toping.
A) 7 B) 5 C) 4 D) 0 E) 6

41. (02-12-11)

$$|x-1|\cdot|x+2|=4$$

tenglamaning butun sonlardan iborat ildizi nechta.
A) 2 B) 3 C) 4 D) 1 E) 0

42. (03-1-21)

$$|x|=x^2-6$$

tenglamaning ildizlari ko'paytmasini toping.
A) -6 B) -1 C) 3 D) -9 E) 6

43. (03-1-68)

$$|17-3x^2|=3x+2$$

tenglama nechta ildizga ega?
A) 1 B) 2 C) 3 D) 4 E) ildizi yo'q

44. (03-3-16)

$$x|x|+2x+1=0$$

tenglamani yeching.
A) 1 B) -1 C) $1-\sqrt{2}$
D) $1+\sqrt{2}$ E) $-1; 1-\sqrt{2}; 1+\sqrt{2}$

45. (03-3-18)

$$|(x-6)^3+28|=36$$

tenglamaning ildizlari yig'indisini toping.
A) -2 B) 6 C) -6 D) 10 E) -10

46. (03-4-13)

$$2-3|x-5|=-4$$

tenglamaning ildizlari yig'indisini toping.
A) 8 B) 7 C) 9 D) 6 E) 10

47. (03-5-19)

$$(x+2)^2-2|x+2|-3=0$$

tenglama ildizlarining yig'indisi nechaga teng?
A) -4 B) 6 C) -6 D) 4 E) -5

48. (03-6-48)

$$|x^2-5x|=6$$

tenglamaning ildizlari yig'indisini toping?
A) 5 B) -6 C) 10 D) -5 E) -10

49. (03-11-70)

$$|3x-1|=|5-x|$$

tenglamaning ildizlari ko'paytmasini toping?
A) -3 B) $1,5$ C) 3 D) 2 E) -2

50. (03-12-67)

$$x^2=|5x-6|$$

tenglamaning nechta ildizi bor?
A) 0 B) 1 C) 2 D) 3 E) 4

1.8.3 Modulli tengsizliklar

1. $|f(x)|<a,\ (a>0) \Longleftrightarrow -a<f(x)<a$

2. $|f(x)|>a,\ (a>0) \Longleftrightarrow \left[\begin{array}{l} f(x)>a \\ f(x)<-a \end{array}\right.$

3. $|f(x)|<|g(x)| \iff f^2(x)<g^2(x)$,
$\Longleftrightarrow (f(x)-g(x))(f(x)+g(x))<0$

(98-10-66) Tengsizlikning butun yechimlari nechta?

$$2\cdot|x-1|<|x+3|$$

A) 6 B) 5 C) cheksiz ko'p D) 0 E) 8

Yechish: Tengsizlikning har ikkala qismini kvadratga ko'taramiz

$$(2|x-1|)^2\le|x+3|^2$$

hadlarini chap qismga o'tkazamiz:

$$(2x-2)^2-(x+3)^2\le 0$$

$a^2-b^2=(a-b)(a+b)$ formula yordamida ko'paytuvchilarga ajratamiz:

$$(2x-2+x+3)(2x-2-x-3)\le 0,$$

$$(3x+1)(x-5)\le 0$$

Bu tengsizlikni oraliqlar usuli bilan yechib 0, 1, 2, 3, 4, 5 butun yechimlarini hosil qilamiz. J: 6 ta (A).

1. (96-3-26) Tengsizlikni yeching.

$$|x-1|\ge 2$$

A) $(-\infty;-1]$ B) $[-1;3]$ C) $(-\infty;-1]\cup[3;\infty)$
D) $[1;3]$ E) $[-1;-3]$

2. (96-7-8) Tengsizlik nechta butun yechimga ega?

$$|x-2|\le 5$$

A) 11 B) 10 C) 8 D) 7 E) 6

3. (96-11-27) Tengsizlikni yeching.

$$|x-1|\ge 1$$

A) $[0;2]$ B) $(-\infty;0]\cup[2;\infty)$ C) $[-2;0]$
D) $[0;2]$ E) $[-1;2]$

4. (96-12-27) Tengsizlikni yeching.

$$|x-1|\le 2$$

A) yechimga ega emas B) $(-\infty;-1]\cup[3;\infty)$
C) $[-1;3]$ D) $[1;3]$ E) $(-\infty;3]$

5. (97-7-8) Tengsizlik nechta butun yechimga ega.

$$|x+2|\le 3$$

A) 5 B) 6 C) 7 D) 4 E) 8

6. (97-1-73) Tengsizlikni qanoatlantiradigan natural sonlarning eng kattasi topilsin.

$$|3x-7|<5$$

A) 4 B) 3 C) 2 D) 1 E) 5

7. (97-3-8) Tengsizlik nechta butun yechimga ega.

$$|3-x|<4$$

A) 4 B) 5 C) 6 D) 7 E) 9

8. (97-6-70) Tengsizlikni qanoatlantiradigan eng katta natural sonni toping.

$$|2x+3|<7$$

A) 1 B) 2 C) 3 D) 4 E) 5

9. (97-10-8) Tengsizlik nechta butun yechimga ega?

$$|4-x|<6$$

A) 3 B) 5 C) 8 D) 11 E) 10

10. (98-3-18) Tengsizlikning butun yechimlari nechta?

$$2|x+3|\le|x-1|$$

A) cheksiz ko'p B) 5 C) 6 D) 10 E) 12

11. (98-5-23) Ushbu

$$|x-7|\le 1$$

tengsizlikning eng kichik natural yechimini toping.
A) 5 B) 7 C) 8 D) 6 E) 1

12. (98-11-22) Tengsizlikni yeching.

$$|x|\cdot(x-\frac{1}{2})<0$$

A) $(-\infty;\frac{1}{2})$ B) $(0;\frac{1}{2})$ C) $(-\infty;0)$
D) $(-\infty;\frac{1}{2})\cup(\frac{1}{2};\infty)$ E) $(-\infty;0)\cup(0;\frac{1}{2})$

13. (99-7-24) Ushbu

$$|x-6|\le 8$$

tengsizlikning eng kichik natural yechimlarini toping.
A) 2 B) 7 C) 3 D) 0 E) 1

14. (99-8-4) Tengsizlikni qanoatlantiruvchi x ning eng kichik natural qiymatini toping.

$$|x+1|+|x-4|>7$$

A) 1 B) 3 C) 6 D) 5 E) 2

15. (99-9-18) Ushbu $|x-4|\le 12$ tengsizlikning eng kichik va eng katta butun yechimlari yig'indisini toping.
A) 6 B) 8 C) -6 D) -8 E) 10

16. (99-10-10) Tengsizlikning eng katta va eng kichik musbat butun yechimlari ayirmasini toping.

$$\frac{|x|-10}{2-|x|}\ge 0$$

A) 6 B) 8 C) 9 D) 7 E) 5

17. (00-3-24) Tengsizlik nechta yechimga ega?

$$|x-3|\le 6-x$$

A) 0 B) 1 C) 2 D) 4 E) cheksiz ko'p

18. (00-6-6) Tengsizlikni yeching.

$$|x^2-5|<4$$

A) $(-3;3)$ B) $(-3;0)\cup(0;3)$
C) $(-3;-1)\cup(1;3)$ D) $(-3;-1)$
E) $(1;3)$

19. (00-8-13) Tengsizlikning butun yechimlari yig'indisini toping?

$$|x-2|<5$$

A) 18 B) 21 C) 20 D) 19 E) 15

20. (00-8-45) Tengsizlikni yeching.

$$|-2x+1|>5$$

A) $(-\infty;-2)\cup(3;\infty)$ B) $(-2;3)$ C) $(-2;\infty)$
D) $(-\infty;3)$ E) $(-\infty;0)\cup(0;\infty)$

21. (00-10-18) Tengsizlikni yeching.

$$|x|\cdot\left(x-\frac{1}{8}\right)<0$$

A) $(-\infty;\frac{1}{8})$ B) $(0;\frac{1}{8})$ C) $(-\infty;0)$
D) $(-\infty;\frac{1}{8})\cup(\frac{1}{8};\infty)$ E) $(-\infty;0)\cup(0;\frac{1}{8})$

22. (00-10-70) Tengsizlikni yeching.

$$\frac{|x-3|}{x^2-5x+6}\ge 2$$

A) $[\frac{3}{2};2)$ B) $[\frac{5}{2};4)$ C) yechimi yo'q
D) $[-10;10]$ E) $(-\frac{5}{2};0)$

23. (97-4-26) a ning qanday qiymatlarida $ax\le|a|$ tengsizlikning yechimlari to'plami $[-1;\infty)$ oraliqdan iborat bo'ladi?
A) $a<0$ B) $a>0$ C) $a\,\epsilon\,(-\infty;\infty)$
D) $a=0$ E) $a\le 0$

24. (97-9-86) a ning qanday qiymatlarida $a^6x\ge|a|^3$ tengsizlikning yechimlari $x\ge\frac{1}{8}$ bo'ladi?
A) $a>0$ B) $a\le 0$ C) $a\ne 0$
D) $-2;2$ E) ± 4

25. (01-1-16) Tengsizlikni yeching.

$$\frac{2}{|x-4|}\le 1$$

A) $[-4;4]$ B) $(-\infty;-4]\cup[4;\infty)$
C) $(-\infty;2]\cup[6;\infty)$ D) $[2;6]$
E) $(-\infty;2]\cup[4;\infty)$

26. (01-2-69) Ushbu

$$\left|\frac{3}{x-7}\right| > \frac{6}{7}$$

tengsizlikning barcha butun yechimlari yig'indisini toping.
A) 39 B) 45 C) 32 D) 49 E) 42

27. (01-3-7) Ushbu

$$x^2 - 3|x| - 4 \le 0$$

tengsizlikni qanoatlantiruvchi butun sonlarning yechimlari yig'indisini aniqlang.
A) 0 B) 2 C) 3 D) 1 E) 4

28. (01-5-24) Ushbu

$$|5 - 2x| \le 3$$

tengsizlikning butun yechimlari yig'indisini toping.
A) 10 B) 15 C) 6 D) 3 E) 5

29. (01-8-21) Ushbu

$$y = \sqrt{\frac{x^2}{|x| - 3}}$$

funksiyaning aniqlanish sohasini toping.
A) $(3;\infty)$ B) $(0;3)$ C) $(-3;0)$
D) $(3;\infty)\cup\{0\}$ E) $(-\infty;-3)\cup(3;\infty)\cup\{0\}$

30. (01-11-13) Ushbu

$$|8 - x| < 4$$

tengsizlikning eng katta butun yechimini toping.
A) 12 B) 10 C) 11 D) 8 E) 9

31. (01-12-17) Tengsizlikni yeching.

$$|x + 1| > 2|x + 2|$$

A) $(-2;-1)$ B) $[-3;-1]$ C) $(-3;-\frac{5}{3})$
D) $(-3;0)$ E) $\emptyset$

32. (02-1-47)

$$|3x + 8| \le 2$$

tengsizlikni qanoatlantiruvchi butun sonlar nechta?
A) 1 B) 2 C) 3 D) 4 E) 5

33. (02-2-9)

$$|x^2 - 2| < 1$$

tengsizlikni yeching?
A) $(-\sqrt{3};-1)\cup(1;\sqrt{3})$ B) $(-\sqrt{3};-1)$
C) $(1;\sqrt{3})$ D) $(-\sqrt{3};\sqrt{3})$ E) $(-1;1)$

34. (02-9-12)

$$\left|\frac{3}{x-2}\right| \ge \frac{1}{4}$$

tengsizlikning butun sonlardan iborat yechimlardan eng kattasi va eng kichigining ko'paytmasini toping?
A) 42 B) -117 C) -140 D) -130
E) aniqlab bo'lmaydi

35. (02-10-11)

$$x^2 - 7x + 12 < |x - 4|$$

tengsizlikni yeching?
A) $(2;4)$ B) $\emptyset$ C) $(3;4)$ D) $(2;3)$
E) $(-\infty;3)\cup(4;\infty)$

36. (02-10-55)

$$\begin{cases} |2x - 3| \le 1 \\ 5 - 0,4x > 0 \end{cases}$$

tengsizliklar sistemasini yeching?
A) $[1;2]$ B) $(-\infty;2]$ C) $(-\infty;1]\cup(2;\infty)$
D) $(-0,4;2)$ E) $(0;1]$

37. (02-11-23)

$$|x^2 - 3| < 2$$

tengsizlikning butun sonlardan iborat yechimlari nechta?
A) 2 B) 3 C) 4 D) 5 E) cheksiz ko'p

38. (03-5-20)

$$1 < |x - 2| < 3$$

tengsizlikni yeching?
A) $(-1;1)\cup(3;5)$ B) $(-1;1)$ C) $(3;5)$
D) $(-1;5)$ E) $(0;4)$

39. (03-6-16)

$$|x - 4| > |x + 4|$$

tengsizlikni yeching?
A) $(-4;4)$ B) $(0;4)\cup(4;\infty)$ C) $(-4;\infty)$
D) $(-\infty;-4)\cup(-4;0)$ E) $(-\infty;0)$

40. (03-6-51)

$$|x^2 - 8| < 1$$

tengsizlikni yeching?
A) $x < -\sqrt{7}$ B) $x > \sqrt{7}$ C) $-\sqrt{7} < x < \sqrt{7}$
D) $-3 < x < -\sqrt{7},\ \sqrt{7} < x < 3$ E) $-3 < x < 3$

41. (03-6-52)

$$|x^2 + 2x| > 8$$

tengsizlikni yeching?
A) $x < -4,\ x > 2$ B) $-4 < x < 2,$ C) $x < -4$
D) $x > 2$ E) $x > -4$

42. (03-7-22)

$$|x - 4| < |x + 4|$$

tengsizlikni yeching?
A) $(-4;4)$ B) $(0;4)\cup(4;\infty)$ C) $(0;\infty)$
D) $(-\infty;-4)\cup(-4;0)$ E) $(-\infty;-4)$

43. (03-9-11)

$$|x^2 - 3x| < 10$$

tengsizlikning butun sonlardan iborat yechimlari yig'indisini toping?
A) 6 B) 7 C) 9 D) 12 E) 16

44. (03-12-69)

$$x^2 - 2|x| < 3$$

tengsizlikning butun sonlardan iborat yechimlari nechta?
A) 7 B) 6 C) 5 D) 4 E) 3

1.8.4 Modulli tenglamalar va tengsizliklar sistemasi.

(98-8-25) b ning qanday qiymatlarida tenglamalar sistemasi yagona yechimga ega?

$$\begin{cases} x = 3 - |y| \\ 2x - |y| = b \end{cases}$$

A) $b = 0$ B) $b > 0$ C) $b < 1$ D) $b = 6$ E) $b = 4$

Yechish: Agar (x_0, y_0) berilgan sistemaning yechimi bo'lsa, u holda $(x_0, -y_0)$ ham uning yechimi bo'ladi. Demak, sistema yagona yechimga ega bo'lishi uchun $y_0 = 0$ bo'lishi kerak ekan. Uni sistemaning birinchi tenglamasiga qo'yib $x = 3$ ekanini, ikkinchi tenglamadan esa $b = 6$ ekanini hosil qilamiz. J: $b = 6$ (D).

1. (98-1-15) Ushbu

$$y = \sqrt{|x| - 3} + \frac{1}{\sqrt{10 - x}}$$

funksiyaning aniqlanish sohasini toping.
A) $[-3; 10]$ B) $[3; 10)$ C) $(3; 10) \cup \{-3\}$
D) $(-10; 3]$ E) $(-\infty; -3] \cup [3; 10)$

2. (98-1-25) a ning qanday qiymatlarida

$$\begin{cases} 3|x| + y = 2 \\ |x| + 2y = a \end{cases}$$

sistema yagona yechimga ega?
A) $a = 0$ B) $a > 0$ C) $a = 2$
D) $a = -2$ E) $a = 4$

3. (98-8-23) Agar

$$\begin{cases} x + 2|y| = 3 \\ x - 3y = 5 \end{cases}$$

bo'lsa, $x - y$ ning qiymatini toping.
A) 3 B) 2 C) 1 D) -1 E) -4

4. (98-1-23) Agar

$$\begin{cases} |x| + y = 2 \\ 3x + y = 4 \end{cases}$$

bo'lsa, $x + y$ ning qiymatini toping.
A) 3 B) 1 C) $2,5$ D) 2 E) $1,5$

5. (98-8-15) Ushbu

$$y = \sqrt{7 - |x - 2|} + \frac{1}{\sqrt{3 - 2x}}$$

funksiyaning aniqlanish sohasini toping.
A) $(-\infty; -1, 5)$ B) $(-\infty; 1, 5)$
C) $[-7; -1, 5)$ D) $[-5; 1, 5)$ E) $(-5; 1, 5)$

6. (99-1-7) Tengsizlikni yeching.

$$1 < |x| < 4$$

A) $(-\infty; -4) \cup (4; \infty)$ B) $(-4; -1) \cup (1; 4)$
C) $(-\infty; -1) \cup (1; \infty)$ D) $(-1; 1)$ E) $(-4; 4)$

7. (99-4-5) Tengsizlik nechta butun yechimga ega?

$$4 \le |x| \le 8$$

A) 12 B) 10 C) 8 D) 6 E) 5

8. (00-1-18) Tengsizliklar sistemasini yeching?

$$\begin{cases} x \ge 3 \\ |x - 3| \le 1 \end{cases}$$

A) $2 \le x \le 3$ B) $-2 \le x \le 4$
C) $3 \le x \le 4$ D) $x \le 4$ E) $x \ge 2$

9. (00-7-20) Agar

$$\begin{cases} (x - 2)^2 + |y| = 4 \\ |x - 2| + |y| = 2 \end{cases}$$

bo'lsa, $x + y$ ning qiymatini toping.
A) 4 yoki 2 yoki 0 B) 0 yoki 3 C) 2 yoki 4
D) 0 yoki 4 E) 3 yoki 4

10. (01-7-20) Ushbu

$$\begin{cases} |x| + |y| = 1 \\ x^2 + y^2 = 4 \end{cases}$$

tenglamalar sistemasi nechta yechimga ega?
A) 1 B) 2 C) 4 D) $\emptyset$
E) to'g'ri javob keltirilmagan

11. (02-12-17) Agar

$$\begin{cases} |x - 1| + |y - 5| = 1 \\ y = 5 + |x - 1| \end{cases}$$

bo'lsa, $x+y$ qanday qiymatlar qabul qilishi mumkin?
A) 6 yoki 8 B) 7 C) 8 yoki 10
D) 6 yoki 7 E) 9

12. (03-10-31) Agar

$$\begin{cases} |x + y| = 5 \\ xy = 4,75 \end{cases}$$

bo'lsa, son o'qida x va y sonlari orasidagi masofani toping.
A) $\sqrt{6}$ B) $\sqrt{3}$ C) $\sqrt{5}$ D) $\sqrt{7}$ E) $\sqrt{13}$

1.9 Irratsional tenglama va tengsizliklar.

1.9.1 Irratsional tenglamalar.

1. $\sqrt[2k]{f(x)} = \varphi(x) \Rightarrow \begin{cases} f(x) = [\varphi(x)]^{2k} \\ \varphi(x) \ge 0 \end{cases}$

2. $\sqrt[2k+1]{f(x)} = \varphi(x) \Rightarrow f(x) = [\varphi(x)]^{2k+1}$

(98-9-19) Ushbu

$$\sqrt{x^4 + 5x^2} = -3x$$

tenglamaning ildizlari yig'indisini toping.
A) 0 B) -2 C) -4 D) 2 E) 4

Yechish: Ushbu sistemani hosil qilamiz.

$$\begin{cases} x^4+5x^2=9x^2 \\ -3x\ge 0. \end{cases}$$

Uning birinchi tenglamasini yechamiz.

$$x^4-4x^2=0,\ \ x^2(x^2-4)=0$$

$$1)\ x_1=0;\ \ 2)\ x^2-4=0,\ \Rightarrow\ x_2=-2,\ x_3=2$$

Endi $-3x\ge 0$ shartni tekshiramiz. Uni faqat $x_1=0$ va $x_2=-2$ sonlarigina qanoatlantiradi. Shunday qilib, berilgan tenglamaning ildizlari $x=0$ va $x=-2$ ekan. **J** :$0+(-2)=-2$ (B).

1. (97-1-72) Tenglamani yeching.

$$\sqrt{x+2}+x=0$$

A) -1 B) -2 C) 2 D) 0
E) to'g'ri javob berilmagan

2. (97-5-39) Tenglamalar sistemasini yeching.

$$\begin{cases} \sqrt{(x+2)^2}=x+2 \\ \sqrt{(x-2)^2}=2-x \end{cases}$$

A) $x\ge -2$ B) $x<2$ C) $x\le 2$
D) $-2\le x\le 2$ E) $-2<x<2$

3. (97-7-61) Ushbu $\sqrt{3+2x}=-x$ tenglik x ning qanday qiymatlarida o'rinli?
A) -1 B) 1 C) -3
D) hech qanday qiymatida E) 3

4. (97-9-39) Tenglamalar sistemasini yeching.

$$\begin{cases} \sqrt{(x+5)^2}=x+5 \\ \sqrt{(x-5)^2}=5-x \end{cases}$$

A) $-5\le x\le 5$ B) $x\le 5$ C) $x\ge -5$
D) $-5<x<5$ E) $x<5$

5. (98-2-21) Agar $\sqrt{x^4-9x^2}=-4x$ tenglamaning katta ildizi x_0 bo'lsa, x_0+10 nechaga teng?
A) 10 B) 12 C) 20 D) 15 E) 18

6. (99-2-19) Tenglamaning ildizlari yig'indisini toping.

$$\sqrt{x^2-3x+5}+x^2=3x+7$$

A) 4 B) -3 C) 3 D) -4 E) -5

7. (99-6-41) $\sqrt{a}-\sqrt{b}=4$ va $a-b=24$ bo'lsa, $\sqrt{a}+\sqrt{b}$ nimaga teng.
A) 6 B) 4 C) 5 D) 3 E) 8

8. (99-3-14) Agar

$$\sqrt[5]{25+\sqrt{x+13}}-2=0$$

bo'lsa, $\sqrt{x}+\frac{x}{3}$ ning qiymatini toping.
A) 18 B) 20 C) $10\sqrt{2}$ D) $14\sqrt{2}$ E) $15\sqrt{2}$

9. (99-5-15) Tenglamaning natural ildizlari nechta?

$$\sqrt{(3x-13)^2}=13-3x$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

10. (99-8-3) Tenglamani yeching.

$$\sqrt{x+1}+\sqrt{2x+3}=1$$

A) -1 B) 3 C) $-1;3$ D) 1 E) -3

11. (99-9-11) Tenglamaning ildizlarining o'rta arifmetigini toping.

$$(x^2-25)(x-3)(x-6)\sqrt{4-x}=0$$

A) $4\frac{1}{3}$ B) $1\frac{1}{3}$ C) $\frac{2}{3}$ D) $4\frac{1}{2}$ E) 2

12. (99-9-12) Tenglama ildizlarining ko'paytmasini toping.

$$\sqrt{x^2+77}-2\sqrt[4]{x^2+77}-3=0$$

A) -3 B) 3 C) 4 D) -4 E) -6

13. (99-10-21) Ushbu

$$\sqrt{x^3-2x^2-4x}=x$$

tenglamaning ildizlari yig'indisi 10 dan qancha kam?
A) 4 B) 7 C) 5 D) 6 E) 8

14. (00-1-19) Agar

$$\sqrt{1-\frac{1}{x}}=\frac{x-1}{x}-6$$

bo'lsa, $6\frac{1}{8}+x$ ning qiymatini hisoblang.
A) -7 B) 6 C) 7 D) -6 E) 8

15. (00-2-19) Tenglik x ning qanday qiymatlarida to'gri bo'ladi?

$$\sqrt{(2x-1)^2(3-x)}=(2x-1)\sqrt{3-x}$$

A) $[0,5;3]$ B) $[0;3]$ C) $[1;3]$ D) $(-\infty;0,5]$
E) $(-\infty;3]$

16. (00-2-25) Tenglamani yeching.

$$\sqrt{13^2-12^2}=\sqrt[x]{625}$$

A) 2 B) 3 C) 4 D) 5 E) 6

17. (00-3-10) Tenglamani yeching.

$$3\sqrt{2x}-5\sqrt{8x}+7\sqrt{18x}=28$$

A) 1 B) 2 C) 3 D) 4 E) 6

18. (00-3-22) Tenglamaning ildizlari yig'indisini toping.

$$\sqrt{x+1}+\sqrt{2x+3}=1$$

A) 2 B) 3 C) 4 D) -2 E) -1

19. (00-4-7) Tenglamani yeching.

$$\frac{2\sqrt{x}-\sqrt{2x}}{2}+3=\sqrt{x}+1$$

A) 8 B) 4 C) 9 D) 1 E) 16

20. (00-4-34) Tenglamaning ildizlari yig'indisini toping.
$$(16-x^2)\sqrt{3-x}=0$$
A) 7 B) 3 C) 0 D) -2 E) -1

21. (00-5-29) Tenglamani yeching.
$$\sqrt{x^2-x-2}=x-3$$
A) 5 B) tenglama cheksiz ko'p yechimga ega
C) 4 D) $\emptyset$ E) 2,2

22. (00-6-33) Agar
$$\sqrt{3x^2-6x+16}=2x-1$$
bo'lsa, $x^2\cdot(x+2)$ ning qiymatini toping.
A) -75 B) -45 C) 15 D) 45 E) 75

23. (00-7-16) Tenglama katta ildizining eng kichik ildiziga nisbatini toping.
$$\sqrt[3]{x^3+19}=x+1$$
A) $\frac{1}{2}$ B) $-\frac{2}{3}$ C) $\frac{2}{3}$ D) $-\frac{1}{2}$ E) $-\frac{3}{4}$

24. (00-8-5) Tenglamani yeching.
$$(x^2-9)\sqrt{x+1}=0$$
A) $-1;3$ B) ±3 C) $\pm3;1$ D) 2 E) -3

25. (00-8-25) Agar
$$\sqrt{8-a}+\sqrt{5+a}=5$$
bo'lsa, $\sqrt{(8-a)(5+a)}$ ning qiymatini toping.
A) 6 B) 20 C) 12 D) 10 E) 7

26. (00-8-26) Agar
$$\sqrt{25-x^2}+\sqrt{15-x^2}=5$$
bo'lsa, $\sqrt{25-x^2}-\sqrt{15-x^2}$ ifodaning qiymatini toping.
A) 2 B) 3 C) 5 D) 6 E) 10

27. (00-9-20) Agar
$$\sqrt{13+z^2}+\sqrt{z^3-14}=3$$
bo'lsa, $\sqrt{13+z^2}-\sqrt{z^3-14}=3$ ning qiymati nechaga teng?
A) 5 B) 6 C) 7 D) 8 E) 9

28. (00-9-23) Tenglamaning natural ildizlari nechta.
$$\sqrt[4]{(2x-7)^4}=7-2x$$
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

29. (00-9-31) Agar $\sqrt[4]{ab}=2\sqrt{3}$ va $a,b\,\epsilon\,N$ bo'lsa, $a-b$ quyidagi keltirilgan qiymatlardan qaysi birini qabul qila olmaydi?
A) -32 B) 10 C) 0 D) 70 E) 25

30. (97-5-26) Agar
$$\begin{cases}\sqrt{x}+\sqrt{y}=3\\ \sqrt{xy}=2\end{cases}$$
bo'lsa, $x+y$ ni toping.
A) 2 B) 3 C) 4 D) 5 E) 6

31. (97-9-26) Agar
$$\begin{cases}\sqrt{x}+\sqrt{y}=5\\ \sqrt{xy}=4\end{cases}$$
bo'lsa, $x+y$ ni toping.
A) 17 B) 18 C) 19 D) 16 E) 15

32. (01-1-18) Agar $\sqrt{x-3}-\sqrt{x+1}+2=0$ bo'lsa, x^3-2x+1 ifodaning qiymatini toping.
A) 24 B) 22 C) -1 D) 18 E) 21

33. (01-1-19) Agar
$$\begin{cases}x-y=21\\ \sqrt{x}-\sqrt{y}=3\end{cases}$$
bo'lsa, $x+y$ ning qiymatini toping.
A) 7 B) 12 C) 23 D) 29 E) 31

34. (01-2-24) Ushbu
$$x-5\sqrt{x}+4=0$$
tenglama ildizlarining o'rta arifmetigini toping.
A) 16 B) 8,5 C) 3 D) 2 E) 5

35. (01-4-26) Tenglamani yeching.
$$\sqrt{x}+\sqrt[4]{x}=12$$
A) 80 B) 81 C) 82 D) 8 E) 16

36. (01-5-9) Ushbu
$$(x^2-4)\sqrt{x+1}=0$$
tenglama ildizlarining yig'indisini hisoblang.
A) 1 B) -1 C) 3 D) 2 E) 0

37. (01-6-25) Agar $\sqrt{x+1}+x-11=0$ bo'lsa, $x+12$ ning qiymatini toping.
A) 15 B) 16 C) 20 D) 19 E) 18

38. (01-7-21) Ushbu
$$x^2+5x+\sqrt{x^2+5x-5}=17$$
tenglamaning ildizlari ko'paytmasini toping.
A) 5 B) -5 C) 8 D) -8 E) -14

39. (01-9-12) Ushbu
$$\begin{cases}y=\sqrt{16-x^2}\\ y-x=4\end{cases}$$
tenglamalar sistemasining nechta yechimi bor?
A) 2 B) 1 C) $\emptyset$ D) 3 E) 4

40. (01-10-20) Ushbu

$$\frac{x-9}{\sqrt{x}+3}=x-15$$

tenglama nechta ildizga ega?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

41. (01-10-24) Ushbu

$$f(x)=\frac{\sqrt{x+2}-\sqrt[4]{x+3}}{\sqrt[4]{x-1}-\sqrt[4]{3-x}}$$

funksiyaning aniqlanish sohasiga tegishli barcha butun sonlarning yig'indisini toping,
A) 3 B) 4 C) 5 D) 6 E) 7

42. (01-12-43) Tenglamani yeching.

$$\sqrt{3x-7}-\sqrt{7-3x}=0$$

A) $2,3$ B) $\frac{3}{7}$ C) $\frac{7}{3}$ D) $\emptyset$ E) $0,43$

43. (02-1-8)

$$\sqrt{x^2+1}-\sqrt{x^2-1}=1$$

tenglama nechta haqiqiy ildizga ega?
A) $\emptyset$ B) 1 C) 2 D) 3 E) cheksiz ko'p

44. (02-2-3)

$$\sqrt{(2x-1)^2(3-x)}=(1-2x)\sqrt{3-x}$$

tenglik x ning qanday qiymatlarida to'g'ri bo'ladi?
A) $x\le 0,5$ B) $0,5\le x\le 3$
C) $x\le 3$ D) $-3\le x\le 3$ E) $x\ge 0$

45. (99-9-25) Ushbu $\sqrt{a^2(3-a)}$ va $a\sqrt{3-a}$ ifodalar qaysi oraliqda aynan teng bo'ladi?
A) $[0;\infty)$ B) $[3;\infty)$ C) $(0;3)$
D) $[0;3]$ E) $[0;3)$

46. (02-2-17)

$$\sqrt{x^2-4x+4}=\sqrt{x^2-10x+25}$$

tenglamaning ildizlari qaysi oraliqqa tegishli?
A) $2<x<5$ B) $x\le 2$ C) $x\ge 5$
D) $x\le -2$ E) $-5<x<-2$

47. (02-2-18) Agar $2\sqrt{3x+2}-\sqrt{6x}=2$ bo'lsa, $x+4\frac{1}{3}$ nimaga teng?
A) 5 B) 6 C) 4 D) $5\frac{2}{3}$ E) $4\frac{2}{3}$

48. (02-3-19) Agar $a^3+5\sqrt{a^3+1}-13=0$ bo'lsa, $\sqrt{a^3+13}$ ning qiymatini aniqlang.
A) 4 B) 5 C) 3 D) 6 E) $\sqrt{28}$

49. (02-4-8)

$$\sqrt{5-4x}+5=4x$$

tenglamani yeching.
A) $\frac{4}{5}$ B) $\frac{5}{4}$ C) $\frac{4}{5}$ va $\frac{5}{4}$ D) $-\frac{4}{5}$ E) $-\frac{5}{4}$

50. (02-4-9)

$$\sqrt{2-x^2}\cdot\sqrt{x^2-4}=0$$

tenglamaning ildizlari sonini toping.
A) 0 B) 1 C) 2 D) 3 E) 4

51. (02-4-10)

$$\sqrt{-x}\sqrt{x^4-13x^2+36}=0$$

tenglamaning ildizlari yig'indisini toping.
A) 5 B) -5 C) 6 D) -6 E) 4

52. (02-6-22)

$$(x-2)\sqrt{x^2-x-20}+12-6x=0$$

tenglamaning haqiqiy ildizlari yig'indisini toping.
A) 4 B) 8 C) 3 D) 10 E) 1

53. (02-6-24)

$$\sqrt{x+2\sqrt{x-1}}-\sqrt{x-2\sqrt{x-1}}=2$$

tenglamani yeching.
A) 1 B) 2 C) $[1;\infty)$ D) $[2;\infty)$ E) $[1;2]$

54. (02-8-14)

$$6+\sqrt{x^2-3x+6}=2x$$

tenglama ildizlarining yig'indisini toping.
A) 5 B) 6 C) 7 D) 4 E) 5

55. (02-11-25)

$$\sqrt{\sqrt{11x^2+1}-2x}=1-x$$

tenglamaning turli ildizlari sonini aniqlang.
A) 1 B) 2 C) 3 D) 4 E) 0

56. (02-12-36)

$$\sqrt{6+x}-\sqrt{8-x}=0$$

tenglamaning ildizi 12 dan qancha kam?
A) 10 B) 8 C) 9 D) 13 E) 11

57. (02-12-46)

$$\sqrt{x-5}+3\sqrt{x+3}=10$$

tenglamaning nechta ildizi bor?
A) 4 B) 3 C) 2 D) 1 E) $\emptyset$

58. (01-1-17) Tenglama ildizlarining yig'indisini toping.

$$x^2+5x+\sqrt{x^2+5x-5}=17$$

A) 6 B) 3 C) -5 D) -3 E) 5

59. (99-6-52) Tenglamani yeching.

$$\sqrt[3]{x^2\cdot\sqrt[3]{x^2\cdot\sqrt[3]{x^2\ldots}}}=49$$

A) 49, -49 B) 7 C) 39 D) 50 E) 24

60. (99-5-18) Tenglamaning ildizlari yig'indisini toping.

$$\sqrt{x+4\sqrt{x+1}+5}+$$
$$+\sqrt{18+6\sqrt{9-x}-x}=9$$

A) $\emptyset$ B) 4 C) 2 D) 8 E) 9

61. (00-4-35) Tenglamaning nechta ildizi bor?

$$\sqrt{x+1-\sqrt{x+7}}+\sqrt{8+2\sqrt{x+7}+x}=4$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

62. (00-9-27) Tenglamaning ildizlari ko'paytmasini toping.

$$\sqrt{x^2+10+6\sqrt{1+x^2}}+$$
$$+\sqrt{2+x^2-2\sqrt{x^2+1}}=4$$

A) 0 B) 3 C) 4 D) -2 E) -3

63. (00-10-14) Tenglama ildizlarining kvadratlarini toping.

$$\sqrt{1-x}-\sqrt{5+2\sqrt{1-x}}+1=0$$

A) $1;4$ B) 4 C) 9 D) $4;9$ E) $1;9$

64. (01-2-64) Agar

$$\begin{cases} x^2+xy+y^2=84 \\ x+\sqrt{xy}+y=14 \end{cases}$$

bo'lsa, $\frac{|x-y|}{x+y}$ ning qiymatini toping.
A) $0,3$ B) $0,4$ C) $0,5$ D) $0,6$ E) $0,8$

65. (01-12-45) Tenglamani yeching.

$$\sqrt{x^2-4x-21}+\sqrt{10+3x-x^2}=2$$

A) $1;3$ B) $-2;4$ C) $\emptyset$ D) $-3;4$ E) 2

66. (02-5-14) Agar

$$\sqrt{x+3-\sqrt{x+14}}+\sqrt{x+3+\sqrt{x+14}}=4$$

bo'lsa, $\frac{x}{x+1}$ ning qiymatini hisoblang.
A) $\frac{2}{3}$ B) $-\frac{2}{3}$ C) 3 D) $\frac{3}{2}$ E) $-\frac{3}{2}$

67. (02-10-52)

$$\sqrt{4x^2+9x+5}-\sqrt{2x^2+x-1}=\sqrt{x^2-1}$$

tenglamani yeching.
A) $-1;5$ B) $-1\frac{2}{7};-1;5$ C) $1;5$ D) $1;0$
E) $-5;1$

68. (03-1-2)

$$\sqrt{x^2}-\sqrt[3]{x^3}+\sqrt[4]{x^4}-\sqrt[5]{x^5}=7$$

tenglamani yeching.
A) yechimga ega emas B) $1,75$ C) $1,25$
D) $-1,25$ E) $-1,75$

69. (03-3-13)

$$\sqrt{x^4+x^2+8x}-x=4$$

tenglamani yeching.
A) ± 4 B) 4 C) ± 2 D) 2 E) -2

70. (03-3-23)

$$(4-x^2)\sqrt{-1-3x}=0$$

tenglama ildizlarining yig'indisini toping.
A) $-\frac{1}{3}$ B) $\frac{1}{3}$ C) $-\frac{7}{3}$ D) $\frac{7}{3}$ E) $\frac{5}{3}$

71. (03-3-27)

$$3\cdot\sqrt{\frac{x}{x-1}}-2,5=3\cdot\sqrt{1-\frac{1}{x}}$$

tenglamani yeching.
A) $\frac{2}{5}$ B) $-\frac{2}{5}$ C) 3 D) $\frac{9}{5}$ E) 2

72. (03-3-29) Agar

$$\sqrt{x+3+\sqrt{x+14}}+\sqrt{x+3-\sqrt{x+14}}=4$$

bo'lsa, $x(x+1)^{-1}$ ifodaning qiymatini toping.
A) $\frac{3}{2}$ B) $-\frac{3}{2}$ C) 3 D) $\frac{2}{3}$ E) $-\frac{2}{3}$

73. (03-4-15) Agar $x-\sqrt{x+3}-17=0$ bo'lsa, $\sqrt{x+3}$ ning qiymatini hisoblang.
A) 3 B) 4 C) 6 D) 7 E) 5

74. (03-6-15)

$$\sqrt[3]{x+\sqrt[3]{x+\sqrt[3]{x+...}}}=4$$

tenglamani yeching.
A) 56 B) 48 C) 60 D) 54 E) 64

75. (03-6-47)

$$\sqrt{2x^2+17}=x^2+1$$

tenglamaning haqiqiy ildizlari ko'paytmasini toping.
A) 16 B) 4 C) -4 D) 8 E) -16

76. (03-7-20)

$$\sqrt[3]{x\sqrt[3]{x\sqrt[3]{x...}}}=8$$

tenglamani yeching.
A) 56 B) 48 C) 60 D) 54 E) 64

77. (03-8-33)

$$y\sqrt[3]{y\sqrt[3]{y...}}=2\sqrt{2}$$

tenglamani yeching.
A) 2 B) $\sqrt{2}$ C) 3 D) 4 E) 5

78. (03-8-38)

$$\sqrt{x}+\sqrt[4]{x}-12=0$$

tenglamani yeching.
A) 81 B) 16 C) 25 D) 9 E) 256

79. (03-9-10)

$$(x^2-25)\sqrt{6-2x}=0$$

tenglama ildizlarining yig'indisini toping.
A) 2 B) -2 C) 3 D) 8 E) -8

80. (03-9-13)
$$|\sqrt{x+2}-5|=4$$
tenglama ildizlarining yig'indisini toping.
A) 76 B) 78 C) 79 D) 81 E) 83

81. (03-9-14) Agar
$$\sqrt[3]{1+\sqrt{x-1}}+\sqrt[3]{1-\sqrt{x-1}}=2$$
bo'lsa, $\frac{x}{x+2}$ ning qiymatini toping.
A) $\frac{2}{3}$ B) $-\frac{2}{3}$ C) $\frac{1}{3}$ D) $-\frac{1}{3}$ E) $\frac{3}{5}$

82. (03-10-13)
$$\sqrt{x-2}+\sqrt{1-x}=2$$
tenglamani yeching.
A) $\emptyset$ B) 2 C) $1,2$ D) $0,4$ E) $0,9$

83. (03-11-76)
$$\frac{\sqrt{2-x}}{\sqrt{3+x}}=\frac{2-x}{3+x}$$
tenglama ildizlarining o'rta arifmetigini toping.
A) 1 B) $0,75$ C) $1,5$ D) $\frac{1}{3}$ E) -1

84. (03-12-15)
$$\sqrt{(x-7)^2}+\sqrt[3]{(5-x)^3}=8$$
tenglamaning ildizi nechta?
A) ildizi yo'q B) 1 C) 2 D) 3 E) cheksiz ko'p

85. (03-12-17) Agar
$$\sqrt[4]{x}-4\sqrt[8]{x}=5$$
bo'lsa, $\frac{100}{\sqrt{x}}$ ning qiymatini toping.
A) $0,4$ B) $0,24$ C) $0,16$ D) $0,25$ E) $0,36$

1.9.2 Irratsional tengsizliklar.

1. $\sqrt[2k]{f(x)}>\varphi(x) \Leftrightarrow \begin{cases} f(x)>[\varphi(x)]^{2k} \\ \varphi(x)\geq 0; \end{cases}$
$\cup \begin{cases} f(x)\geq 0, \\ \varphi(x)<0. \end{cases}$

2. $\sqrt[2k+1]{f(x)}>\varphi(x) \Leftrightarrow f(x)>[\varphi(x)]^{2k+1};$

3. $\sqrt[2k]{f(x)}<\varphi(x) \Rightarrow \begin{cases} f(x)\geq 0, \\ \varphi(x)\geq 0, \\ f(x)<[\varphi(x)]^{2k} \end{cases}$

4. $\sqrt[2k+1]{f(x)}<\varphi(x) \Leftrightarrow f(x)<[\varphi(x)]^{2k+1};$

(97-10-34) Tengsizlikning yechimini ko'rsating.
$$(x-1)\sqrt{6+x-x^2}\leq 0$$
A) $(-\infty;1]$ B) $[-2;3]$ C) $[-2;1]\cup\{3\}$
D) $[3;\infty)$ E) $[-3;1]$

Yechish: Berilgan tengsizlikni yechish uchun ikkita holni qaraymiz. 1) $6+x-x^2=0$. Uning ildizlari $x_1=-2$, $x_2=3$. Bu sonlar berilgan tengsizlikning ham yechimi bo'ladi.
$$2) \begin{cases} 6+x-x^2>0 \\ x-1\leq 0 \end{cases}$$
Birinchi tengsizliklarni -1 ga ko'paytirib, uning chap qismini ko'paytuvchilarga ajratamiz.
$$\begin{cases} (x+2)(x-3)<0 \\ x-1\leq 0 \end{cases}$$
Bu holda $(-2;1]$ yechimni hosil qilamiz. Endi yuqorida topilgan $x_1=-2$, $x_2=3$ sonlarni hisobga olib berilgan tengsizlikning $[-2;1]\cup\{3\}$ yechimini hosil qilamiz. J: (C).

1. (01-2-20) Tengsizlikni yeching.
$$\sqrt{3x-8}<-2$$
A) $x<4$ B) $x\,\epsilon\,\emptyset$ C) $x>\frac{8}{3}$
D) $x>4$ E) $(\frac{8}{3};4]$

2. (96-7-34) Tengsizlikning yechimini ko'rsating.
$$(x+3)\sqrt{x^2-x-2}\geq 0$$
A) $[-3;\infty)$ B) $[-1;2]$ C) $[-3;-1]\cup[2;\infty)$
D) $[2;\infty)$ E) $(-\infty;-2]\cup[1;\infty)$

3. (97-3-34) Quyidagilardan qaysi biri
$$(x-3)\sqrt{x^2+x-2}\leq 0$$
tengsizlikning yechimi?
A) $(-\infty;3]$ B) $(-\infty;-2]\cup[1;3]$ C) $[-2;3]$
D) $[-1;2]\cup[3;\infty)$ E) $[-2;\infty)$

4. (97-4-4) k raqamining qanday qiymatlarida $\sqrt{30+k}$ ning butun qismi 5 bo'ladi?
A) $6;7;8;9$ B) $0;1;2$ C) $1;2;3$
D) $5;6$ E) $0;1;2;3;4;5$

5. (97-7-34) Tengsizlikning yechimini ko'rsating.
$$(x-2)\sqrt{3+2x-x^2}\geq 0$$
A) $[2;\infty)$ B) $[-1;3]$ C) $[3;\infty)$
D) $[2;3]\cup\{-1\}$ E) $[2;2\frac{1}{3})$

6. (97-9-64) n raqamining qanday qiymatlarida $\sqrt{49+n}$ ning butun qismi 7 bo'ladi?
A) $0;1;2$ B) $0;1$ C) $3;4;5$
D) hech qanday qiymatida
E) barcha qiymatlarida

7. (98-4-23) Ushbu
$$\sqrt{x+2}>x$$
tengsizlikni qanoatlantiruvchi butun sonlar nechta?
A) 3 B) 2 C) 4 D) 1 E) 5

8. (98-12-82) Tengsizlikni qanoatlantiruvchi butun sonlar nechta?
$$\sqrt{5-x^2}>x-1$$
A) 5 B) 3 C) 4 D) 2 E) 1

9. (99-2-20) Tengsizlik nechta butun yechimga ega?

$$\sqrt{x^2-6x+9}<3$$

A) 4 B) 6 C) 7 D) 8 E) 5

10. (00-1-24) Ushbu $\sqrt{9-x}\le 2$ tengsizlikning yechimlari OX o'qida joylashtirilsa, qanday uzunlikdagi kesma hosil bo'ladi?
A) 4 B) $3,8$ C) $4,5$ D) $4,8$ E) 5

11. (00-2-15) Tengsizlikning eng kichik musbat butun yechimini toping?

$$\frac{\sqrt{x+5}}{1-x}<1$$

A) 6 B) 3 C) 5 D) 4 E) 2

12. (00-3-21) Tengsizlikni yeching?

$$\sqrt{3x+10}>\sqrt{6-x}$$

A) $[-1;6]$ B) $[-\frac{10}{3};6]$ C) $(-1;6]$
D) $[-\frac{10}{3};-1)\cup(-1;6]$ E) $(-\frac{10}{3};6]$

13. (00-5-38) Tengsizlikning eng kichik butun musbat va eng katta butun manfiy yechimlari ayirmasini toping?

$$\frac{x^2-2x-8}{\sqrt{x^2+1}}>0$$

A) 3 B) 2 C) 8 D) 5 E) 6

14. (00-7-23) Tengsizlikning eng katta butun va eng kichik butun yechimlari ayirmasini toping?

$$\sqrt{x^2-16}<\sqrt{4x+16}$$

A) 4 B) 5 C) 2 D) 3 E) 6

15. (01-5-23) Ushbu

$$\sqrt{\frac{3x-4}{8-x}}>1$$

tengsizlikning nechta butun yechimi bor?
A) 4 B) 1 C) 2 D) 3 E) 5

16. (01-6-26) Ushbu

$$\frac{\sqrt{2x+7}}{6-3x}\ge 0$$

tengsizlikning barcha butun sonlardan iborat yechimlari yig'indisini toping.
A) -4 B) -3 C) 4 D) 3 E) -5

17. (01-10-19) Tengsizlikni yeching.

$$\sqrt{3x-8}>\sqrt{5-x}$$

A) $(3,25;\infty)$ B) $(\frac{8}{3};5)$ C) $(3,25;5]$
D) $(3,25;5)$ E) $(\frac{8}{3};\infty)$

18. (01-10-22) Ushbu

$$f(x)=\sqrt{7-2\sqrt{x-1}}$$

funksiyaning aniqlanish sohasini toping.
A) $[1;12,5]$ B) $[1;13,25]$ C) $[2;12]$
D) $[1;14,75]$ E) $[0;12,75]$

19. (01-10-27) Ushbu

$$\frac{\sqrt{x+2}\cdot(x-1)^2x^3}{(x+1)^4}<0$$

tengsizlikni qanoatlantiruvchi butun sonlar nechta?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

20. (01-12-46) Tengsizlikni yeching.

$$\sqrt{5x-2x^2-42}>3$$

A) $\{-2\}$ B) $\{1\}$ C) $\{2\}$ D) $\emptyset$ E) $\{3\}$

21. (02-1-48)

$$\sqrt{x+1}<4$$

tengsizlikni yeching.
A) $(-\infty;15)$ B) $[0;15]$ C) $[0;15)$
D) $(-1;15]$ E) $[-1;15)$

22. (02-1-68)

$$(x+3)\sqrt{10-3x-x^2}\ge 0$$

tengsizlikni yeching.
A) $[-3;\infty)$ B) $[2;\infty)$ C) $[-3;2]$
D) $\{-5\}\cup[-3;2]$ E) $\{-5\}\cup[-3;\infty)$

23. (02-4-26)

$$\sqrt{x-50}\cdot\sqrt{100-x}>0$$

tengsizlik nechta butun yechimga ega?
A) 43 ta B) 54 ta C) 49 ta
D) 51 ta E) 47 ta

24. (02-6-23)

$$\sqrt{x^2}+\sqrt[4]{x^4}\le 4$$

tengsizlikni yeching.
A) $(-\infty;2]$ B) $[2;\infty)$ C) $[-2;2]$
D) $[-2;\infty)$ E) $[-1;1]$

25. (02-6-25)

$$\frac{(x-1)^2(x-2)^3}{\sqrt{x+2}}\ge 0$$

tengsizlikni yeching.
A) $[-3;-2)\cup(-2;1]$ B) $\{1\}\cup[2;\infty)$
C) $\{1\}\cup(-2;\infty)$ D) $(-2;0)\cup\{1\}\cup[2;\infty)$
E) $[2;\infty)$

26. (02-9-26)

$$x-4\sqrt{x}-5\le 0$$

tengsizlikning butun sondan iborat eng kichik va eng katta yechimlari ayirmasini toping.
A) -25 B) -24 C) -27 D) -5 E) -15

27. (02-9-28)

$$\frac{\sqrt{3+2x-x^2}}{x-2}\le 0$$

tengsizlikning butun sonlardan iborat yechimlari nechta?
A) 3 B) 4 C) 5 D) 2 E) 7

28. (02-10-12)

$$\frac{\sqrt{6+x-x^2}}{2x+5} \geq \frac{\sqrt{6+x-x^2}}{x+4}$$

tengsizlikni yeching.
A) $[-2;-1]\cup\{3\}$ B) $[-2;1]$ C) $[1;3]$
D) $[-2;3]$ E) $(0;3]$

29. (02-10-14) x ning qanday qiymatlarida $y=\sqrt{2x-1}$ funksiyaning qiymatlari 3 dan katta bo'lmaydi?
A) $[0,5;5]$ B) $(-\infty;5]$ C) $(0;3]$
D) $(1;2)$ E) $[0;2]$

30. (02-12-14)

$$\frac{5-\sqrt{x}}{\sqrt{x}-2} > 0$$

tengsizlikni qanoatlantiruvchi butun sonlar nechta?
A) 20 B) 19 C) 21 D) 2 E) bitta ham yo'q

31. (02-12-15)

$$\sqrt{|x-3|+1} > 2|x-3|-1$$

tengsizlikni yeching.
A) $(1;1,5)$ B) $(\frac{7}{4};\frac{17}{4})$ C) $(0;\frac{17}{4})$ D) $(2;5)$
E) $(\frac{9}{4};\frac{21}{4})$

32. (02-12-35) Qanday eng kichik butun son

$$\sqrt{12-x} < 2$$

tengsizlikni qanoatlantiradi?
A) 8 B) 9 C) 6 D) 10 E) 7

33. (03-1-8)

$$\sqrt{\frac{2-3x}{x+4}} > -2$$

tengsizlikning eng kichik butun yechimini toping.
A) 0 B) -1 C) -2 D) -3 E) -5

34. (03-1-30)

$$\sqrt{x} \geq x-6$$

tengsizlikni qanoatlantiruvchi butun sonlarning yig'indisini toping.
A) 6 B) 15 C) 28 D) 35 E) 45

35. (03-1-67)

$$x\cdot(x^2+4x+4)\sqrt{25-x^2} \geq 0$$

tengsizlikning butun sonlardan iborat yechimlari yig'indisini toping.
A) 15 B) 10 C) 8 D) 12 E) 0

36. (03-2-38)

$$(\sqrt{4-x})^2 \leq \frac{21-x^2}{4}$$

tengsizlikning butun sonlardan iborat yechimlaridan eng katta va eng kichigining yig'indisini toping.
A) 5 B) 4 C) 3 D) 2 E) 1

37. (03-3-20)

$$\sqrt{x-4}-\sqrt{x-7} \geq 1$$

tengsizlikning butun sonlardan iborat yechimlari nechta?
A) 0 B) 1 C) 2 D) 4 E) cheksiz ko'p

38. (03-3-30)

$$\sqrt{5-|2x-1|} < 2$$

tengsizlikning butun sonlardan iborat yechimlari sonini toping.
A) 2 B) 3 C) 4 D) 6 E) cheksiz ko'p

39. (03-4-16)

$$\sqrt{|x|-2} < \frac{2|x|}{x}$$

tengsizlikning butun sonlardan iborat nechta yechimi bor?
A) 6 B) 5 C) 3 D) 4 E) 7

40. (03-8-37)

$$\sqrt{x^2-3x+2} \geq 0$$

tengsizlikni qanoatlantiruvchi eng kichik natural sonni toping.
A) 1 B) 2 C) 3 D) 5 E) 10

41. (03-9-9)

$$\sqrt{\frac{x^2-2}{x}} \leq 1$$

tengsizlikning butun sonlardan iborat yechimlari nechta?
A) $\emptyset$ B) 1 C) 2 D) 3 E) cheksiz ko'p

42. (03-10-37)

$$\frac{(x^2-9)\sqrt{x+5}}{(x^2-4)\sqrt{3-x}} \leq 0$$

tengsizlikni qanoatlantiradigan butun sonlarning yig'indisini toping.
A) 8 B) 0 C) 6 D) -6 E) -8

43. (03-11-14)

$$\sqrt{\frac{8-x}{x-18}} > -1$$

tengsizlikning butun sonlardan iborat yechimlari yig'indisini toping.
A) 125 B) 130 C) 143 D) 136 E) 124

44. (03-11-73)

$$\sqrt{8+2x-x^2} > 6-3x$$

tengsizlikning butun sonlardan iborat yechimlari nechta?
A) 2 B) 3 C) 4 D) 5 E) 1

45. (03-12-16)

$$\sqrt{\frac{2x-3}{5x+7}} \geq -2$$

tengsizlikni yeching.
A) $(-\infty;-1,2]\cup[2,5;\infty)$

B) $(-\infty;-1,4]\cup[1,5;\infty)$
C) $[1,5;4]$
D) $(-\infty;-1,4)\cup[1,5;\infty)$
E) $(-\infty;-1,4)\cup[2,5;\infty)$

46. (03-12-21)

$$(x+2)(x^2+10x+25)\sqrt{49-x^2}\geq 0$$

tengsizlikni qanoatlantiruvchi barcha butun sonlarning yig'indisini toping.
A) 25 B) 13 C) 20 D) 28 E) 21

1.10 Progressiyalar.

1.10.1 Arifmetik progressiya.

$n-$hadi formulasi.
Arifmetik progressiya: a_1 - birinchi hadi, a_n - n-chi hadi, d - ayirma, n - hadlar soni.

1. $a_n=a_{n-1}+d.$
2. $a_n=a_1+(n-1)d.$

(96-9-78) Arifmetik progressiyada $a_4-a_2=4$ va $a_7=14$. Shu progressiyaning beshinchi hadini toping.
A) 12 B) 8 C) 7 D) 10 E) 6
Yechish: Birinchi tenglikdan $2d=4$, ya'ni $d=2$ ekani kelib chiqadi. U holda

$$a_5=a_7-2d=14-4=10.$$

J: $a_5=10$ (D).

1. (96-1-27) Arifmetik progressiyada $a_2=12$ va $a_5=3$. Shu progressiyaning o'ninchi hadini toping.
A) -6 B) 0 C) -12 D) -30 E) -15

2. (98-12-36) Arifmetik progressiya uchun quyidagi formulalardan qaysilari to'g'ri?
1) $a_1-2a_2+a_3=0$ 2) $a_1=a_3-a_2$
3) $n=\dfrac{a_n-a_1+d}{d}$
A) 1; 3 B) 1 C) 2 D) 1; 2 E) hammasi

3. (99-1-22) Arifmetik progressiyada $a_{20}=0$ va $a_{21}=-41$ bo'lsa, a_1 ni toping.
A) 779 B) -779 C) 41 D) -41 E) -820

4. (99-9-26) Arifmetik progressiyada $a_2-a_1=6$ bo'lsa, a_8-a_6 ni toping.
A) 10 B) 12 C) 9 D) 18 E) 14

5. (00-5-32) Arifmetik progressiyada $a_2=9$ va $a_{26}=105$ bo'lsa, shu progressiya birinchi hadi va ayirmasining o'rta proportsional qiymatini toping.
A) 20 B) $4,5$ C) $2\sqrt{5}$ D) 9 E) 4

6. (00-8-65) Agar a_1, a_2, ..., a_n sonlar arifmetik progressiyani tashkil qilsa,

$$\frac{1}{a_1\cdot a_2}+\frac{1}{a_2\cdot a_3}+\frac{1}{a_3\cdot a_4}+...+\frac{1}{a_{n-1}\cdot a_n}$$

yig'indisini toping.
A) a_1 B) $a_1\cdot a_{n+1}$ C) $\frac{1}{a_1}$ D) $\frac{n}{a_1}$ E) $\frac{n-1}{a_1}$

7. (00-10-22) 4; 9; 14; ... arifmetik progressiyaning sakkizinchi hadi to'rtinchi hadidan nechtaga ortiq?
A) 16 B) 18 C) 20 D) 22 E) 24

8. (01-6-20) Arifmetik progressiyaning barcha hadlari natural sonlardan iborat. Agar $a_1=3$ va $20<a_3<22$ bo'lsa, progressiyaning ayirmasini toping.
A) 8 B) 10 C) 7 D) 6 E) 9

9. (01-11-15) Arifmetik progressiyaning birinchi hadi 6 ga, oxirgi hadi esa 39 ga teng. Agar progressiyaning ayirmasi butun sondan iborat bo'lib, u 2 dan katta va 6 dan kichik bo'lsa, oxirgi haddan oldingi hadlar sonini aniqlang.
A) 12 B) 11 C) 10 D) 9 E) 13

10. (02-2-12) 7; 10; 13; ... arifmetik progressiyaning nechta hadining har birining qiymati 100 sonidan katta, 200 sonidan kichik bo'ladi?
A) 33 B) 34 C) 35 D) 32 E) 31

11. (02-4-16) Arifmetik progressiyada $a_1=3$ va $d=2$ bo'lsa, $a_1-a_2+a_3-a_4+...+a_{25}-a_{26}+a_{27}$ ning qiymatini hisoblang.
A) 31 B) 30 C) 29 D) 28 E) 27

12. (02-9-18) $-\frac{1}{4};-\frac{1}{5},...$ arifmetik progressiyaning nechta hadi manfiy?
A) 10 B) 6 C) 5 D) 7
E) aniqlab bo'lmaydi.

13. (02-11-38) Arifmetik progressiyaning to'rtinchi hadi va o'n birinchi hadlari mos ravishda 2 va 30 ga teng. Shu progressiyaning uchinchi va o'ninchi hadlari yig'indisini toping.
A) 16 B) 18 C) 24 D) 28 E) 32

14. (03-2-67) Kinoteatrning birinchi qatorida 21 ta o'rin bor. Har bir keyingi qatorda o'rinlar soni oldingi qatordagidan 2 tadan ko'p. 40 - qatorda nechta o'rin bor?
A) 42 B) 80 C) 99 D) 100 E) 101

15. (03-3-36) Arifmetik progressiyada $a_2+a_5-a_3=10$ va $a_1+a_6=17$ bo'lsa, uning o'ninchi hadini toping.
A) 24 B) 26 C) 28 D) 29 E) 30

16. (03-6-18) Arifmetik progressiyada $a_1=1$, $a_5=5+x$ va $a_{15}=10+3x$ bo'lsa, a_{37} ni toping.
A) -53 B) -54 C) -55 D) -56 E) -57

17. (03-7-24) Arifmetik progressiyada $a_1=1$, $a_5=5+x$ va $a_{15}=10+3x$ bo'lsa, a_{39} ni toping.
A) -53 B) -54 C) -55 D) -56 E) -57

18. (03-9-24) Arifmetik progressiyaning ikkinchi hadi -7 ga, beshinchi va sakkizinchi hadlarining ayirmasi -6 ga teng. Shu progressiyaning nechanchi hadi 9 ga teng bo'ladi?
A) 4 B) 7 C) 10 D) 12 E) 13

Xossasi.

1. $a_n = \frac{a_{n-1}+a_{n+1}}{2}$
2. $a_k + a_m = a_p + a_q, \;\; k+m = p+q$

(97-4-27) Arifmetik progressiyaning dastlabki 6 ta hadlari $7, a_2, a_3, a_4, a_5$ va 22 bo'lsa, $a_2 + a_3 + a_4 + a_5$ ni hisoblang.
A) 65 B) 60 C) 82 D) 58 E) 70
Yechish. Shartga ko'ra $a_1 = 7$, $a_6 = 22$ ekan. Arifmetik progressiyaning xossasiga ko'ra

$$a_3 + a_4 = a_1 + a_6 = 29, \;\; a_2 + a_5 = a_1 + a_6 = 29.$$

U holda $a_2 + a_3 + a_4 + a_5 = 29 + 29 = 58$. J:58 (D).

1. (97-12-36) Ikkinchi, to'rtinchi va oltinchi hadlarining yig'indisi -18 ga teng arifmetik progressiyaning to'rtinchi hadini toping.
   A) 6 B) -5 C) -6 D) -4 E) 5
2. (98-3-20) Birinchi hadi 1 ga, o'n birinchi hadi 13 ga teng bo'lgan arifmetik progressiyaning oltinchi hadini toping.
   A) 4 B) 5 C) 6 D) 7 E) 8
3. (98-10-67) Ikkinchi hadi 5 ga sakkizinchi hadi 15 ga teng bo'lgan arifmetik progressiyaning beshinchi hadini toping.
   A) $7,5$ B) $12,5$ C) 10 D) $8,5$ E) 9
4. (98-11-6) To'rtta banderolni jo'natish haqi uchun jami 120 so'mlik 4 ta har xil pochta markasi kerak bo'ladi. Agar markalarning baholari arifmetik progressiyani tashkil etib, eng qimmat marka eng arzonidan 3 marta qimmat tursa, eng qimmatining bahosi necha pul turadi?
   A) 50 B) 45 C) 62 D) 54 E) 48
5. (99-5-35) $0,(328); x$ va $0,(671)$ sonlari arifmetik progressiyani tashkil qiladi. x ning qiymatini toping.
   A) $0,(45)$ B) $0,(523)$ C) $0,(532)$
   D) $0,47$ E) $0,50$
6. (02-1-17) m ning $\sqrt{m-1}$; $\sqrt{5m-1}$; $\sqrt{12m+1}$; ... lar ko'rsatilgan tartibda arifmetik progressiya tashkil qiladigan qiymatlari yig'indisini toping.
   A) 12 B) 13 C) 8 D) 15
   E) m ning bunday qiymatlari yo'q
7. (02-1-40) Uchta sonning o'rta arifmetigi 2,6 ga, birinchi son esa 2,4 ga teng. Agar keyingi har bir son avvalgisidan ayni bir songa farq qilsa, keyingi sondan oldingisining ayirmasini toping.
   A) $\frac{1}{3}$ B) $0,1$ C) $\frac{1}{4}$ D) $0,2$ E) $0,3$
8. (02-2-13) O'suvchi geometrik progressiyaning dastlabki uchta hadining yig'indisi 24 ga teng. Shu progressiyaning ikkinchi hadini toping.
   A) 8 B) aniqlab bo'lmaydi C) 10
   D) 6 E) 7
9. (02-5-29) Arifmetrik progressiyaning birinchi va to'rtinchi hadi yig'indisi 26 ga teng, ikkinchi hadi esa beshinchi hadidan 6 ga ko'p. Shu progressiyaning uchinchi va beshinchi hadi yig'indisini toping.
   A) 20 B) 21 C) 22 D) 23 E) 24

Dastlabki n ta hadi yig'indisi.

S_n dastlabki n ta hadi yig'indisi.

1. $S_n = a_1 + a_2 + ... + a_n$,
2. $S_n = \frac{a_1+a_n}{2} n$,
3. $S_n = \frac{2a_1+d(n-1)}{2} n$,
4. $S_n - S_{n-1} = a_n$.

(96-3-27) Arifmetik progressiya uchinchi va to'qqizinchi hadlarining yig'indisi 8 ga teng. Shu progressiyaning dastlabki 11 ta hadlari yig'indisini toping.
A) 22 B) 33 C) 44 D) 55 E) 60
Yechish: Arifmetik progressiyaning xossasiga ko'ra

$$a_1 + a_{11} = a_3 + a_9 = 8.$$

U holda

$$S_{11} = \frac{a_1 + a_{11}}{2} \cdot 11 = \frac{8}{2} \cdot 11 = 44.$$

J: 44 (C).

1. (96-6-36) Ikkinchi va o'n to'qqizinchi hadlarining yig'indisi 12 ga teng bo'lgan arifmetik progressiyaning dastlabki yigirmata hadning yig'indisini toping.
   A) 110 B) 120 C) 130 D) 115 E) 125
2. (96-7-27) 100 dan katta bo'lmagan 3 ga karrali barcha natural sonlarning yig'indisini toping.
   A) 1683 B) 2010 C) 1500 D) 1080 E) 1680
3. (96-10-29) Arifmetik progressiyada $a_2 = 10$ va $a_5 = 22$. Shu progressiyaning dastlabki sakkizta hadining yig'indisini toping.
   A) 162 B) 170 C) 115 D) 160 E) 156
4. (96-11-28) Arifmetik progressiyada $a_3 + a_5 = 12$. S_7 ni toping.
   A) 18 B) 36 C) 42 D) 48 E) 54
5. (96-12-28) Arifmetik progressiyada $a_4 + a_6 = 10$. S_9 ni toping.
   A) 25 B) 30 C) 35 D) 40 E) 45
6. (97-1-17) Hadlari $x_n = 4n+5$ formula bilan berilgan ketma-ketlikning dastlabki o'ttizta hadi yig'indisini toping.
   A) 2010 B) 1900 C) 2100 D) 1940 E) 2210
7. (97-2-36) (x_n) arifmetik progressiyaning dastlabki n ta hadi yig'indisi 120 ga teng. Agar $x_3 + x_{n-2} = 30$ bo'lsa, yig'indida nechta had qatnashgan?
   A) 6 B) 10 C) 8 D) 12 E) 11
8. (97-3-27) 150 dan katta bo'lmagan 7 ga karrali barcha natural sonlarning yig'indisini toping.
   A) 1450 B) 1617 C) 1803 D) 1517 E) 1950
9. (97-5-27) G'o'la shaklidagi to'sinlar ustma-ust taxlangan. Birinchi taxlamda 10 ta, ikkinchisida 9 ta, va x.k., oxirgi taxlamda 1 ta to'sin bor. Taxlamda nechta to'sin bor?
   A) 53 B) 54 C) 55 D) 56 E) 57

10. (97-6-17) $a_n = 4n - 2$ formula bilan berilgan ketma-ketlikning dastlabki 50 ta hadi yig'indisini toping.
A) 4500 B) 5050 C) 3480 D) 4900 E) 5000

11. (97-7-27) 100 dan katta bo'lmagan 4 ga karrali barcha natural sonlarning yig'indisini toping.
A) 1250 B) 1300 C) 1120 D) 1000 E) 1296

12. (97-8-35) Dastlabki yettita hadining yig'indisi -266 ga, dastlabki sakkizta hadining yig'indisi -312 ga va hadlarining ayirmasi -2 ga teng bo'lgan arifmetik progressiyaning birinchi hadini toping.
A) -32 B) -42 C) -34 D) -36 E) -56

13. (97-9-27) Quvurlar ustma-ust taxlangan. Birinchi qatlamda 11 ta, ikkinchisida 10 ta va x.k., oxirgi qatlamda 1 ta quvur bor. Taxlamda nechta quvur bor?
A) 66 B) 67 C) 68 D) 65 E) 64

14. (97-10-27) 150 dan katta bo'lmagan 6 ga karrali barcha sonlarning yig'indisini toping.
A) 1800 B) 2024 C) 1760 D) 1950 E) 2100

15. (97-11-17) Hadlari $b_n = 3n - 1$ formula bilan berilgan ketma-ketlikning dastlabki 60 ta hadining yig'indisini toping.
A) 4860 B) 4980 C) 5140 D) 5260 E) 5430

16. (98-1-27) Arifmetik progressiyaning dastlabki 16 ta hadlari yig'indisi 840 ga, oxirgi hadi (a_{16}) 105 ga teng. Shu progressiyaning ayirmasini toping.
A) 9 B) 7 C) 15 D) 5 E) 11

17. (98-2-18) Arifmetik progressiyada $S_{20} - S_{19} = -30$ va $d = -4$ bo'lsa, a_{25} ning qiymatini toping.
A) -40 B) -50 C) -48 D) -56 E) -42

18. (98-6-26) Arifmetik progressiyaning dastlabki n ta hadining yig'indisi $S_n = n^2$ bo'lsa, uning o'ninchi hadini toping.
A) 100 B) 15 C) 23 D) 19 E) 121

19. (98-8-27) Arifmetik progressiyaning uchinchi hadi 8 ga, to'rtinchi hadi 5 ga va dastlabki bir nechta hadlari yig'indisi 28 ga teng. Yig'indida nechta had qatnashgan?
A) 10 B) 7 C) 11 D) 9 E) 8

20. (98-9-12) Agar arifmetik progressiyada $S_n - S_{n-1} = 52$ va $S_{n+1} - S_n = 64$ bo'lsa, uning hadlari ayirmasi qanchaga teng bo'ladi?
A) 10 B) 11 C) 12 D) 13 E) 14

21. (98-10-18) Arifmetik progressiyada $a_2 + a_{19} = 40$. Shu progressiyaning dastlabki 20 ta hadlari yig'indisini toping.
A) 300 B) 360 C) 400 D) 420 E) 380

22. (98-11-26) Arifmetik progressiyaning uchinchi hadi va beshinchi hadi, mos ravishda, 11 va 19 ga teng bo'lsa, uning dastlabki o'nta hadlarining yig'indisi qanchaga teng bo'ladi?
A) 210 B) 190 C) 230 D) 220 E) 240

23. (98-11-75) (a_n) arifmetik progressiyada $a_1 = 3$, $a_{60} = 57$ bo'lsa, progressiyaning dastlabki 60 ta hadi yig'indisi qanchaga teng bo'ladi?
A) 1500 B) $\frac{3423}{2}$ C) 1600 D) 1800 E) 6000

24. (98-12-98) Tenglikni qanoatlantiruvchi natural son N ni toping.

$$\frac{1}{100} + \frac{2}{100} + ... + \frac{N}{100} = 100N$$

A) 19999 B) 9999 C) 21999 D) 999 E) 1999

25. (99-2-23) Arifmetik progressiyaning hadlari 19 ta. Uning o'rta hadi 21 ga teng. Shu progressiyaning hadlari yig'indisini toping.
A) 398 B) 399 C) 400 D) 384 E) 392

26. (99-3-22) Agar $a_2 + a_4 + a_6 + ... + a_{2n} = 126$ va $a_{n-2} + a_{n+4} = 42$ bo'lsa, $a_1, a_2, ..., a_{2n}$ arifmetik progressiyaning hadlari sonini toping.
A) 6 B) 8 C) 10 D) 16 E) 12

27. (99-3-23) 5 ga bo'lganda qoldiq 1 chiqadigan dastlabki 20 ta sonning yig'indisini toping.
A) 950 B) 1070 C) 1090 D) 1030 E) 1100

28. (99-4-28) Arifmetik progressiyaning o'n uchinchi hadi 5 ga teng. Uning dastlabki 25 ta hadlarining yig'indisini toping.
A) 125 B) 100 C) 75 D) 225
E) aniqlab bo'lmaydi

29. (99-5-4) $a; 2a+2; 3a+4; ...$ ketma-ketlikning dastlabki 10 ta hadi yig'indisi 225 ga teng. a ning qiymatini toping.
A) 3 B) 2 C) 5 D) 7 E) 8

30. (99-6-54) Arifmetik progressiyaning dastlabki n ta hadining yig'indisi 91 ga teng. Agar $a_3 = 9$ va $a_7 - a_2 = 20$ ekanligi ma'lum bo'lsa, n ni toping.
A) 7 B) 5 C) 3 D) 9 E) 8

31. (99-6-56) 100 dan ortiq bo'lmagan 3 ga karrali barcha natural sonlarning yig'indisini toping.
A) 1683 B) 1783 C) 1680 D) 1693 E) 1608

32. (99-8-14) Barcha ikki xonali sonlar yig'indisi qanday raqam bilan tugaydi?
A) 5 B) 0 C) 4 D) 2 E) 9

33. (99-10-24) Arifmetik progressiya 26 haddan iborat. Agar $a_6 = -0,25$ va $a_{21} = -0,5$ bo'lsa, uning hadlari yig'indisini toping.
A) $-10,5$ B) $-10,75$ C) $-7,85$
D) $-8,5$ E) $-9,75$

34. (00-1-21) Arifmetik progressiyaning dastlabki to'rtta hadi yig'indisi 124 ga, oxirgi to'rttasiniki 156 ga teng. Progressiyaning hadlari yig'indisi 350 ga teng. Progressiyaning nechta hadi bor?
A) 8 B) 9 C) 11 D) 10 E) 7

35. (00-2-5) Natural sonlar qatori har biri natural sonning kvadrati bilan tugaydigan quyidagi qismlarga ajratilgan: 1, (2, 3, 4), (5, 6, 7, 8, 9),

$(10, 11, 12, 13, 14, 15, 16), ...10$ - qismdagi sonlar yig'indisini toping.
A) 1758 B) 1800 C) 1626 D) 1729 E) 1913

36. (00-2-11) 25 ta ketma-ket natural sonning yig'indisi 1000 ga teng. Bu sonlarning kichigi nechaga teng bo'ladi?
A) 30 B) 28 C) 26 D) 27 E) 32

37. (00-3-44) Arifmetik progressiyaning dastlabki 13 ta hadi yig'indisi 104 ga teng. Yettinchi hadining kvadratini toping.
A) 25 B) 36 C) 49 D) 64 E) 81

38. (00-3-45) Arifmetik progressiyaning dastlabki nechta hadini olmaylik ularning yig'indisi hadlar soni kvadratining uchlanganiga teng. Shu progressiyaning yettinchi hadini toping.
A) 25 B) 27 C) 31 D) 39 E) 42

39. (00-4-22) Arifmetik progressiyaning beshinchi hadi 6 ga teng. Uning dastlabki to'qqizta hadi yig'indisini toping.
A) 36 B) 48 C) 54 D) 45 E) 63

40. (00-5-1) 1 dan 75 gacha bo'lgan toq sonlar yig'indisi qanday raqam bilan tugaydi?
A) 0 B) 2 C) 3 D) 4 E) 8

41. (00-6-23) O'zidan oldinggi barcha natural sonlar yig'indisining $\frac{1}{10}$ qismiga teng bo'lgan natural sonni toping.
A) 21 B) 10 C) 25 D) 20
E) to'g'ri javob keltirilmagan

42. (00-6-24) Arifmetik progressiyaning dastlabki sakkizta hadi yig'indisi 32 ga, dastlabki yigirmata hadining yig'indisi 200 ga teng. Progressiyaning dastlabki 28 ta hadining yig'indisini toping.
A) 232 B) 342 C) 406 D) 280 E) 392

43. (00-7-25) Arifmetik progressiyaning birinchi va to'qqizinchi hadlari yig'indisi 64 ga teng. Shu progressiyaning dastlabki 9 ta hadlari yig'indisi va beshinchi hadi ayirmasini toping.
A) 256 B) 260 C) 270 D) 208 E) 180

44. (00-8-1) 5 va 1 sonlari orasiga shu sonlar bilan arifmetik progressiya tashkil etadigan bir nechta son joylashtirildi. Agar bu sonlarning yig'indisi 33 ga teng bo'lsa, nechta had joylashtirilgan?
A) 11 B) 10 C) 9 D) 12 E) 6

45. (00-9-13) $y; 3y + 5; 5y + 10; ...$ arifmetik progressiyaning dastlabki 8 ta hadi yig'indisi 396 ga teng. y ning qiymatini toping.
A) 2 B) 3 C) 4 D) 5 E) 6

46. (01-1-26) Agar soat 1 da bir marta, 2 da ikki marta,... va 12 da o'n ikki marta zang ursa, bir sutkada necha marta zang uradi?
A) 72 B) 78 C) 108 D) 144 E) 156

47. (01-1-27) Arifmetik progressiyaning dastlabki uchta hadi yi'indisi 66 ga, ikkinchi va uchinchi hadlarining ko'paytmasi 528 ga teng. Progressiyaning birinchi hadini toping.
A) 18 B) 20 C) 22 D) 24 E) 16

48. (01-1-65) 2 va 65 sonlari orasiga 20 ta shunday son quyilganki, natijada hosil bo'lgan ketma - ketlik arifmetik progressiyani tashkil etgan. Shu progressiya hadlarining o'rta arifmetigini toping.
A) $27,5$ B) 32 C) 44 D) $33,5$ E) 46

49. (01-2-1) 1 dan 50 gacha bo'lgan toq sonlar yig'indisining kvadrat ildizini hisoblang.
A) 45 B) 35 C) 25 D) 40 E) 50

50. (01-2-19) 1, 8, 22 43, ... sonlar ketma - ketligi shunday xususiyatga egaki,ikkita qo'shni hadlarining ayirmasi 7, 14, 21, ... arifmetik progressiyani tashkil etadi. Berilgan ketma - ketlikning nechanchi hadi 35351 ga teng bo'ladi?
A) 97 B) 99 C) 101 D) 103 E) 107

51. (01-3-37) Arifmetik progressiya uchun quyidagi formulalardan qaysilari to'g'ri?
1) $a_1 + a_n = a_3 + a_{n-2}$;
2) $\frac{a_n - a_1 + d}{n} = d$;
3) $S_n = \frac{a_1 + (n-1)d}{2} n$
A)$1; 2$ B) $2; 3$ C) 3 D) $1; 2; 3$ E) 2

52. (01-5-27) Arifmetik progressiyada 20 ta had bor. Juft nomerli hadlar yig'indisi 250 ga, toq nomerli hadlarning yig'indisi 220 ga teng. Progressiyaning $1-$ hadi va ayirmasini toping.
A) $-5; 3$ B) $3; -3$ C) $2; 7$ D) $-2; 7$ E) $3; 3$

53. (01-5-28) Arifmetik progressiya uchun $a_{17} = 2$ ga teng bo'lsa, $S_{21} - S_{12}$ ni toping
A) 18 B) 15 C) 16 D) 17 E) 19

54. (01-7-2) Ushbu

$$100^2 - 99^2 + 98^2 - 97^2 + ... + 2^2 - 1$$

yig'indisini hisoblang. A) 10100 B) 10000 C) 5000 D) 5100 E) 5050

55. (01-8-23) O'zidan oldin kelgan barcha toq natural sonlar yig'indisining $\frac{1}{6}$ qismiga teng bo'lgan natural sonni toping.
A) 18 B) 30 C) 24 D) 36 E) 48

56. (01-9-4) Ushbu $-\sqrt{8}; -\sqrt{2}; ...$ arifmetik progressiyaning dastlabki 8 ta hadi yig'indisini toping.
A) $12\sqrt{2}$ B) 12 C) $-12\sqrt{2}$ D) $5\sqrt{2}$ E) $3\sqrt{2}$

57. (01-10-3) Ketma - ket kelgan 6 ta natural sonning yig'indisi 435 ga teng. Shu sonlarning eng kichigini toping.
A) 59 B) 67 C) 70 D) 48 E) 87

58. (01-10-4) Ketma - ket kelgan 7 ta natural sonning o'rta arifmetigi nimaga teng?
A) ikkinchisiga B) uchinchisiga C) to'rtinchisiga
D) beshinchisiga E) aniqlab bo'lmaydi

59. (02-1-55) Arifmetik progressiya birinchi o'nta hadining yig'indisi 140 ga teng bo'lsa, $a_2 + a_9$ ni aniqlang.
A) 24 B) 26 C) 30 D) 28 E) 27

60. (02-3-26) Arifmetik progressiyaning uchinchi, yettinchi, o'n to'rtinchi va o'n sakkizinchi hadlarining yig'indisi 48 ga teng. Bu progressiyaning dastlabki 20 ta hadi yig'indisini toping.
A) 240 B) 280 C) 260 D) 220 E) 340

61. (02-4-13) 4, 7, 10, ... 100 sonlarining o'rta arifmetik qiymatini toping.
A) 50 B) 51 C) 52 D) 53 E) 54

62. (02-4-14) Arifmetik progressiyada $a_1 = -3$ va $d = 5$ bo'lsa, $S_{15} - S_{14}$ ayirmani toping.
A) 73 B) 70 C) 67 D) 64 E) 61

63. (02-4-18) Arifmetik progressiya hadlari uchun $a_1 + a_3 + \cdots + a_{21} = a_2 + a_4 + \cdots + a_{20} + 15$ tenglik o'rinli bo'lsa, a_{11} ni toping.
A) 11 B) 13 C) 15 D) 17 E) 19

64. (02-4-20) Arifmetik progressiyada $a_1 = 0$ va $d = 3$ bo'lsa, $a_3+a_6+a_9+\cdots+a_{33}$ ning qiymatini hisoblang.
A) 560 B) 561 C) 559 D) 562 E) 563

65. (02-4-22) Agar arifmetik progressiya hadlari uchun $a_1+a_3+\cdots+a_{19} = a_2+a_4+\cdots+a_{20}+10$ tenglik o'rinli bo'lsa, arifmetik progressiyaning ayirmasini toping.
A) 1 B) -1 C) 0 D) -2 E) 2

66. (02-5-8)

$$\frac{a + 2a + 3a + \cdots + na}{n^2 - 2n - 3} - \frac{3a}{2(n-3)}$$

ni soddalashtiring.
A) $\frac{n}{a}$ B) $\frac{a}{n}$ C) $\frac{a}{2}$ D) $\frac{na}{2}$ E) $\frac{2}{na}$

67. (02-6-10) Sakkizta ketma-ket kelgan natural sonlarning yig'indisi 700 ga teng. Shu sonlardan eng kichigini toping.
A) 78 B) 84 C) 82 D) 80 E) 86

68. (02-8-10)

$$(x+1) + (x+4) + (x+7) + \cdots + (x+28) = 155$$

tenglamani yeching.
A) 1 B) 2 C) -1 D) -2 E) 3

69. (02-10-19) Bir xil raqamlardan iborat ikki xonali sonlar yig'indisini toping.
A) 495 B) 505 C) 491 D) 550 E) 521

70. (02-10-53) 1 dan 75 gacha bo'lgan natural sonlardan kvadratini 3 ga bo'lganda 1 qoldiq qoladigan sonlar yig'indisini toping.
A) 1875 B) 925 C) 1900 D) 2850 E) 2125

71. (02-11-37) 9 ga bo'lganda, qoldig'i 4 ga teng bo'ladigan barcha ikki xonali sonlarning yig'indisini toping.
A) 527 B) 535 C) 536 D) 542 E) 545

72. (02-12-3) 7 ga karrali barcha uch xonali sonlarning yig'indisini toping.
A) 76056 B) 70336 C) 69756 D) 70056 E) 72236

73. (02-12-18) O'zidan oldingi toq natural sonlar yig'indisining $\frac{1}{8}$ qismiga teng bo'lgan natural sonni toping.
A) 16 B) 24 C) 32 D) 64 E) 40

74. (03-1-70) Dastlabki mingta natural sonlarning o'rta arifmetigini toping.
A) 500 B) 501 C) 501,5 D) 500,5 E) 502,5

75. (03-2-3) (a_n) ketma-ketlikning dastlabki n ta hadining yig'indisi S_n =11-$4n^2$ formula bo'yicha hisoblanadi. $a_5 + a_6$ ning qiymatini toping.
A) 60 B) 80 C) -80 D) -60 E) -208

76. (03-2-39) Arifmetik progressiya hadlari 60 ta.Uning juft o'rinda turgan hadlari yig'indisi toq o'rinda turgan hadlari yig'indisidan 15 ga ko'p. Progressiyaning to'rtinchi hadi 4,5 ga teng. Progressiyaning hadlari yig'indisini toping.
A) 900 B) 1200 C) 1050 D) 1065 E) 1125

77. (03-3-2)

$$100^2 - 97^2 + 96^2 - 93^2 + 92^2 - 89^2 + \cdots + 4^2 - 1$$

ni hisoblang.
A) 7575 B) 5055 C) 6675 D) 6775 E) 7475

78. (03-4-19) 15 ta haddan iborat arifmetik progressiyaning sakkizinchi hadi 18 ga teng. Shu progressiyaning hadlari yig'indisini toping.
A) 280 B) 270 C) 250 D) 300 E) 260

79. (03-5-26) Agar arifmetik progressiyaning dastlabki n ta hadining yig'indisi $S_n = \frac{n^2}{2} - 3n$ formula bilan topilsa, uning umumiy hadi qanday ifodalanadi?
A) $n - 3,5$ B) $\frac{1}{2}n + 3,5$ C) $3n - 0,5$
D) $n + 3,5$ E) $2n + 0,5$

80. (03-5-27) Arifmetik progressiyaning oltinchi hadi 10 ga, dastlabki 16 ta hadining yig'indisi 200 ga teng. Bu progressiyaning 12-hadini toping.
A) 16 B) 14 C) 18 D) 20 E) 15

81. (03-6-3) $1\cdot4+2\cdot8+3\cdot12+\cdots+20\cdot80$ yig'indida har bir qo'shiluvchining ikkinchi ko'paytuvchisi bittadan kamaytirilsa, bu yig'indi qanchaga kamayadi?
A) 60 B) 120 C) 210 D) 375 E) 465

82. (03-6-56) Arifmetik progressiyada $a_{10} = 56$ bo'lsa, uning dastlabki 19 ta hadlari yig'indisini toping.
A) 1024 B) 1032 C) 1056 D) 1064 E) 976

83. (03-7-5) $1\cdot4+2\cdot8+3\cdot12+\cdots+30\cdot120$ yig'indida har bir qo'shiluvchining ikkinchi ko'paytuvchisi bittadan kamaytirilsa bu yig'indi qanchaga kamayadi?
A) 60 B) 120 C) 210 D) 375 E) 465

84. (03-8-13)

$$\frac{a+2a+3a+...+na}{n^2-2n-3}-(\sqrt{ab}-\frac{ab}{a+\sqrt{ab}}):$$

$$:\frac{2(\sqrt{ab}-b)}{a-b}$$

ni soddalashtiring.
A) $a+n$ B) $\frac{3a}{2(n-3)}$ C) $\frac{2a}{3(n+1)}$ D) $\frac{a}{n-3}$ E) $n-a$

85. (03-8-50) Agar arifmetik progressiyada $a_1+a_2+\cdots+a_{16}+a_{17}=136$ bo'lsa, a_6+a_{12} ni hisoblang.
A) 16 B) 10 C) 12 D) 10 E) 32

86. (03-9-26) 7 ga bo'lganda, qoldig'i 2 ga teng bo'ladigan barcha ikki xonali sonlarning yig'indisini toping.
A) 640 B) 647 C) 650 D) 654 E) 700

87. (03-10-2) $1\cdot4+2\cdot6+3\cdot8+\cdots+10\cdot22$ yig'indining har bir hadidagi ikkinchi ko'paytuvchi 3 ta kamaytirilsa, yig'indi qanchaga kamayadi?
A) 165 B) 30 C) 180 D) 90 E) 330

88. (03-10-39) 21 ta hadining yig'indisi 546 ga teng bo'lgan arifmetik progressiyaning o'n birinchi hadini toping.
A) 16 B) 24 C) 22 D) 26 E) 28

89. (03-11-4)

$$\frac{x-1}{x}+\frac{x-2}{x}+\frac{x-3}{x}+\cdots+\frac{1}{x}=4$$

tenglamaning ildizi 10 dan nechta kam?
A) 1 B) 2 C) 3 D) 4 E) 5

90. (03-11-9) S_n arifmetik progressiyaning dastlabki n ta hadi yig'indisi bo'lsa, $S_5-3S_4+3S_3-S_2$ ning qiymatini toping.
A) 10 B) $-2a_1$ C)$2a_1$ D) $3a_1$ E) $-3a_1$

91. (03-12-63) 10; 15; 20; ... arifmetik progressiyaning dastlabki nechta hadining yig'indisi 2475 ga teng bo'ladi?
A) 40 B) 25 C) 30 D) 35 E) 33

92. (03-12-64) Dastlabki n ta hadining yig'indisi $S_n=2n^2-3n$ formula bo'yicha hisoblanadigan arifmetik progressiyaning ayirmasini toping.
A) 5 B) - 3 C) 3 D) 2 E) 4

1.10.2 GEOMETRIK PROGRESSIYA. n-hadi formulasi.

1. Geometrik progressiya: b_1 – birinchi hadi, b_n – n chi hadi, $q(q\neq0)$– mahraj, n – hadlar soni.

2. $b_n=b_{n-1}q$

3. $b_n=b_1\cdot q^{n-1}$

(98-4-21) Nolga teng bo'lmagan x,y,z sonlar ko'rsatilgan tartibda ishorasi o'zgaruvchi geometrik progressiyani, $x+y;y+z;z+x$ sonlar esa arifmetik progressiyani tashkil etadi.Geometrik progressiyaning maxrajini toping.
A) -2 B) -1 C) -3 D) -4 E) -5

Yechish: Geometrik progressiyaning maxraji q ga teng bo'lsin. U holda $y=qx$, $z=q^2x$. Endi $x+y$, $y+z$, $z+x$ sonlar arifmetik progressiya tashkil etgani uchun $2(y+z)=x+y+z+x$, ya'ni $y+z=2x$ bo'ladi. y,z larning o'rniga ularning ifodalarini qo'yib $qx+q^2x-2x=0$ tenglamani, bu yerdan esa $x(q^2+q-2)=0$ ekanini topamiz. $x\neq0$ bo'lgani uchun $q^2+q-2=0$ bo'ladi. Uning ildizlari $q_1=1$, $q_2=-2$. Geometrik progressiyaning ishora almashinuvchiligidan $q=-2$ ekani kelib chiqadi. J:-2(A).

1. (97-9-87) Geometrik progressiyaning dastlabki 6 ta hadi $2,b_2,b_3,b_4,b_5$ va 486 bo'lsa, $b_2+b_3+b_4+b_5$ ni hisoblang.
A) 200 B) 260 C) 230 D) 250 E) 240

2. (98-7-38) Quyidagi ketma-ketliklardan qaysilari geometrik progressiyani tashkil etadi?

$$1)\ a_n=2x^n \quad 2)\ c_n=ax^n+1$$
$$3)\ b_n=(\tfrac{3}{5})^n\cdot sin60^0$$

A)1;3 B) 2;3 C) hech biri D) 1;2;3 E) 1;2

3. (98-12-37) Quyidagi ketma-ketliklardan qaysilari geometrik progressiyani tashkil etadi?

$$1)\ a_n=\tfrac{2}{3}\cdot2^n \quad 2)\ a_n=3\cdot2^{-n}+5$$
$$3)\ b_n=(-\tfrac{1}{3})^n$$

A)1;3 B) 1;2 C) 2;3 D) 1;2;3 E) hech qaysisi

4. (00-2-21) Nechanchi hadidan boshlab -8; 4; -2; ... geometrik progressiya hadlarining absolyut qiymati 0,001 dan kichik bo'ladi?
A) 16 B) 12 C) 15 D) 14 E) 13

5. (00-10-23) 64; 32; 16; ... geometrik progressiyaning to'qqizinchi hadi oltinchi hadidan nechtaga kam?
A)1,025 B) 1,5 C) 1,25 D) 1,75 E) 1,85

6. (02-4-17) Geometrik progressiyaning maxraji $\frac{1}{2}$ ga teng bo'lsa, $b_1(b_2)^{-1}b_3(b_4)^{-1}\cdots b_{13}(b_{14})^{-1}$ ning qiymatini hisoblang.
A)64 B) 32 C) 16 D) 128 E) 256

7. (02-4-19) Geometrik progressiya hadlari uchun $b_1b_3\cdots b_{13}=b_2b_4\cdots b_{14}\cdot128$ tenglik o'rinli bo'lsa, b_1 ni toping.
A)128 B) 64 C) 32 D) 256
E) aniqlab bo'lmaydi

8. (02-4-23)Agar geometrik progressiya hadlari uchun $b_1b_3\cdots b_{13}=b_2b_4\cdots b_{14}/128$ tenglik o'rinli bo'lsa, progressiyaning maxrajini toping.
A)1 B) 2 C) 3 D) 4 E) 5

9. (01-5-29) Agar geometrik progressiyaning dastlabki 4 ta hadiga mos ravishda 1; 1; 4 va 13 sonlarini qo'shsak, ular arifmetik progressiyani tashkil etadi. Geometrik progressiyaning maxrajini toping.
A)2 B) -2 C) 3 D) -3 E) 4

10. (01-9-35) Yig'indisi 35 ga teng bo'lgan uchta son o'suvchi geometrik progressiyaning dastlabki uchta hadlaridir. Agar shu sonlardan mos ravishda 2; 2 va 7 sonlarni ayrilsa, hosil bo'lgan sonlar arifmetik progressiyaning ketma - ket hadlari bo'ladi. Arifmetik progressiyaning dastlabki 10 ta hadining yig'indisini toping.
A)245 B) 275 C) 255 D) 265 E) 235

11. (03-2-5) (b_n) geometrik progressiyada $b_4 - b_2 = 24$ va $b_2 + b_3 = 6$ bo'lsa, b_1 ning qiymatini toping.
A)0,4 B) 1 C) $1\frac{1}{5}$ D) 2,2 E) $\frac{1}{5}$

12. (03-6-17)
$$c_n = a \cdot k^{n-5} \ (a > 0)$$
sonlar ketma-ketligining umumiy hadi bo'lib, $c_2 \cdot c_8 = 16$ bo'lsa, a nimaga teng?
A) 2 B) 4 C) 5 D) 6 E) 8

13. (03-6-57) Ikkinchi hadi 6 ga teng, birinchi uchta hadining yig'indisi 26 ga teng o'suvchi geometrik progressiyaning uchinchi va birinchi hadlari ayirmasini toping.
A)15 B) 16 C) 14 D) 13 E) 12

14. (03-7-23) $c_n = a \cdot k^{n-5}$ $(a > 0)$ sonlar ketma-ketligining umumiy hadi bo'lib, $c_2 \cdot c_8 = 36$ bo'lsa, a nimaga teng?
A)2 B) 4 C) 5 D) 6 E) 8

15. (03-12-66) O'suvchi geometrik progressiyaning birinchi hadi 3 ga, yettinchi va to'rtinchi hadlarining ayirmasi 168 ga teng. Shu progressiyaning maxrajini toping.
A) 3 B) $\frac{3}{2}$ C) $\sqrt{7}$ D) $2\sqrt{2}$ E) 2

Xossasi.

1. $b_n^2 = b_{n-1} b_{n+1}$
2. $b_k b_m = b_p b_q$, $k + m = p + q$

(00-9-40) x ning qanday qiymatlarida 0,(16); x va 0,(25) sonlar ishoralari almashinuvchi geometrik progressiyaning ketma-ket keluvchi hadlari bo'ladi?
A) 0, (20) B) $\pm$ 0, (20) C) -0, (20)
D) -0, (21) E) 0, (22)

Yechish: Geometrik progressiyaning ishora almashinuvchiligidan $x < 0$ ekani, xossasidan esa
$$x^2 = 0,(16) \cdot 0,(25) = \frac{16}{99} \cdot \frac{25}{99}$$
ekani kelib chiqadi. Shuning uchun
$$x = -\frac{4 \cdot 5}{99} = -\frac{20}{99} = -0,(20)$$
J: - 0,(20) (C).

1. (00-3-46) Geometrik progressiyada uchinchi va yettinchi hadlarining ko'paytmasi 144 ga teng. Uning beshinchi hadini toping.
A) 6 B) $\pm$ 12 C) - 8 D) - 12 E) 12

2. (96-6-37) Geometrik progressiyada $b_2 \cdot b_3 \cdot b_4 = 216$ bo'lsa, uning uchinchi hadini toping.
A) 12 B) 8 C) 4 D) 10 E) 6

3. (97-8-36) $b_3 \cdot b_4 \cdot b_5 = 64$ ga teng bo'lgan geometrik progressiyaning to'rtinchi hadini toping.
A) 10 B) 12 C) 4 D) 6 E) 8

4. (98-6-27) Agar geometrik progressiyada $b_1 + b_9 = 5$ va $b_1^2 + b_9^2 = 17$ bo'lsa, $b_4 \cdot b_6$ni toping.
A) 4 B) 3 C) 2 D) 1 E) 6

5. (00-3-47) $\frac{1}{3}$ va $\frac{1}{48}$ sonlar orasiga shunday uchta musbat sonni joylashtiringki, natijada geometrik progressiya hosil bo'lsin. O'sha qo'yilgan uchta sonning yig'indisini toping.
A) 0,5 B) $\frac{7}{12}$ C) 0,375 D) $\frac{5}{24}$ E) $\frac{7}{24}$

6. (00-7-26) Barcha hadlari musbat bo'lgan geometrik progressiyaning birinchi hadi 2 ga, beshinchi hadi 18 ga teng. Shu progressiyaning beshinchi va uchinchi hadlari ayirmasini toping.
A) 10 B) 12 C) 8 D) 11 E) 9

7. (01-6-21) Hadlari musbat bo'lgan geometrik progressiyaning birinchi va uchinchi hadi ko'paytmasi 4 ga, uchinchi va beshinchisiniki esa 64 ga teng. Progressiyaning ikkinchi, to'rtinchi va oltinchi hadlari yig'indisini toping.
A) 40 B) 44 C) 42 D)46 E) 38

8. (01-11-16) 2; b_2 va b_3 sonlari o'suvchi geometrik progressiyaning dastlabki uchta hadidan iborat. Agar bu progressiyaning ikkinchi hadiga 4 qo'shilsa, hosil bo'lgan sonlar arifmetik progressiyaning dastlabki uchta hadini tashkil etadi. Berilgan progressiyaning maxrajini toping.
A) 3 B) 2 C) 2,5 D) 3,5 E) 1,5

9. (02-3-28) Kamayuvchi geometrik progressiya tashkil etuvchi uchta sondan uchinchisi 18 ga teng. Bu son o'rniga 10 soni olinsa, uchta son arifmetik progressiya tashkil etadi. Birinchi sonni toping.
A) 50 B)60 C) 40 D) 27 E) 36

10. (02-8-9) 3 va 19683 sonlari o'rtasiga 7 ta shunday musbat sonlar joylashtirilganki, hosil bo'lgan to'qqizta son geometrik progressiya tashkil etadi. 5-o'rinda turgan son nechaga teng?
A)243 B)343 C) 286 D) 729 E) 442

11. (03-8-36) Agar 1; $\sqrt{y}$; $3\sqrt{y} + 4$ sonlari geometrik progressiyaning ketma-ket hadlari bo'lsa, y ni toping.
A) 16 B)9 C) 25 D) 4 E) 49

12. (03-11-10) a, b, c, d sonlar ko'rsatilgan tartibda geometrik progressiya tashkil etadi.
$$(a-c)^2 + (b-c)^2 + (b-d)^2 - (a-d)^2$$

ni soddalashtiring.
A) 0 B)2a C) 3b D) d E)-2a

Dastlabki n ta hadi yig'indisi.

S_n - dastlabki n ta hadi yig'indisi:

1. $S_n = b_1 + b_2 + \cdots + b_n$;
2. $S_n = \frac{b_1(1-q^n)}{1-q} \quad (q \neq 1)$;
3. $S_n - S_{n-1} = b_n$.

(97-12-35) Daslabki beshta hadining yig'indisi –62 ga, dastlabki oltita hadining yig'indisi –126 ga va maxraji 2 ga teng geometrik progressiyaning birinchi hadini toping.
A) – 1 B) – 3 C) – 4 D) – 2 E)3
Yechish: $S_5 = -62$, $S_6 = -126$ ekanidan $b_6 = S_6 - S_5 = -126+62 = -64$ ni topamiz. $q = 2$ va $b_6 = b_1 \cdot q^5$ ekanidan $b_1 \cdot 2^5 = -64$, bundan esa $b_1 = -2$ ni hosil qilamiz.
J: -2 (D)

1. (98-3-21) Geometrik progrogressiyaning maxraji 3 ga, dastlabki to'rta hadlari yig'indisi 80 ga teng. Uning to'rtinchi hadini toping.
A) 24 B) 32 C) 54 D) 27 E)57

2. (98-8-26) Geometrik progrogressiyaning birinchi hadi 486 ga, maxraji $\frac{1}{3}$ ga teng. Shu progressiyaning dastlabki to'rtta hadi yig'indisini toping.
A) 680 B) 840 C) 720 D) 760 E)800

3. (98-10-19) Geometrik progressiyaning dastlabki uchta hadi yig'indisi -26 ga, dastlabki to'rtasiniki esa -80 ga teng. Agar shu progressiyaning birinchi hadi -2 ga teng bo'lsa, uning maxraji qanchaga teng bo'ladi?
A) 3 B) -3 C) -2 D) 2 E) 4

4. (98-10-68) Geometrik progrogressiyaning maxraji 3 ga, dastlabki to'rta hadining yig'indisi 80 ga teng. Birinchi hadining qiymatini toping.
A) 1 B) 2 C) 3 D) 4 E) 2,5

5. (97-2-37) Maxraji 2 ga teng bo'lgan geometrik progressiyaning dastlabki oltita hadi yig'indisi 126 ga, dastlabki beshta hadi yig'indisi 62 ga teng. Progressiyaning birinchi hadini toping.
A) 6 B) 5 C) 4 D) 2 E) 3

6. (98-1-26) Geometrik progrogressiyaning maxraji -2 ga, dastlabki beshta hadining yig'indisi 5,5 ga teng. Progressiyaning beshinchi hadini toping.
A) 4 B) -8 C) 8 D) -16 E)16

7. (98-11-27) Agar olti hadli geometrik progressiyaning dastlabki uchta hadining yig'indisi 112 ga va oxiridagi uchta hadining yig'indusi 14 ga teng bo'lsa, birinchi hadi nechaga teng bo'ladi?
A) 72 B) 64 C) 56 D) 63 E) 81

8. (99-2-24) Ishorasi almashinuvchi geometrik progressiyaning birinchi hadi 2 ga, uchinchi hadi 8 ga teng. Shu progressiyaning gastlabki 6 ta hadining yig'indisini toping.
A) 20 B) -20 C) -42 D) 42 E)-64

9. (99-3-24) Geometrik progrogressiya barcha hadlarining yig'indisi uning toq nomerli hadlari yig'indisidan uch marta ko'p. Agar geometrik progressiya hadlarining soni juft bo'lsa, uning maxrajini toping.
A) 3 B) $\frac{3}{2}$ C) $\frac{5}{2}$ D) 2 E) -3

10. (99-4-29) (b_n) Geometrik progrogressiyada $q = 2$ va $S_4 = 5$. b_2 ni toping.
A) 0,4 B) 0,8 C) $1\frac{1}{3}$ D) $\frac{2}{3}$ E) $\frac{5}{6}$

11. (99-7-25) a_n arifmetik progressiyaning hadlari ayirmasi 1 ga teng.

$$(a_3 - a_1) + (a_5 - a_3)^2 + \cdots + (a_{19} - a_{17})^9$$

yig'indini hisoblang.
A) 1022 B) 8192 C) 4094 D) 8194 E)4098

12. (00-6-25) O'suvchi geometrik progressiyaning dastlabki to'rtta hadi yig'indisi 15 ga, undan keyingi to'rttasiniki esa 240 ga teng. Shu progressiyaning dastlabki oltita hadi yig'indisini toping.
A) 31 B) 48 C) 63 D) 127 E)114

13. (99-3-25) 5 ta haddan iborat geometrik progrogressiyaning hadlari yig'indisi birinchi hadini hisobga olmaganda 30 ga, oxirgisini hisobga olmaganda 15 ga teng. Shu progressiyaning uchinchi hadini toping.
A) 6 B) 8 C) 4 D) 10 E) 12

14. (98-2-19) Geometrik progrogressiyada $S_6 - S_5 = -128$ va $q = -2$. b_8 ning qiymatini toping.
A) 512 B) 256 C) -512 D) -256 E) 1024

15. (98-9-13) Agar geometrik progressiyada $S_k - S_{k-1} = 64$, va $S_{k+1} - S_k = 128$ bo'lsa, uning maxraji qanchaga teng bo'ladi?
A) 2 B) 2,2 C) 1,8 D) 2,4 E) 1,6

16. (97-4-35) Tenglamani yeching.

$$1 - x + x^2 - x^3 + \cdots + x^8 - x^9 = 0$$

A) 10 B) 1 C) $-1; 1$ D) -1 E) $-1; 10$

17. (97-9-95) Tenglamani yeching.

$$1 - 3x + 9x^2 - \cdots - 3^9 x^9 = 0$$

A) $\pm\frac{1}{3}$ B) $\frac{1}{3}$ C) $-\frac{1}{3}$ D) $\frac{1}{5}$ E) $\frac{3}{4}$

18. (98-5-24) Arifmetik progressiyaning hadlari $a_1, a_2, \ldots, a_n$, ayirmasi esa $d \neq -1, 0, 1$ bo'lsa,

$$(a_2 - a_1) + (a_3 - a_2)^2 + (a_4 - a_3)^3 + \cdots + (a_{n+1} - a_n)^n$$

ni hisoblang.
A) $\frac{d^n - 1}{d-1}$ B) $\frac{d(d^n-1)}{d-1}$ C) $\frac{d^n}{d-1}$
D) $\frac{d(d^n+1)}{d-1}$ E) $\frac{d(d^n-1)}{d-1}$

19. (01-1-28) Oltita haddan iborat geometrik progressiyaning dastlabki uchta hadining yig'indisi 168 ga, keyingi uchtasiniki esa 21 ga teng. Shu progressiyaning maxrajini toping.
A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 2 E) 3

20. (01-3-38) Geometrik progrogressiya uchun quyidagi formulalardan qaysilari to'g'ri?
1) $b_n = b_1 \cdot q^{n-1}$ 2) $b_n^2 = b_{n-1}b_{n+1}$
3) $S_n = \frac{b_1(1-q^n)}{1-q}$
A) 1; 2; 3 B) 1 C) 2 D) 3 E) 1; 3

21. (01-12-36) Yig'indisi 15 ga teng bo'lgan uchta son arifmetik progressiyaning dastlabki uchta hadidir. Agar shu sonlarga mos ravishda 1; 3 va 9 sonlari qo'shilsa, hosil bo'lgan sonlar o'suvchi geometrik progressiyaning ketma-ket hadlari bo'ladi. Geometrik progressiyaning dastlabki 6 ta hadi yig'indisini toping.
A) 252 B) 256 C) 248 D) 254 E)250

22. (02-1-56) Agar hadlari haqiqiy sondan iborat bo'lgan o'suvchi geometrik progressiyaning birinchi uchta hadi yig'indisi 7 ga, ko'paytmasi 8 ga teng bo'lsa, shu progressiyaning beshinchi hadini toping.
A) 6 B) 32 C) 12 D) 16 E)20

23. (02-4-15) Geometrik progressiyada $b_1 = -\frac{1}{2}$ va $q = 2$ bo'lsa, $S_{14} - S_{13}$ ayirmani toping.
A) 4096 B) -4096 C) 2048 D) -2048 E) 8192

24. (02-4-21) Geometrik progressiyada $b_1 = 1$ va $q = \sqrt{2}$ bo'lsa, $b_1 + b_3 + b_5 + ... + b_{15}$ ning qiymatini hisoblang.
A) 253 B) 254 C) 255 D) 256 E) 257

25. (02-5-28) Geometrik progressiyaning dastlabki oltita hadi yig'indisi 1820 ga, maxraji esa 3 ga teng. Shu progressiyaning birinchi va beshinchi hadlari yig'indisini toping.
A) 164 B) 246 C) 328 D) 410 E) 492

26. (02-9-19) $-0,25;\ 0,5;\ \ldots$ geometrik progressiyaning hadlari 10 ta. Shu progressiyaning oxirgi 7 ta hadi yig'indisini toping.
A) -43 B) 43 C) 83 D) 56 E) 86

27. (02-11-39) Geometrik progressiyaning ikkinchi hadi 2 ga, beshinchi hadi 16 ga teng. Shu progressiyaning dastlabki oltita hadi yig'indisini toping.
A) 81 B) 72 C) 65 D) 64 E) 63

28. (03-2-32) 1; 3; 7; 15; 31; $\ldots$; 2^n-1; $\ldots$ ketma-ketlikning dastlabki n ta hadining yig'indisini toping.
A) $4^n + 3n$ B) $2(2^n - 1) - n$ C)$2^n + n + 1$
D) $2^{2n} - 4n$ E) aniqlab bo'lmaydi

29. (03-3-37) Agar geometrik progressiyaga $b_1 = 2$; $b_n = \frac{1}{8}$ va $S_n = 3\frac{7}{8}$ bo'lsa, uning nechta hadi bor?
A) 12 B) 10 C) 8 D) 6 E) 5

30. (03-4-20) Geometrik progressiyaning oltinchi va birinchi hadi ayirmasi 1210 ga, maxraji 3 ga teng. Shu progressiyaning dastlabki beshta hadi yig'indisini toping.
A) 610 B) 615 C) 600 D) 605 E) 608

31. (03-9-25) Geometrik progressiyaning birinchi hadi va maxraji 2 ga teng. Shu progressiyaning dastlabki nechta hadlari yig'indisi 1022 ga teng bo'ladi?
A) 5 B) 8 C) 9 D) 10 E) 11

Cheksiz kamayuvchi geometrik progressiya.

1. $S = \frac{b_1}{1-q}$ – cheksiz kamayuvchi geometrik progressiya hadlari yig'indisi.

(99-1-23) Geometrik progressiyaning yig'indisini toping:

$$\sqrt{5},\ 1,\ \frac{1}{\sqrt{5}},\ \ldots$$

A) $\frac{5}{\sqrt{5}-1}$ B) $\frac{6\sqrt{5}+5}{5}$ C) $\frac{\sqrt{5}-1}{\sqrt{5}}$ D) 4,16 E) 4,5

Yechish: Berilgan ketma–ketlik cheksiz kamayuvchi geometrik progressiya bo'lib, bunda $b_1 = \sqrt{5}$ va $q = \frac{1}{\sqrt{5}}$. U holda $S = \frac{b_1}{1-q}$ formulaga ko'ra

$$S = \frac{\sqrt{5}}{1 - \frac{1}{\sqrt{5}}} = \frac{5}{\sqrt{5} - 1}.$$

Javob: $\frac{5}{\sqrt{5}-1}$ (A).

1. (99-10-25) Cheksiz kamayuvchi geometrik progressiyaning hadlari yig'indisi 8 ga, dastlabki to'rttasiniki esa $\frac{15}{2}$ ga teng. Agar uning barcha hadlari musbat bo'lsa, progressiyaning birinchi hadini toping.
A) 2 B) 4,5 C) 4 D) 3 E) 3,5

2. (00-1-22) Cheksiz kamayuvchi geometrik progressiyaning hadlari yig'indisi 12 ga, maxraji esa $-\frac{1}{2}$ ga teng. Uning birinchi va ikkinchi hadlari ayirmasini toping.
A) 26 B) -26 C) 28 D) -27 E) 27

3. (00-3-48) Cheksiz kamayuvchi geometrik progressiyaning hadlari yig'indisi 9 ga, maxraji esa $\frac{1}{3}$ ga teng. Uning birinchi hamda uchinchi hadlari ayirmasini toping.
A) $5\frac{1}{3}$ B) $4\frac{2}{3}$ C) $5\frac{2}{3}$ D) $2\frac{1}{3}$ E) $3\frac{1}{3}$

4. (01-8-25) Cheksiz kamayuvchi geometrik progressiyaning birinchi hadi ikkinchisidan 8 ga ortiq, hadlarining yig'indisi esa 18 ga teng. Progressiyaning uchinchi hadini toping.
A) $1\frac{1}{3}$ B) $-33\frac{1}{3}$ C) $-1\frac{1}{3}$ D) $2\frac{2}{3}$ E) $1\frac{2}{3}$

5. (01-11-17) Cheksiz kamayuvchi geometrik progressiyaning birinchi hadi 3 ga, hadlarining yig'indisi esa $\frac{9}{2}$ ga teng. Shu progressiyaning uchinchi hadini toping.
A) $\frac{2}{3}$ B) $\frac{1}{2}$ C) $\frac{3}{4}$ D) $\frac{1}{4}$ E) $\frac{1}{3}$

6. (02-1-16) Cheksiz kamayuvchi geometrik progressiyaning yig'indisi 56 ga, hadlari kvadratlarining yig'indisi esa 448 ga teng. Progressiyaning maxrajini toping.
A) 0,75 B) 0,8 C) 0,25 D) 0,5 E) 0,85

7. (02-3-34)
$$\frac{1}{2}\cdot\frac{1}{3}+\frac{1}{4}\cdot\frac{1}{9}+\frac{1}{8}\cdot\frac{1}{27}+\cdots$$
cheksiz kamayuvchi geometrik progressiyaning yig'indisini toping.
A) 0,2 B) $\frac{1}{2}$ C) $\frac{3}{4}$ D) 1,2 E) 2,5

8. (02-4-24)
$$\sqrt{\frac{1}{3}-\frac{1}{9}+\frac{1}{27}-\frac{1}{81}+\cdots}$$
ni hisoblang.
A) 0,3 B) 0,4 C) 0,5 D) 0,6 E) 0,7

9. (02-4-25)
$$x^3\Big(1+(1-x)+(1-x)^2+(1-x)^3+\ldots\Big)=$$
$$=\frac{17x}{4}-1 \qquad (0<x<2)$$
tenglamani yeching.
A) 0,5 B) 0,4 C) 0,25 D) 0,45 E) 0,35

10. (02-5-30) a ning qanday qiymatida $2a+a\sqrt{2}+a+$ $+\frac{a}{\sqrt{2}}+\ldots$ cheksiz kamayuvchi geometrik progressiyaning yig'indisi 8 ga teng bo'ladi?
A) 1 B) $\frac{4}{\sqrt{2}}$ C) $2-\sqrt{2}$ D) $2+\sqrt{2}$ E) $2(2-\sqrt{2})$

11. (02-9-24) Cheksiz kamayuvchi geometrik progressiya hadlarining yig'indisi uning dastlabki ikkita hadi yig'indisidan 2 ga ko'p. Progressiyaning birinchi hadi 4 ga teng. Shu progressiyaning hadlari yig'indisini toping.
A) $2\frac{1}{3}$ B) -4 C) 4 D) 8 E) 6

12. (02-10-54) Bir-biridan faqat maxrajlarining ishoralari bilan farq qiladigan 2 ta cheksiz kamayuvchi geometrik progressiya berilgan. Ularning yig'indilari mos ravishda S_1 va S_2 ga teng. Shu progressiyalardan istalganining hadlari kvadratlaridan tuzilgan cheksiz kamayuvchi geometrik progressiyaning yig'indisini toping.
A) $S_1\cdot S_2$ B) S_1+S_2 C) $|S_1-S_2|$
D) $(S_1+S_2)^2$ E) $S_1^2+S_2^2$

13. (02-12-32) Cheksiz kamayuvchi geometrik progressiyaning yig'indisi 243 ga, dastlabki beshta hadiniki esa 275 ga teng. Bu progressiyaning maxraji $\frac{1}{5}$ dan qanchaga kam?
A) $\frac{7}{15}$ B) $\frac{8}{15}$ C) $\frac{3}{5}$ D) $\frac{13}{15}$ E) $\frac{11}{15}$

14. (00-3-49) Hisoblang:
$$\sqrt[3]{3\sqrt[3]{3\sqrt[3]{3\sqrt[3]{3\ \ldots}}}}$$
A) $\sqrt[3]{3}$ B) $\sqrt[6]{3}$ C) 1 D) $\sqrt{3}$ E) 3

15. (03-3-38) Hadlarining yig'indisi 2,25 ga, ikkinchi hadi 0,5 ga teng bo'lgan cheksiz kamayuvchi geometrik progressiyaning maxrajini toping.
A) $\frac{1}{3}$; $\frac{1}{6}$ B) $\frac{1}{4}$ C) $\frac{2}{3}$; $\frac{1}{4}$ D) $\frac{1}{6}$ E) $\frac{1}{3}$; $\frac{2}{3}$

16. (03-4-21) Cheksiz kamayuvchi geometrik progressiyaning birinchi hadi 2 ga, hadlarining yig'indisi esa 5 ga teng. Shu progressiyaning hadlari kvadratlaridan tuzilgan progressiyaning hadlari yig'indisini toping.
A) 6,25 B) 6,5 C) 5,75 D) 6,75 E) 5,85

17. (03-7-25) $\sqrt{\frac{3}{2}}+\sqrt{\frac{2}{3}}+\frac{2}{3}\sqrt{\frac{2}{3}}+\cdots$ ni hisoblang.
A) $\frac{\sqrt{6}}{2}$ B) $\frac{3\sqrt{6}}{2}$ C) $\frac{2\sqrt{6}}{3}$ D) $\frac{2\sqrt{3}}{3}$ E) $\frac{2\sqrt{2}}{3}$

18. (03-7-68) $\frac{1}{x}+1+x+x^2+\cdots+x^n+\cdots=4,5$ $(|x|<1)$ tenglamani yeching.
A) $\frac{1}{8}$; $\frac{1}{4}$ B) $\frac{1}{3}$; $\frac{3}{5}$ C) $\frac{2}{3}$; $\frac{1}{2}$ D) $\frac{1}{3}$; $\frac{2}{3}$ E) $\frac{1}{4}$; $\frac{1}{2}$

19. (02-12-32) Cheksiz kamayuvchi geometrik progressiyaning hadlari yig'indisi 1,6 ga, ikkinchi hadi $-0,5$ ga teng. Shu progressiyaning uchinchi hadini toping.
A) $\frac{1}{8}$ B) $-\frac{1}{4}$ C) $-\frac{1}{8}$ D) $\frac{5}{8}$ E) $\frac{1}{4}$

1.11 Matnli masalalar.

1.11.1 Sonlarga oid masalalar.

Sodda mushohada.

- Hech bir uchtasi bitta to'g'ri chiziqda yotmaydigan n ta nuqtadan $\frac{n(n-1)}{2}$ ta to'g'ri chiziq o'tkazish mumkin.

1. (96-10-39) Har qanday uchtasi bir to'g'ri chiziqda yotmaydigan 6 ta nuqta berilgan. Shu 6 ta nuqtalar orqali nechta turlicha to'g'ri chiziq o'tkazish mumkin?
A) 6 B) 12 C) 10 D) 36 E) 15

2. (96-1-36) Har qanday uchtasi bir to'g'ri chiziqda yotmaydigan 7 ta nuqta berilgan. Shu 7 ta nuqtalar orqali nechta turlicha to'g'ri chiziq o'tkazish mumkin?
A) 28 B) 21 C) 42 D) 35 E) 14

3. (96-3-8) Birinchi kuni ish normasining $\frac{1}{4}$ qismi bajarildi. Ikkinchi kuni birinchi kunda bajarilgan ishning $\frac{1}{8}$ qismicha ko'p ish bajarildi. Shu ikki kunda qancha ish normasi bajarildi?
A) $\frac{9}{32}$ B) $\frac{5}{32}$ C) $\frac{3}{40}$ D) $\frac{17}{32}$ E) $\frac{1}{18}$

4. (96-6-4) 2 soat 30 minut 3 sekund necha sekund bo'ladi?
A) 10203 B) 8203 C) 9003 D) 9803 E) 8993

5. (96-9-87) Har qanday uchtasi bir to'g'ri chiziqda yotmaydigan 9 ta nuqta orqali nechta turlicha to'g'ri chiziq o'tkazish mumkin?
A) 9 B) 18 C) 72 D) 36 E) 24

6. (01-2-43) Istalgan uchtasi bir to'g'ri chiziqda yetmaydigan to'rtta nuqtani juft-juft ravishda tutashtirish natijasida nechta kesma hosil bo'ladi ?
A) 4 B) 5 C) 6 D) 7 E) 8

7. (01-4-10) To'g'ri chiziqda 7 ta nuqta olindi. Uchlari berilgan nuqtalardan iborat nechta turli kesmalar hosil bo'ldi?
A) 14 B) 21 C) 49 D) 28 E) 42

8. (96-11-8) Birinchi kuni ish normasining $\frac{1}{2}$ qismi bajarildi. Ikkinchi kuni birinchi kunda bajarilgan ishning $\frac{1}{4}$ qismicha ko'p ish bajarildi. Shu ikki kunda qancha ish normasi bajarildi?
A) $1\frac{1}{8}$ B) $\frac{1}{4}$ C) $\frac{3}{4}$ D) $\frac{1}{8}$ E) $\frac{3}{8}$

9. (96-12-8) Birinchi kuni ish normasining $\frac{1}{3}$ qismi bajarildi. Ikkinchi kuni birinchi kunda bajarilgan ishning $\frac{1}{6}$ qismicha ko'p ish bajarildi. Shu ikki kunda qancha ish normasi bajarildi?
A) $0,5$ B) $\frac{2}{9}$ C) $\frac{13}{18}$ D) $\frac{5}{6}$ E) $\frac{23}{24}$

10. (97-2-4) $3m^2\ 1dm^2\ 5sm^2$ necha sm^2 ga teng?
A) 3015 B) 3105 C) 30015 D) 31015 E) 30105

11. (97-5-7) Bolalar archa bayramida bir xil sovg'a olishdi. Hamma sovg'alarda jami 123 ta olma va 82 ta nok bo'lgan. Archa bayramida nechta bola qatnashgan va har bir bola nechta olma va nechta nok olgan?
A) 41, 3, 2 B) 82, 1, 1 C) 20, 61, 41
D) 41, 2, 3 E) 61, 2, 1

12. (97-5-8) Chumoli 5 minutda $15\frac{5}{6}$ m yuradi. U 1 minutda necha metr yuradi?
A) $3\frac{5}{6}$ B) $15\frac{1}{6}$ C) $3\frac{1}{6}$ D) 3 E) 4

13. (97-5-11) Avtomashina bakiga 60 l benzin quyildi. Toshkent dengiziga borish uchun bakdagi benzinning $\frac{2}{5}$ qismi, Chirchiqqa borish uchun $\frac{1}{12}$ qismi sarflandi. Bakda necha litr benzin qolgan?
A) 30 B) 31 C) 25 D) 26 E) 27

14. (97-5-14) 1601 sonini tub son ekanligini aniqlash uchun uni ketma-ket 2, 3, 5 va xokazo tub sonlarga bo'lib boriladi. Qanday tub songa yetganda bo'lishni to'xtatish mumkin?
A) 29 B) 31 C) 37 D) 41 E) 43

15. (97-5-20) Binoning 4-qavatigacha bo'lgan zinaning uzunligi 2-qavatgacha bo'lgan zina uzunligidan necha marta uzun (qavatlar orasidagi zinalar soni bir xil deb xisoblanadi)?
A) 4 B) 3,5 C) 3 D) 2,5 E) 2

16. (97-8-4) 1 soat 160 minut 2 sekund necha sekunddan iborat?
A) 106002 B) 12202 C) 14202
D) 13202 E) 13102

17. (97-9-7) Bolalar archa bayramida bir xil sovg'a olishdi. Hamma sovg'alarda 76 ta mandarin va 57 ta konfet bo'lgan. Bayramda nechta bola qatnashgan va har bir bola nechta mandarin va nechta konfet olgan?
A) 19; 3; 4 B) 3; 25; 19 C) 57; 1; 1 D) 19; 4; 3 E) 4; 19; 16

18. (97-9-8) G'ildirak 7 minutda $12\frac{3}{5}$ marta aylanadi.U 1 minutda necha marta aylanadi?
A) $1\frac{4}{5}$ B) 1 C) $1\frac{3}{5}$ D) $1\frac{2}{5}$ E) $1\frac{1}{5}$

19. (97-9-11) Avtomashina bakiga 70 l benzin quyildi. Gulistonga borish uchun benzinning $\frac{2}{5}$ qismi, Chimyonga borish uchun esa $\frac{3}{7}$ qismi sarflandi. Bakda necha litr benzin qolgan?
A) 13 B) 15 C) 18 D) 20 E) 12

20. (97-9-14) 3607 sonini tub son ekanligini aniqlash uchun uni ketma-ket 2, 3, 5 va hokazo tub sonlarga bo'lib boriladi. Qanday tub songa yetganda bo'lishni to'xtatish mumkin?
A) 41 B) 43 C) 47 D) 53 E) 59

21. (97-9-20) Binoning 8-qavatigacha bo'lgan zinaning uzunligi 2-qavatgacha bo'lgan zina uzunligidan necha marta uzun (qavatlar orasidagi zinalar soni bir xil deb xisoblansin)?
A) 4 B) 5 C) 4,5 D) 3,5 E) 7

22. (97-12-4) $2m^2\ 3dm^2\ 4sm^2$ necha sm^2 ga teng?
A) 2034 B) 20244 C) 21034 D) 23004 E) 20304

23. (98-2-6) Agar kamayuvchini 16ta va ayriluvchini 20 ta orttirilsa, ayirma qanday o'zgaradi?
A) 4 ta kamayadi B) 36 ta ortadi C) 36 ta kamayadi D) 4 ta ortadi E) 26 ta kamayadi

24. (98-3-2) 7 ni berilgan songa ko'paytirganda hosil bo'lgan son ... 36 ko'rinishda bo'lsa, berilgan son quyidagilardan qaysi biri ko'rinishida bo'lishi mumkin?
A) ...18 B) ...98 C) ...52 D) ...48 E) ...78

25. (98-3-7) Agar $4\frac{3}{5}$ son $2\frac{1}{2}$ marta oshirilgan bo'lsa, u qanchaga ko'paygan?
A) 6,6 B) 6 C) 7 D) 6,5 E) 6,9

26. (98-4-6) x, y - raqamlar; xy va $8y$ esa ikki xonali sonlar. Agar $xy \cdot 6 = 8y$ bo'lsa, $x+y$ ning qiymati qanchaga teng bo'ladi?
A) 9 B) 4 C) 6 D) 8 E) 5

27. (98-7-12) Piyoda kishi 1 km yo'lni $\frac{2}{9}$ soatda o'tadi. U $\frac{3}{4}$ km yo'lni qancha soatda o'tadi?
A) $\frac{1}{5}$ B) $\frac{1}{6}$ C) $\frac{8}{27}$ D) $\frac{1}{4}$ E) $\frac{27}{8}$

28. (98-9-5) Agar kamayuvchini 24 ta va ayiriluvchini 36 ta kamaytirilsa, ayirma qanday o'zgaradi?
A) 56ta kamayadi B) 24ta ortadi C) 12ta ortadi D) 12ta kamayadi E) 56ta ortadi

29. (98-12-101) 13 kishi bir-biri bilan salomlashganda, qo'l berib ko'rishishlar soni qancha bo'ladi?
A) 169 B) 156 C) 78 D) 130 E) 143

30. (99-4-1) Balandligi 10 m bo'lgan simyog'ochga shilliqqurt ko'tariliyapti. Shilliqqurt kunduzi 5 m ko'tariladi, kechasi esa 4 m pastga tushadi. Necha kundan keyin shilliqqurt simyog'ochning uchiga chiqadi.
A) 10 B) 9 C) 6 D) 5 E) 7

31. (99-4-6) Agar kasrning surati $6\frac{1}{3}$ marta kamaytirilsa, maxraji esa $4\frac{1}{2}$ marta orttirilsa, u qanday o'zgaradi?
A) $1\frac{11}{27}$ marta ortadi
B) $1\frac{11}{27}$ marta kamayadi
C) $28\frac{1}{2}$ marta ortadi
D) $28\frac{1}{2}$ marta kamayadi
E) $\frac{27}{32}$ marta kamayadi

32. (99-6-59) $\frac{65}{6}$ va $\frac{39}{8}$ kasrlar butun qismlarining o'rta arifmetigini toping.
A) 7 B) 6 C) 8 D) 5 E) 4

33. (99-8-18) Ikki sonning nisbati 11:13 kabi, ularning eng katta umumiy bo'luvchisi 5 ga teng. Bu sonlarning yig'indisini toping.
A) 130 B) 120 C) 125 D) 150 E) 100

34. (99-9-21) [1;3] oraliqdagi maxraji 3 ga teng bo'lgan barcha qisqarmaydigan kasrlarning yig'indisini toping.
A) $8\frac{1}{3}$ B) $8\frac{2}{3}$ C) $7\frac{1}{3}$ D) 9 E) 8

35. (00-1-4) Yilning qaysidir oyida uchta shanba kuni oyning juft kunlariga to'g'ri kelgan. Shu oyning 25-kuni haftaning qaysi kuniga mos keladi?
A) seshanba B) chorshanba C) dushanba
D) payshanba E) juma

36. (00-2-2) $32 < a < 92$ shartni qanoatlantiruvchi ikki xonali a sonning birinchi raqami o'chirilganda u 31 marta kamaydi. O'chirilgan raqam nechaga teng?
A) 5 B) 4 C) 6 D) 7 E) 8

37. (00-2-14) Ikkita toq sonning yig'indisi 5 ga bo'linadi. Bu sonlar kublarining yig'indisi qanday raqam bilan tugaydi?
A) 6 B) 5 C) 4 D) 0 E) 8

38. (01-6-6) 39 ni bo'lganda, qoldiq 9 chiqadigan barcha natural sonlarning yig'indisini toping.
A) 60 B) 45 C) 50 D) 48 E) 55

39. (00-4-12) Ikki sutka necha sekunddan iborat?
A) 136000 B) 232400 C) 126600
D) 168800 E) 172800

40. (00-4-23) Kommersant a ta kostyumni b so'mdan sotib oldi va ularning har birini bir xil bahoda sotdi. Natijada u c so'm foyda qildi. Kommersant kostyumlarni necha so'mdan sotgan?
A) $\frac{ab+c}{a}$ B) $\frac{a(b+c)}{c}$ C) $\frac{c}{a}$ D) $ab+c$ E) $\frac{ab-c}{b}$

41. (00-4-25) Agar A, B, C va D larning nisbati $2:3:4:5$ kabi bo'lsa, $\frac{A+B}{C+D}$ ning qiymatini aniqlang.
A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{7}$ D) $\frac{9}{5}$ E) aniqlab bo'lmaydi

42. (00-4-38) Agar $a \in N$ bo'lsa, quyidagi ifodalardan qaysi birining qiymati har doim butun son bo'ladi?
A) $\frac{a^2+1}{4}$ B) $\frac{a^2+a}{6}$ C) $\frac{a(a^2-1)}{6}$ D) $\frac{a-3}{5}$ E) $\frac{a^2-2}{3}$

43. (98-11-21) Xaritada ikki shahar orasidagi masofa 4,5 sm ga teng. Xaritadagi masshtab 1 : 2000000 bo'lsa, shaharlar orasidagi haqiqiy masofa necha km bo'ladi?
A) 0,9 B) 9 C) 90 D) 900 E) 9000

44. (00-5-11) Xaritada 3,6 sm uzunlikdagi kesmaga 72 km masofa mos keladi.Agar xaritada ikki shahar orasidagi masofa 12,6 sm bo'sa, ular orasidagi masofa necha km?
A) 240 B) 244 C) 246 D)250 E) 252

45. (00-5-19) Fermer dehqon 4 va 5 sonlariga proportsional yerga bug'doy va paxta ekdi. Agar 15 ga yerga paxta ekilgan bo'lsa, necha ga yerga bug'doy ekilgan?
A) 16 B) 10 C) 8 D) 14 E) 12

46. (00-5-24) 1 l dengiz suvida o'rtacha $0,00001$ mg oltin bor. $1km^3$ dengiz suvida necha kg oltin bor?
A) 0,1 B) 0,01 C) 1 D) 10 E) 100

47. (00-10-17) Ikki shahar orasidagi masofa 200 km bo'lsa, 1 : 2000000 mashtabli xaritada bu masofa necha mm ga teng bo'ladi?
A) 100 B) 10 C) 20 D) 40 E) 200

48. (01-2-6) Tiko avtomashinasida 100 km yo'lni o'tish uchun $5,8$ l yonilg'i sarflanadi. $8,7$ l yonilg'i bilan bu avtomashinada necha km yul yurish mumkin?
A) 160 B) 154,8 C) 150 D) 145,4 E) 140

49. (01-2-9) Bir kombaynchi bug'doyzorning $\frac{2}{9}$ qismidagi bu g'doyni, ikkinchisi $\frac{2}{3}$ qismidagi bug'doyni o'rib oldi. Bug'doyzorning qancha qismi o'rilmay qoldi?
A) $\frac{2}{9}$ B) $\frac{1}{9}$ C) $\frac{1}{3}$ D) $\frac{4}{9}$ E) $\frac{5}{9}$

50. (01-3-23) Ketma-ket kelgan yettiga bo'linuvchi ikki son kvadratlarining ayirmasi 931 ga teng. Shu sonlardan kattasini toping.
A) 84 B) 70 C) 91 D) 63 E) 77

51. (01-7-12) Shahmat turnirida ishtirok etayotganlarning har biri qolgan o'yinchilar bilan ikki partiyadan shaxmat o'ynadi. Agar turnirda hammasi bo'lib 462 partiya o'ynalgan bo'lsa, turnir ishtirokchilari necha kishi bo'lgan?
A) 18 B) 20 C) 22 D) 24 E) 25

52. (01-10-11) Sayohatchilar guruhidagi erkaklarning ayollar soniga nisbati 3 : 4 kabi. Quyida keltirilganlardan qaysi biri guruhdagi sayohatchilar soniga teng bo'lsa olmaydi?
A) 28 B) 21 C) 23 D) 35 E) 42

53. (02-1-28) 1, 2 va 3 raqamlari yordamida yozilgan turli raqamli barcha uch xonali sonlar yig'indisi toping.
A) 1233 B) 2133 C 1332 D) 2331 E) 3213

54. (02-1-30) Agar a va b ixtiyoriy natural sonlar bo'lsa, u xolda $2a+8b$ ufoda quyidagi sonlarning qaysi biriga qoldiqsiz bo'linadi?
A) 2 B) 3 C) 4 D) 12 E) 24

55. (02-1-38) Detal 1 : 5 masshtabdagi chizma $2,1$ sm uzunlikka ega. Shu detal 1 : 3 masshtabdagi chizma qancha (sm.) uzunlikka ega bo'ladi?
A) 15 B) $2\frac{1}{3}$ C) $\frac{2}{5}$ D) 3,1 E) 3,5

56. (02-7-51) Hech bir uchtasi bir to'g'ri chiziqda yotmaydigan 20 ta nuqta berilgan. Bu nuqtalar orqali nechta to'g'ri chiziq o'tkazish mumkin?
A) 190 B) 200 C) 220 D) 380 E) 180

57. (02-12-23) Matematikadan yozma ish yozgan o'quvchilarning $\frac{1}{8}$ qismi a'lo, $\frac{1}{4}$ qismi yaxshi, $\frac{1}{2}$ qismi qoniqarli va qolgan 4 o'quvchi qoniqarsiz baho oldi. Nechta o'quvchi yozma ish yozgan?
A) 28 B) 32 C) 26 D) 24 E) 29

58. (03-4-4) 4 va 64 sonlarining o'rta arifmetigi ularning o'rta geometrigidan necha marta katta?
A) $2\frac{1}{4}$ B) $2\frac{3}{4}$ C) 2,2 D) $2\frac{3}{8}$ E) $2\frac{1}{8}$

59. (03-10-20) Son o'qida $4,2$ sondan masofasi 17 dan oshmaydigan songacha bo'lgan oraliqda nechta butun son mavjud?
A) 21 B) 35 C) 32 D) 34 E) 33

60. (03-12-11) y minutda x (mm) yomg'ir yog'adi. $2,5$ soatda necha mm yomg'ir yog'adi?
A) $\frac{x}{150y}$ B) $\frac{xy}{150}$ C) $\frac{150x}{y}$ D) $\frac{150y}{x}$ E) $\frac{150}{xy}$

61. (03-12-13) Ikkita to'rt xonali sonning ayirmasi eng kami bilan nechaga teng bo'la oladi?
A) -8999 B) -9000 C) -8998 D) -19998 E)-19999

To'plamlar birlashmasining elementlari soni.

$N(A)$ orqali A to'plamning elementlari sonini belgilaylik.

- $N(A\cup B)=N(A)+N(B)-N(A\cap B)$

1. (96-3-62) 1 dan 100 gacha bo'lgan sonlar orasida 2 ga ham, 3 ga ham bo'linmaydiganlari nechta?
A) 33 B) 30 C) 32 D) 21 E)19

2. (96-9-2) 1 dan 100 gacha bo'lgan sonlar orasida 2 ga ham, 7 ga ham bo'linmaydiganlari nechta?
A) 40 B) 41 C) 43 D) 45 E)38

3. (96-12-60) 1 dan 100 gacha bo'lgan sonlar orasida 2 ga ham, 5 ga ham bo'linmaydiganlari nechta?
A) 35 B) 40 C) 41 D) 32 E)34

4. (96-13-2) 1 dan 100 gacha bo'lgan sonlar orasida 3 ga ham, 5 ga ham bo'linmaydiganlari nechta?
A) 50 B) 52 C) 48 D) 53 E)54

5. (98-2-5) 100 kishidan iborat turistlar guruhida 70 kishi ingliz tilini, 45 kishi nemis tilini va 23 kishi ikkala tilni biladi.Ikkala tilni bilmaydigan turistlar necha foizni tashkil etadi?
A) 6 B) 12 C) 8 D) 10 E)14

6. (98-9-3) Sinfdagi 35 ta o'quvchidan 28 tasi suzish sektsiyasiga, 14 tasi voleybol sektsiyasiga qatnashadi. Agar har bir o'quvchi hech bo'lmaganda bitta sektsiyaga qatnashsa, ikkala sektsiyaga qatnashadigan o'quvchilar necha foizni tashkil etadi?
A) 20 B) 18 C) 25 D) 15 E) 21

7. (00-4-24) 48 ta chet tili o'qituvchisidan 30 tasi ingliz tili, 29 tasi nemis tili o'qituvchilari. Shu o'qituvchilardan nechtasi faqat bitta tilda dars beradi.
A) 1 B) 28 C) 29 D) 30 E)37

8. (03-10-34) 30 kishidan 22 tasi o'yin to'garagiga, 17 tasi esa xorda ashula aytadi. Necha kishi faqat o'yin to'garagiga qatnashadi?
A) aniqlab bo'lmaydi B) 8 C) 10 D) 12 E) 13

9. (03-12-53) Ko'p qavatli uyga yashovchi aholining $\frac{1}{6}$ qismi shaxmat o'ynashni, $\frac{1}{4}$ qismi narda o'ynashni biladi. Shu uyda yashovchi aholining $\frac{2}{3}$ qismi hech qanday o'yin o'ynashni bilmaydi. Aholining qanday qismi ham shaxmat, ham narda o'ynashni biladi?
A) $\frac{1}{12}$ B) $\frac{1}{6}$ C) $\frac{2}{5}$ D) $\frac{1}{12}$ dan $\frac{1}{6}$ qismigacha
E) $\frac{1}{6}$ dan $\frac{1}{4}$ qismigacha

10. (03-12-54) 30 ta turistdan 20 tasi ingliz tilini, 15 tasi fransuz tilini bilishadi. Shu turistlarlardan nechtasi ikkala tilni ham bilishadi?
A) 5 B) 10 C) 15 D) 5 tadan 10 tagacha
E) 5 tadan 15 tagacha

Tenglama yoki tenglamalar sistemasi yordamida yechiladigan masalalar.

1. $x_1,\dots,x_n$ sonlarning o'rta arifmetigi $\frac{x_1+x_2+\dots+x_n}{n}$ ga teng.

2. $x_1,\dots,x_n$ sonlarning o'rta geometrigi $\sqrt[n]{x_1x_2\dots x_n}$ ga teng.

3. Har qanday ikki xonali sonni $10x+y$ ko'rinishda yozish mumkin, bunda x,y lar raqamlar.

(98-12-61) Ikki xonali son bilan uning raqamlari o'rinlarini almashtirishdan hosil bo'lgan son ayirmasi quyidagilardan qaysi biriga qoldiqsiz bo'linadi?
A) 5 B) 11 C) 9 D) 4 E) 6

Yechish: Raqamlar a,b ga teng bo'lgan kiki xonali sonni $10a+b$ ko'rinishda yozish mumkin. Uning raqamlari o'rinlarini almashtirishdan hosil bo'ladigan ikki xonali son $10b+a$ ga teng bo'ladi. Ularning ayirmasini hisoblaymiz:

$$10a+b-(10b+a)=9a-9b=9(a-b)$$

Demak, ayirma 9 ga qoldiqsiz bo'linadi. **J:** 9 ga (C).

1. (96-1-10) x; $-2,1$ va $3,3$ sonlarining o'rta arifmetigi $0,2$ ga teng. x ni toping.
A) 0,6 B)- 0,6 C) 0,8 D) 2 E)- 0,8

2. (96-9-60) $5,4$; y; $-2,2$ sonlarining o'rta arifmetigi $1,2$ ga teng. y ni toping.
A) 1,2 B)- 0,8 C) 0,4 D) -0,4 E) 3

3. (96-10-10) y; 2,1; 3 va 2,1 sonlarining o'rta arifmetigi 2,3 ga teng. y ni toping.
A) 2,1 B) 2,6 C) 2 D) 3,4 E) 3

4. (98-1-12) Bir son ikkinchi sondan 6 ta ortiq. Ularning o'rta arifmetigi 20 ga teng. Shu sonlardan kattasini toping.
A) 23 B) 27 C) 33 D) 26 E) 34

5. (98-4-47) Uzunliklari har xil bo'lgan 8 ta yog'och berilgan.Ularning o'rtacha uzunligi 10 dm ga teng. Shu yog'ochlarga yana bitta yog'och qo'shildi. Natijada ularning o'rtacha uzunligi 12 dm ga teng bo'ldi. Qo'shilgan yog'ochning uzunligini aniqlang.
A) 18 B) 22 C) 32 D) 28 E) 26

6. (98-6-6) Uchta sonning o'rta arifmetigi 17,4 ga teng. Agar sonlarning ikkitasi 17,5 va 21,6 bo'lsa, uchinchi sonni toping.
A) 12,1 B) -0,2 C) -8,4 D) 13 E) 13,1

7. (98-8-12) Bir son ikkinchisidan 15 ga kichik. Shu sonlarning o'rta arifmetigi 11,5 ga teng. Shu sonlardan kichigini toping.
A) 3 B) 3,5 C) 4 D) 7 E) 8

8. (98-11-56) Uchta sonning o'rta geometrigi 6 ga teng bo'lib,ulardan ikkitasi 8 va 9 bo'lsa, uchinchi son necha bo'ladi?
A) 3 B) 7 C) -5 D) -3 E) 4

9. (98-12-100) Agar a natural son hamda $a \in (9;17)$ bo'lsa, 6; 10; va a sonlarning o'rta arifmetigi quyida keltirilgan sonlardan qaysi biriga teng bo'ladi?
A) 10 B) 12 C) 8 D) 18 E) 13

10. (00-4-30) Uchta sonning o'rta arifmetigi 10 ga, boshqa ikki sonning o'rta arifmetigi esa 15 ga teng. Shu beshta sonning o'rta arifmetigini toping.
A) 10 B) 11 C) 12 D) 13 E) 14

11. (00-7-5) Uchta sonning o'rta arifmetigi 30 ga, dastlabki ikkitasiniki esa 25 ga teng. uchinchi sonni toping.
A) 44 B) 40 C) 45 D) 38 E) 36

12. (00-9-67) N ta sonning o'rta arifmetigi 13 ga, boshqa M tasiniki 28 ga teng. Shu $N+M$ ta sonning o'rta arifmetigini toping.
A) $\frac{N}{M}$ B) $\frac{M+N}{41}$ C) $\frac{13N+28M}{M+N}$ D) $\frac{13M+28N}{M+N}$ E) $\frac{13N+28M}{M \cdot N}$

13. (99-2-10) Ikki natural son kvadratlarining o'rta arifmetigi 10 ga, o'rta geometrigi esa 8 ga teng.Shu sonlarning yig'indisini toping.
A) 4 B) 12 C) 9 D) 6 E) 7

14. (01-6-4) $a > 0$ sonining va 4 ning o'rta arifmetigi hamda o'rta geometrigi a ning qanday qiymatida o'zaro teng bo'ladi?
A) 3 B) 7 C) 5 D) 6 E) 4

15. (01-8-24) a; 2,1; 3 va 2,1 sonlarining o'rta arifmetigi 2,3 ga teng. a ning qiymatini toping.
A) 2,1 B) -2,6 C) 3,4 D) 2 E) 3

16. (01-9-16) Ikki sinning o'rta arifmetigi 7 ga, kvadratlarining ayirmasi 14 ga teng.Shu ikki son kvadratlarining yig'indisini toping.
A) 98,5 B) 56,25 C) 42,25 D) 96,5 E) 99,5

17. (01-9-31) Ikki musbat sonning o'rta geometrigi 8 ga, va boshqa ikkita musbat sonning o'rta geometrigi 32 ga teng.Shu to'rtta sonlarning o'rta geometrigini toping.
A) 12 B) 16 C) 15 D) 14 E) 13

18. (01-12-16) Ikki son o'rta geometrigining o'rta arifmetigiga nisbati 3 : 5 kabi. Shu sonlargan kichigining kattasiga nisbatini toping.
A) 1 : 9 B) 9 : 25 C) 3 : 5 D) 4 : 15 E) 2 : 9

19. (02-1-35) 24 ta sonning o'rta arifmetigi 11,5 ga teng. Bu sonlar qatoriga yana bir son qo'shib, o'rta arifmetik qiymat hisoblansa u 12,5 ga teng bo'ladi. Qo'shilgan son nechaga teng?
A) 36,5 B) 30,5 C) 25,5 D) 28,5 E) 50,5

20. (02-2-14) Ikki sonning o'rta arifmetigi bu sonlarning kattasidan 12 ta kam. Bu sonlar ayirmasining moduli nechaga teng bo'ladi?
A) 24 B) 22 C) 25 D) 23 E) 26

21. (02-6-11) Uchta sonning o'rta arifmetigi 20 ga, boshqa ikkita sonning o'rta arifmetigi esa 25 ga teng. Shu beshta sonning o'rta arifmetigini toping.
A) 22,5 B) 22,6 C) 24 D) 22 E) 21

22. (02-8-6) 7 ta sonning o'rta arifmetigi 13 ga teng. Bu sonlarga qaysi son qo'shilsa, ularning o'rta arifmetigi 18 ga teng bo'ladi?
A) 53 B) 50 C) 45 D) 56 E) 43

23. (02-8-6) 5 ta sonning o'rta arifmetigi 13 ga teng. Shu sonlarga qaysi son qo'shilsa, ularning o'rta arifmetigi 19 ga teng bo'ladi?
A) 49 B) 40 C) 46 D) 54 E) 38

24. (01-8-24) n soni 10; 12 va m sonlarining o'rta arifmetigidan 1,5 marta ko'p. m ni n orqali ifodalang.
A) $2n-22$ B) $\frac{2}{3}n-22$ C) $4n-22$ D) $\frac{3}{2}n-12$ E) ifodalab bo'lmaydi

25. (03-12-52) Oltita o'quvchining o'rtacha bo'yi 120 sm, shulardan bir o'quvchining bo'yi 105 sm. Qolgan besh o'quvchining o'rtacha bo'yi qanchaga teng?
A) 122 B) 123 C) 121 D) 124 E) 125

26. (96-3-22) Onasi 50, qizi 28 yoshda. Necha yil oldin qizi onasidan 2 marta yosh bo'lgan.
A) 5 yil B) 6 yil C) 8 yil D) 4 yil E) 7 yil

27. (96-11-23) Otasi 40, o'g'li 16 yoshda. Necha yildan keyin otasi o'g'lidan 2 marta katta bo'lgan.
A) 5 yil B) 7 yil C) 6 yil D) 4 yil E) 8 yil

28. (96-12-23) Buvisi 100, nabirasi 28 yoshda. Necha yil oldin nabirasi buvisidan 4 marta yosh bo'lgan.
A) 8 yil B) 5 yil C) 4 yil D) 6 yil E) 7 yil

29. (00-4-21) Ota o'zining katta o'g'lidan 3 marta katta, kichik o'g'lidan esa 40 yoshga katta. Katta o'g'il ukasidan 3 marta katta bo'lsa,katta o'g'lining yoshi nechada?
A) 8 B) 10 C) 12 D) 15 E) 18

30. (02-1-41) Olim otasidan 32 yosh kichik.Otasi esa bobosidan shuncha yosh kichik. Uch yil avval ularning yoshlari yig'indisi 111 ga teng bo'lgan bo'lsa, hozir Oliming bobosi necha yoshda?
A)69 B) 72 C) 75 D) 80 E) 81

31. (02-7-50) 36 yoshdagi onaning yoshi 4 ta bolalari yoshlari yig'indisidan 3 marta ortiq. Necha yildan keyin onaning yoshi bolalari yoshlarining yig'indisiga teng bo'ladi?
A) 8 B) 9 C) 10 D) 7 E) 12

32. (03-1-61) Egizaklar yoshining yig'indisi 10 yilda ikki marta ortdi. Yana 10 yildan keyin ulardan har birining yoshi nechaga teng bo'ladi?
A) 20 B) 30 C) 40 D) 25 E) 35

33. (98-10-39) Ikki natural sonning yig'indisi 462 ga teng. Ulardan birining oxirgi raqami 0 bilan tugaydi. Agar bu nol o'chirilsa, ikkinchi son hosil bo'ladi. Berilgan sonlardan kichigini toping.
A) 46 B) 44 C) 42 D) 38 E) 34

34. (00-1-5) Ikki xonali sonning o'ng tomoniga 0 raqami yozilsa, berilgan sonning yarmi bilan 323 ning yig'indisiga teng bo'ldan son hosil bo'ladi. Berilgan sonni toping.
A) 54 B) 14 C) 24 D) 44 E) 34

35. (98-4-2) Ikki xonali son bilan uning raqamlari o'rinlarini almashtirishdan hosil bo'lgan son yig'indisi quyidagilardan qaysi biriga qoldiqsiz bo'linadi?
A) 3 B) 11 C) 9 D) 4 E) 7

36. (98-5-11) Raqamlarining yig'indisidan 3 marta katta, raqamlari kvadratlarining yig'indisi esa 53 ga teng bo'lgan ikki xonali sonning kvadratini toping.
A) 2500 B) 961 C) 529 D) 7056 E) 729

37. (98-12-67) A, B- raqamlar; AB va $5A$ esa ikki xonali sonlar. Agar $AB \cdot 3 = 5A$ bo'lsa, $A^2 + B^2$ ning qiymati qanchaga teng bo'ladi?
A) 65 B) 13 C) 50 D) 37 E) 26

38. (99-2-8) Ikki xonali sonning raqamlari yig'indisi 6 ga teng. Agar bu songa 18 qo'shilsa, berilgan sonning raqamlari o'rinlarini almashtirib yozishdan hosil bo'dan songa teng son hisil bo;ladi. Berilgan sonni toping.
A) 15 B) 60 C) 51 D) 24 E) 33

39. (99-7-13) Ikki xonali son o'zining raqamlari yig'indisidan 4 marta katta. Raqamlari kvadratlarining yig'indisi 5 ga teng.Shu ikki xonali sonning kvadratini hisoblang.
A) 441 B) 169 C) 121 D) 196 E) 144

40. (00-6-4) Raqamlari o'rinlarini almashtirganda, qiymati 9 ga ortadigan nechta ikki xonali natural son bor?
A) 5 B) 6 C) 7 D) 8 E) 4

41. (01-2-5) Raqamlari yig'indisining uchlanganiga teng ikki xonali sonni toping.
A) 17 B) 21 C) 13 D) 35 E) 27

42. (01-7-10) Ikki xonali sonni uning raqamlari yig'indisiga bo'lganda, bo'linma 3 ga, qoldiq 7 ga teng chiqdi. Berilgan sonni toping.
A) 38 B) 26 C) 25 D) 35 E) 37

43. (02-12-24) Raqamlari yig'indisining uch baravariga teng bo'lgan ikki xonali sonni toping.
A) 29 B) 28 C) 27 D) 26 E) 24

44. (03-1-63) Raqamlari yig'indisiga bo'lganda, bo'linmasi 4 ga va qoldig'i nolga teng bo'ladigan ikki xonali sonlar nechta?
A) 2 B) 3 C) 4 D) 5 E) 6

45. (96-1-2) Bir nechta natural sonlarning yig'indisi 75 ga teng. Agar shu sonlarning har biridan 2 ni ayirib yig'indi hisoblansa, u 61 ga teng bo'ladi. Yig'indida nechta son qatnashgan?
A) 5 B) 7 C) 14 D) 8 E) 6

46. (98-12-30) Ikki sonning yig'indisi $6,5$ ga teng. Ulardan biri ikkinchisidan 4 marta kichik. Shu sonlarning kattasini toping.
A) 6 B) 5 C) 4 D) 5,3 E) 5,2

47. (96-9-53) Bir nechta natural sonlarning yig'indisi 77 ga teng. Agar shu sonlarning har biridan 4 ni ayirib yig'indi hisoblansa, u 61 ga teng bo'ladi. Yig'indida nechta natural son qatnashgan?
A) 4 B) 6 C) 8 D) 12 E) 24

48. (96-10-2) Bir qanchta natural sonlar berilgan va ularning yig'indisi 60. Agarda har bir sonni 2 ga oshirsak, unda yangi sonlar yig'indisi 76 ga teng. Qancha son berilgan edi?
A) 5 B) 8 C) 9 D) 16 E) 18

49. (96-11-5) Ikki sonning yig'indisi 7 ga teng. Ulardan biri ikkinchisidan 4 marta kichik bo'lsa, Shu sonlarning kattasini toping.
A) 5,2 B) 6,2 C) 5,6 D) 5,4 E) 4,8

50. (96-12-5) Ikki sonning yig'indisi $4,8$ ga teng. Ulardan biri ikkinchisidan 3 marta kichik. Shu sonlarning kichigini toping.
A) 1,2 B) 1,4 C) 1,6 D) 2,1 E) 2,2

51. (98-3-1) Berilgan to'rtta sonning har biriga 3 ni qo'shib, so'ngra ularning har birini 2 ga ko'paytirib chiqqach, hosil bo'lgan sonlar yig'indisi 70 ga teng bo'ldi. Berilgan sonlar yig'indisi nechaga teng?
A) 18 B) 19 C) 23 D) 21 E) 20

52. (98-6-3) Qisqarmaydigan oddiy kasrning maxraji suratidan 11 taga ko'p. Agar kasrning suratiga 167 ni, maxrajiga 13 ni qo'shsak, berilgan kasrga teskari kasr hosil bo'ladi. Berilgan kasr maxrajini

toping.
A) 17 B) 15 C) 13 D) 14 E) 16

53. (98-9-57) Ko'paytmaning har bir hadi 2 ga ko'paytirildi, natijada ko'paytma 1024 marta ortdi. Ko'paytmada nechta had qatnashgan.
A) 8 B) 9 C) 10 D) 11 E) 12

54. (98-10-38)* Natural a sonni natural b songa bo'lganda, bo'linma s ga, qoldiq d ga teng bo'ldi. Agar bo'linuvchi va bo'luvchi 2 marta orttirilsa, d qanday o'zgaradi?
A) o'zgarmaydi B) 2 marta kamayadi C) 1 taga oshadi D) 2 marta ko'payadi E) 1 taga kamayadi

55. (98-10-49) Berilgan beshta sonning har biriga 3 ga ko'paytirilib, so'ngra hosil bo'lgan sonlarning har biriga 2 qo'shildi.Hosil bo'lgan sonlar yig'indisi 70 ga teng bo'lsa, berilgan sonlar yig'indisi nechaga teng bo'lgan?
A) 20 B) 22 C) 15 D) 25 E) 24

56. (98-11-53) Qisqarmaydigan oddiy kasrning maxraji suratidan 6 birlikka katta. Agar kasrning surat va maxrajiga 5 ni qo'shsak, hosil bo'lgan kasrning qiymati $\frac{1}{2}$ ga teng bo'ladi. Berilgan kasrning suratini toping.
A) 5 B) 7 C) 6 D) 12 E) 1

57. (96-3-5) Ikki sonning yig'indisi 51 ga, ayirmasi esa 21 ga teng. Shu sonlarni toping.
A) 36; 15 B) 35; 16 C) 37; 14 D) 34; 17 E) 33; 18

58. (99-2-5)* To'rtta sonning yig'indisi 128 ga teng. Agar birinchi va ikkinchi sonning nisbati 2 : 3 kabi, ikkinchi va uchinchi sonning nisbati 3 : 5 kabi, uchinchi va to'rtinchi sonning nisbati 5 : 6 kabi bo'lsa, birinchi va to'rtinchi sonning yig'indisini toping.
A) 60 B) 62 C) 66 D) 68 E) 64

59. (99-3-8)* Proporsiyaning dastlabki uchta hadi yig'indisi 28 ga teng. Uning ikkinchi hadi birinchi hadining $\frac{1}{2}$ qismini, uchinchi hadi esa $\frac{2}{3}$ qismini tashkil etadi. Proporsiyaning oxirgi hadini toping.
A) $4\frac{1}{13}$ B) $4\frac{2}{13}$ C) $4\frac{3}{13}$ D) $4\frac{4}{13}$ E) $4\frac{5}{13}$

60. (00-2-12) 100 ni shunday ikki musbat songa ajratilganki, ulardan biri 7 ga, ikkinchisi 11 ga bo'linadi. Bu sonlar ayirmasining moduli nimaga teng.
A) 8 B) 14 C) 10 D) 12 E) 16

61. (00-4-15) Biror sonni 2 ga bo'lsak, bo'linma berilgan sondan 4 taga katta chiqadi.Berilgan sonni toping.
A) 4 B) 6 C) 8 D) -8 E) -10

62. (00-4-16) Kamayuvchi, ayriluvchi va ayirmaning yig'indisi 624 ga teng. Kamayuvchini toping.
A) 244 B) 194 C) 312 D) 240 E) 188

63. (00-4-17) Anvar bir son o'yladi, bu songa birni qo'shib, so'ngra uni 2 ga ko'paytirdi, ko'paytmani 3 ga bo'ldi va bo'linmadan 4 ni ayirdi, natijada 5 hosil bo'ldi. Anvar qanday son o'ylagan?
A) 7 B) 8 C) 9 D) 6,5 E) 12,5

64. (00-8-2)* Kitob betlarini sahifalab chiqish uchun 1012 ta raqam ishlatildi. Agar sahifalash 3-betdan boshlangan bo'lsa, kitob necha betlik?
A) 374 B) 400 C) 506 D) 421 E) 434

65. (00-8-30) Kasr surati va mahrajining yig'indisi 23 ga teng. Surati maxrajidan 9 ta kam bo'ladi. Kasrni toping.
A) $\frac{7}{16}$ B) $\frac{8}{15}$ C) $\frac{16}{7}$ D) $\frac{10}{13}$ E) $\frac{11}{12}$

66. (00-10-81) Kasr suratiga 2 qo'shilsa, kasr 1 ga, mahrajiga uch qo'shilsa, u$\frac{1}{2}$ ga teng bo'ladi. Shu kasrning $\frac{3}{5}$ qismini toping.
A) $\frac{3}{7}$ B) $\frac{4}{7}$ C) $\frac{3}{5}$ D) $\frac{3}{4}$ E) $\frac{3}{10}$

67. (01-2-12) 434 sonini 15 va 16 ga teskari proportsional sonlarga ajrating.
A) 150 va 284 B) 224 va 210 C) 192 va 242
D) 254 va 180 E) 280 va 154

68. (01-3-27) Kasrning maxraji suratidan 4 birlik ortiq. Agar kasrning surati va maxrajiga 1 birlik ortirilsa,$\frac{1}{2}$ soni hosil bo'ladi. Berilgan kasrning kvadratini toping.
A) $\frac{25}{81}$ B) $\frac{49}{121}$ C) $\frac{9}{49}$ D) $\frac{121}{225}$ E) $\frac{1}{25}$

69. (01-6-3) To'rtta sonning yig'indisi 40 ga teng. Shu sonlardan chetki hadlarining yig'indisi 18 ga va o'rta hadlarining ayirmasi 4 ga teng proportsiya tuzildi. Proportsiyaning chetki hadlari ko'paytmasini toping.
A) 120 B) 117 C) 118 D) 116 E) 119

70. (01-7-11) Ikki sonning yig'indisi 64 ga teng. Shu sonlardan kattasini uning kichigiga bo'lganda, bo'linma 3 ga, qoldiq 4 ga teng chiqdi. Berilgan sonlardan kattasini toping.
A) 54 B) 42 C) 56 D) 49 E) 46

71. (01-11-5) Ikki sonning ayirmasi 24 ga teng. Agar birinchi sonni ikkinchisiga bo'lsak,bo'linma 4 ga, qoldiq 3 ga teng chiqadi. Berilgan sonlarning yig'indisini toping.
A) 31 B) 30 C) 29 D) 42 E) 38

72. (02-1-5) Ikki sonning ayirmasi $\sqrt{6}$ ga, yig'indisi esa $\sqrt{10}$ ga teng. Ularning ko'paytmasi 2 dan qancha kam?
A) 1 B) 2 C) 3 D) 6 E) 4

73. (02-1-31) Son ikki qismga bo'lingan. Birinchi qismining $\frac{1}{4}$ ulushi ikkinchi qismining $\frac{1}{6}$ ulushiga teng. Agar ikkinchi qismining $\frac{1}{18}$ ulushi 13 ga teng bo'lsa,sonning o'zini toping.
A) 252 B) 390 C) 168 D) 170 E) 420

74. (02-1-37) a ning qanday qiymatida $9-a$ va $15-a$ lar qarama-qarshi sonlar bo'ladi?
A) 9 B) 10 C) 12 D) 15 E) 16

75. (02-3-7) Kasr qisqartirilgandan so'ng $\frac{4}{11}$ ga teng bo'ldi. U kasrning surat va maxrajidan 2 ayrilsa, qiymati $\frac{37}{111}$ ga teng bo'ladi. Berilgan kasrning

maxraji suratidan nechta ortiq?
A) 22 B) 28 C) 30 D) 34 E) 26

76. (02-6-6) Ikki sonning yig'indisi $\sqrt{14}$ ga, ayirmasi esa $\sqrt{10}$ ga teng. Shu sonlarning ko'paytmasini toping.
A) 1 B) $\sqrt{140}$ C) $\sqrt{24}$ D) 2 E) 24

77. (02-7-47) a sonining b songa nisbati $\frac{2}{3}$ ga, s sonining b songa nisbati $\frac{1}{2}$ ga teng. s sonining a soniga nisbati nechaga teng?
A) $\frac{3}{4}$ B) $\frac{5}{7}$ C) $\frac{5}{6}$ D) $\frac{2}{3}$ E) $\frac{4}{5}$

78. (02-7-48) Yig'indisi 22 bo'lgan ikki sonning har biridan 5 ni ayirib ko'paytirilganda 32 bo'ladi. Berilgan sonlar ko'paytmasi necha bo'ladi?
A) 117 B) 57 C) 120 D) 221 E) 112

79. (02−7−49)* 331 sonini n natural songa bo'lganda, bo'linma $4n$ bo'lsa,qoldiq nechaga teng bo'ladi?
A) 7 B) 6 C) 5 D) 4 E) 3

80. (02-7-56) $a-3b$ va 3, $3b-a$ va 4 sonlar proportsiyaning ketma-ket hadlari bo'lsa, $\frac{a^2-b^2}{ab}$ kasrning qiymatini toping.
A) $\frac{8}{3}$ B) $\frac{7}{3}$ C) $\frac{6}{5}$ D) $\frac{9}{5}$ E) 2

81. (02-9-9) a sonini 3 ga bo'lgandagi qoldiq 1 ga, 4 ga bo'lgandagi qoldiq esa 3 ga teng. a sonni 12 ga bo'lgandagi qoldiqni toping.
A) 1 B) 3 C) 5 D) 7 E) 9

82. (02-11-3) Ikki xonali son berilgan. Shu sonni 12 ga bo'lganda, qoldiq 8 ga, 14 ga bo'lganda esa qoldiq 2 ga teng bo'ladi. Berilgan sonni 13 ga bo'lgandagi qoldiqni toping.
A) 3 B) 4 C) 5 D) 7 E) 9

83. (03-2-68)* Natural sonlardan iborat ketma-ketlikning ikkinchi hadi birinchi hadidan katta, uchinchi hadidan boshlab har bir hadi o'zidan oldingi ikkita hadning ko'paytmasiga teng. Agar shu ketma-ketlikning to'rttinchi hadi 18 ga teng bo'lsa, uning , ikkinchi va birinchi hadi ayirmasini toping.
A) 1 B) 5 C) 17 D) 1yoki 17 E) 7

84. (03-3-1) Ikki sonning yig'indisi 6 ga,kvadratlarining ayirmasi esa 48 ga teng. Shu sonlarning ko'paytmasini toping.
A) 8 B) -8 C) 7 D) -7 E) 12

85. (03-4-6) Uchta sonning nisbati $1:2:6$ ga, ularning yig'indisi esa 459 ga teng. Shu sonlardan eng kattasining va eng kichigining ayirmasini toping.
A) 245 B) 255 C) 235 D) 275 E) 265

86. (03-5-8) a soni b^2-3 bilan to'g'ri proportsional. $b=5$ bo'lganda , $a=88$ bo'lsa, $b=-3$ bo'lganda, a soni nechaga teng bo'ladi?
A) 24 B) 6 C) 18 D) 12 E) 36

87. (03-6-6) Qanday son $\frac{2}{5}$ qismining $\frac{2}{5}$ qismidan 2 ayrilsa, 6 soni hosil bo'ladi?
A) 20 B) 50 C) 25 D) 15 E) 18

88. (03-6-30) $\frac{5}{7}$ qismi 4 ga teng bo'lgan sonni toping.
A) $5\frac{6}{7}$ B) $5\frac{1}{5}$ C) $5\frac{2}{5}$ D) $5\frac{3}{5}$ E) $5\frac{3}{7}$

89. (03-6-33) 0,23 qismi 690 ga teng sonni toping.
A) 3000 B) 2500 C) 2800 D) 3500 E) 3200

90. (03-7-9) Qanday son $\frac{2}{5}$ qismining $\frac{2}{5}$ qismiga 2 qo'shilsa, 6 soni hosil bo'ladi?
A) 20 B) 50 C) 25 D) 15 E) 18

91. (03-8-21) $25\frac{1}{2}$ sonini 7; 8; 2 sonlariga mutanosib bo'laklarga bo'lgandagi eng kichik sonni toping/
A) 3 B) 4 C) 5 D) 3,5 E) 2,7

92. (03-8-22) Ikki sonning ko'paytmasi 2,88 ga teng. Birinchi ko'paytuvchi 0,3 ga, ikkinchi ko'paytuvchi 1,6 ga bo'linsa, ko'paytma necha bo'ladi?
A) 6 B) 10 C) 12 D) 14 E) 16

93. (03-8-26) $0,4(6)$ qismi 360 sonining $0,6(4)$ qismiga teng sonni toping.
A) $497\frac{1}{7}$ B) $506\frac{2}{7}$ C) $400\frac{3}{7}$ D) $497\frac{5}{7}$ E) $497\frac{4}{7}$

94. (03-8-28) 3591 sonini $1:0,3(8):1,(1):0,3(9):0,(72)$ kabi nisbatda bo'lganda hosil bo'ladigan eng katta sonni toping.
A) 1100 B) 990 C) 1000 D) 1020 E) 720

95. (03-10-7) Ikki sonning yig'indisi 6 ga, ko'paytmasi 7 ga teng bo'lsa, bu sonlar kublarining yig'indisini toping.
A) 90 B) 48 C) 64 D) 72 E) 108

96. (03-10-18) Ikki sonning yig'indisi $2\sqrt{5}$ ga, ko'paytmasi 1,75 ga teng. Shu sonlardan kattasi kichigidan qanchaga katta?
A) $\sqrt{7}$ B) $\sqrt{15}$ C) $\sqrt{13}$ D) $\sqrt{17}$ E) $\sqrt{21}$

97. (03-10-26) Ikki sonning yig'indisi 18 ga, ko'paytmasi esa 61 ga teng. Shu sonlar kvadratlar ayirmasining modulini toping.
A) $70\sqrt{3}$ B) $72\sqrt{5}$ C) $64\sqrt{2}$ D) $76\sqrt{5}$
E) $80\sqrt{2}$

98. (03-11-60) Birinchu son ikkinchi sondan 2,5 ga ortiq. Birinchi sonning $\frac{1}{5}$ qismi ikkinchi sonining $\frac{4}{5}$ qismiga teng. Shu sonlarning yig'indisini toping.
A) 4 B) 6 C) $6\frac{1}{3}$ D) $5\frac{1}{6}$ E) $4\frac{1}{6}$

99. (03-12-5) Ikki sonning ko'paytmasi ularning yig'indisidan 29 ga, ayirmasidan 41 ga ortiq. Shu ikki sondan birini toping.
A) 7 B) 8 C) 9 D) 10 E) To'g'ri javob keltirilmagan

100. (03-12-6) Ikki sonning ayirmasi $\sqrt{7}$ ga teng, ko'paytmasi esa 4,5 ga teng. Shu ikki sonning yig'indisini toping.
A) ± 4 B) 5 C) ± 5 D) $\sqrt{11}$ E) $\pm\sqrt{15}$

101. (03-12-47) Natural sonlardan iborat ketma-ketlikning ikkinchi hadidan boshlab har bir hadi o'zidan oldingi hadning kvadiratidan 5 ning ayrilganiga teng. Agar shu ketma-ketlikning uchinchi hadi 116 ga teng bo'lsa, uning birinchi hadi nechaga

teng?
A) 3 B) 4 C) 5 D) 7 E) 8

102. (97-3-10) Velosipedchin bir soatda butun yo'lning $0,65$ qismini o'tdi, bu esa yo'lning yarmidan $7,5$ km ko'p. Butun yo'lning uzunligini toping.
A) $47,5$ km B) $62,5$ km C) 50 km
D) 65 km E) $42,5$ km

103. (97-6-4) Zavodning uchta sexida 1872 ishchi ishlaydi. Birinchi sexda ikkinchi sexdagidan 5 marta ko'p,uchinchi sexda birinchi va ikkinchi sexdagi ishchilarning soniga teng ishchi ishlaydi. Birinchi sexda qancha ishchi ishlaydi?
A) 760 B) 730 C) 780 D) 820 E) 800

104. (97-7-10) Velosipedchi butun yo'lning $0,6$ qisnini o'tgach, qolgan yo'l, u bosib o'tgan yo'lning yarmidan 4 kmga kamligi ma'lum bo'ldi. Butun yo'lning uzunligini toping.
A) 40 km B) 24 km C) 20 km
D) $36,6$ km E) $42,2$ km

105. (97-10-10) Turist butun yo'lning $0,85$ qisnini o'tganda, ko'zlangan manziligacha $6,6$ km qolgani ma'lum bo'ldi. Butun yo'lning uzunligini necha km?
A) 52 km B) 44 km C) $36,6$ km
D) $64,4$ km E) $40,4$ km

106. (97-11-4) Uchta brigada 768 s makkajuxori yig'ishtirdi. Ikkinchi brigada birinchi brigadaga nisbatan 2 marta ko'p, uchinchi brigada esa ikkala brigada qancha yig'ishgan bo'lsa, o'sancha makka jo'xori yig'di. Ikkinchi brigada qancha makkajo'xori yig'gan?
A) 240 B) 256 C) 210,5 D) 302,8 E) 128

107. (99-10-2) Yaylovda qo'ylar va g'ozlar boqilayotgandi.Bola sanaganda ularning boshlari 30 ta, oyoqlari esa 96 ta chiqdi. Yaylovda qancha qo'y boqilgan?
A) 18 B) 14 C) 10 D) 12 E) 11

108. (00-1-6) Sayohat uchun ma'lum miqdorda pul yig'ish kerak edi. Agar har bir sayohatchi 750 so'mdan to'lasa, to'lovga 1200 so'm yetmaydi,agar har bir sayohatchi 800 so'mdan to'lasa, keragidan 1200 so'm ortib qoladi. Sayohatga necha kishi qatnashishi kerak edi?
A) 38 B) 48 C) 45 D) 46 E) 47

109. (00-3-7) Zovod tomondan bolalar bog'chasiga 36 ta uch g'ildirakli va ikki g'ildirakli velosipedlarni sovg'a qilindi.Agar hamma velosipedlarning g'ildiraklari 93 ta bo'lsa uch g'ildirakli velosipedlar nechta?
A) 15 B) 18 C) 20 D) 21 E) 22

110. (00-8-8) O'quvchiga testda 30 ta masala berildi. Har bir to'g'ri yechilgan masala uchun 7 ball berilib, noto'g'ri yechilgan har bir masala uchun 12 ball chegirildi. Agar o'quvchi 77 ball to'plagan bo'lsa, u necha masalani to'g'ri echgan?
A) 23 B) 26 C) 21 D) 25 E) 19

111. (00-8-36) Agar maydonning har gektaridan 35 s dan bug'doy hosili olinsa, planni bajarish uchun 20 t yetmaydi, agar har gektardan 42 s dan hosil olinsa, plan 50 t oshirib bajariladi. Maydonning yuzi necha gektarga teng?
A) 100 B) 90 C) 110 D) 70 E) 84

112. (01-2-10) Fermada tovuq va qo'ylar bor. Ularning bosh soni jami 170 ta, oyoqlari soni 440 ta. Quylar soni tovuqlarnikidan nechta kam?
A) 50 B) 60 C) 70 D) 80 E) 85

113. (01-2-63)* Birinchi va uchunchi ishchi birgalikda ikkinchi ishchiga qaraganda 2 marta ko'p, ikkinchi va uchinchi ishchi birgalikda birinchi ishchiga qaraganda 3 marta ko'p detal tayyorlashdi. Qaysi ishchi ko'p detal tayyorlagan?
A) aniqlab bo'lmaydi B) birinchi C) ikkinchi
D) uchinchi E) uchala ishchining tayyorlagan detallari teng

114. (01-6-5) Bug'doy hosili 3 kunda yig'ib olindi. Birinchi kuni maydonning $\frac{2}{5}$ qismidagi, ikkinchi kuni 4 ga yerdagi va uchinchi kuni qolgan $\frac{7}{20}$ qism maydondagi hosil yig'ishtirib olingan bo'lsa, necha ga erga bug'doy ekilgan?
A) 12 B) 14 C) 18 D) 16 E) 20

115. (01-8-2) Kostyum paltodan 5950 so'm arzon. Agar palto kostyumdan $1,7$ marta qimmat bo'lsa, kostyum necha so'm turadi?
A) 8750 B) 7550 C) 3500 D) 8500 E) 850

116. (01-10-10) 30 so'mlik va 35 so'mlik daftarlardan jami 490 so'mlik xarid qilindi. Quyida keltirilganlardan qaysi biri 30 so'mlik daftarlar soniga teng bo'lishi mumkin?
A) 5 B) 6 C) 7 D) 8 E) 9

117. (01-10-12) Qizil qalam 11 so'm, ko'k qalam esa 13 so'm turadi. O'quvchi 190 so'mga ko'k va qizil qalamlar sotib oldi. Quyida keltirilganlardan qaysi biri xarid qilingan ko'k qalamlarning soniga teng bo'la olishi mumkin?
A) 5 B) 6 C) 7 D) 8 E) 9

118. (02-1-29) 442 kg olma 25 va 16 kg li katta va kichik yashiklarga joylandi. Katta yashiklarga joylangan olmalar kichik yashiklarga joylanganidan 58 kg ko'p. Kichik yashiklar soni nechta?
A) 10 B) 11 C) 12 D) 13 E) 15

119. (02-1-34) Do'konga birinchi kuni $5,42$ t, ikkinchi kuni birinchi kundagiga qaraganda $2,43$ t. kam, uchinchi kuni esa dastlabki 2 kundagidan $3,21$ t. kam un keltirildi. Uchinchi kuni qancha un keltirilgan?
A) 13,61 B) 2,99 C) 7,85 D) 5,2 E) 6,1

120. (02-1-42) Agar tijoratchi molning 1 kg ini 40 so'mdan sotsa, 1800 so'm zarar ko'radi. 1 kg ini 70 so'mdan sotsa, 900 so'm foyda ko'radi. Tijoratchida necha kg mol bo'lgan?
A) 60 B) 90 C) 70 D) 100 E) 80

121. (02-2-8) 25 metr uzunlikdagi ipni 4 bo'lakka shunday ajratish kerakki, ikkinchi bo'lak birinchi bo'lakdan 2 marta uzun, uchinchi bo'lak birinchi bo'lakdan va to'rtinchi bo'lak ikkinchi bo'lakdan 1 metr qisqa bo'lsin. To'rtinchi bo'lak necha metr?
A) 8 B) 9 C) 7 D) 8,5 E) 7,5

122. (02-3-4) Sinfda o'qiydigan o'g'il bolalar sonining barcha o'quvchilar soniga nisbati $\frac{4}{7}$ ga teng bo'lsa, qiz bolalar sonining o'g'il bolalar soniga nisbati nechaga teng bo'ladi?
A) $\frac{3}{4}$ B) $\frac{3}{5}$ C) $\frac{1}{2}$ D) $\frac{2}{5}$ E) $\frac{3}{7}$

123. (02-3-20) Teploxod birinchi kuni yo'lning yarmini, ikkinchi kuni $\frac{3}{14}$ qismini, uchinchi kuni esa qolgan qismini bosib o'tdi. Teploxod uchinchi kuni yo'lning qancha qismini bosib o'tgan?
A) $\frac{2}{7}$ B) $\frac{5}{14}$ C) $\frac{3}{14}$ D) $\frac{3}{7}$ E) $\frac{1}{7}$

124. (02-6-16) 20 va 25 so'mlik daftarlardan hammasi bo'lib 350 so'mlik xarid qilindi. Quyida keltirilgan sonlardan qaysi biri 25 so'mlik daftarlarning soniga teng bo'lishi mumkin?
A) 4 B) 5 C) 6 D) 7 E) 8

125. (02-6-17) 4 kitob va 3 ta broshyuraning birgalikdagi narxi 260 so'mga, 2 kitob va 2 ta broshyuraniki esa 140 so'mga teng. Broshyura necha so'm turishini aniqlang?
A) 10 B) 20 C) 30 D) 25 E) 35

126. (02-9-1) Fermadagi tovuqlar va qo'ylarning umumiy soni 920 ta, oyoqlari soni 2120 ta. Tovuqlar qo'ylarga qaraganda qancha ko'p?
A) 640 B) 600 C) 340 D) 580
E) to'g'ri javob keltirilmagan

127. (02-10-8) Klubning zalida 320 o'rin bo'lib, qatorlar bo'yicha bir xil taqsimlangan. Yana bir qator qo'yilib, har bir qatordagi o'rinlar sonini 4 taga orttirilgandan keyin zalda 420 o'rin bo'ldi. Endi zaldagi qatorlar soni nechta bo'ldi? (qatorlar soni 15 dan kam emas)
A) 20 B) 18 C) 16 D) 21 E) 24

128. (00-5-12) Sexda 120 ta samovar va 20 ta patnis yasalgan. Sarf qilingan hamma materialning $0,96$ qismi samovarga ketgan. Agar har bir samovarning og'irligi $3,2$ kg dan bo'lsa, har bir patnis necha kg bo'lgan?
A) 0,8 B) 0,04 C) 7,68 D) 0,768 E) 0,4

129. (03-1-60) Futbol chempionatidagi komandalarning barchasi bir-biri bilan bir martadan o'ynagandan keyin, hammasi bo'lib 120 match o'tkazildi. Chempionatda nechta komanda ishtirok etgan?
A) 12 B) 14 C) 15 D) 16 E) 20

130. (03-6-28) Mehnat unumdorligi bir xil bo'lgan 2 ta ekskavator 35 m kanal qazidi. Birinchi ekskavator ikkinchisiga qaraganda $1\frac{1}{2}$ marta ko'p kanal qazidi. Ikkinchi ekskavator necha m kanal qazigan?
A) 13 B) $13\frac{1}{2}$ C) 14 D) $14\frac{1}{2}$ E) 15

131. (03-6-29) 2 o'ram bir xil sim xarid qilindi.Birinchi o'ram 3060 so'm, ikkinchi esa 1904 so'm turadi. Agar birinchi o'ram ikkinchi o'ramdan 17 m uzun bo'lsa, birinchi o'ramda necha m sim bor?
A) 40 B) 45 C) 47 D) 28 E) 35

132. (03-6-31) Avtomobilda ikki kunda mo'ljallangan yo'lning $\frac{6}{7}$ qismi bosib o'tildi. Bunda birinchi kuni ikkinchi kundagiga qaraganda 2 marta ko'p yo'lni o'tildi. Ikkinchi kuni yo'lning qanday qismi bosib o'tilgan?
A) $\frac{1}{7}$ B) $\frac{2}{7}$ C) $\frac{3}{7}$ D) $\frac{4}{7}$ E) $\frac{5}{7}$

133. (03-6-32) Binoni 3 ta bo'yoqchi birgalikda bo'yadi. Birinchisi binoning $\frac{5}{13}$ qismi yuzasini bo'yadi. Ikkinchi esa, uchinchisiga nisbatan 3 marta ko'p yuzani bo'yadi. Uchinchi bo'yoqchi qancha qism yuzani bo'yagan?
A) $\frac{1}{18}$ B) $\frac{1}{13}$ C) $\frac{1}{9}$ D) $\frac{2}{13}$ E) $\frac{1}{6}$

134. (03-6-36) $9,6$ t yukni tushirish uchun bir nechta ishchi jo'natilda. Lekin ulardan 2 tasi boshqa ishga yuborildi. Shu sababli qolgan har bir ishchi $0,24$ t ko'p yuk tashidi. Agar har bir ishchi bir xil miqdordagi yuk tashigan bo'lsa, yukni tushirishda necha kishi ishlagan?
A) 6 B) 9 C) 8 D) 12 E) 10

135. (03-6-38) 46 o'quvchi 10 qayiqda turistik sayrga jo'nashdi. Qayiqlarning bir qismi 4 o'rinli,qolganlari 6 o'rinli edi. Agar qayiqlardagi o'rinlar band bo'lgan bo'lsa, nechta 4 o'rinli qayiq bo'lgan.
A) 4 B) 5 C) 6 D) 7 E) 8

136. (03-10-5) Sinfdagi qizlar soning o'g'il bolalar soniga nisbatan $\frac{5}{7}$ bo'lsa, sinfdagi barcha o'quvchilar soni quyidagilarning qaysi biriga teng bo'lishi mumkin?
A) 36 B) 34 C) 32 D) 30 E) 28

137. (03-10-19) 7 ta kitob va 4 ta jurnalning birgalikdagi bahosi, 4 ta kitob va 7 ta jurnalning birgalikdagi bahosidan 525 so'm ortiq. Kitob jurnalga qaraganda qancha so'm qimmat turishini aniqlang.
A) 150 B) 175 C) 200 D) 125 E) 145

138. (03-11-53) Muqovasiz kitobning bahosi muqovali kitobga qaraganda 300 so'mga arzon. 6 ta muqovasiz kitobning narxi 4 ta muqavali kitobning narxiga qaraganda 200 so'm arzon. kitobning bahosi muqavasiz holda necha so'm bo'ladi.
A) 450 B) 500 C) 475 D) 800 E) 550

139. (03-11-59) Traktorchilar maydonni uch kunda haydab bo'lishdi. Birinchi kuni ular maydonning $\frac{3}{7}$ qismi, ikkinchi kuni butun er maydonining 40% ini, uchinchi kuni qolgan 72 ga maydonni haydashgan bo'lsa, maydonning yuzi necha gektar bo'ladi?
A) 420 B) 450 C) 500 D) 350 E) 520

140. (03-12-9) Suv bilan to'ldirilgan idishning og'irligi 7 kg, yarmigacha to'latilganda esa 3 kg. 750 g. Idish to'ldirilgandagi suvning og'irligini (kg) aniqlang.
A) 5 B) 5,5 C) 6 D) 6,5 E) 5,75

141. (03-12-10) Sexda tokarlar, slesarlar va frezerovshiklar ishlamoqda. Sexda ishlayotgan slesarlarning soni tokarlarning soniga teng, frezerovshiklarning sonidan esa ikki marta ko'p. Sexda ishlayotgan barcha ishchilarning soni quyidagi sonlardan qaysi biriga teng bo'la olishi mumkin?
A) 32 B) 28 C) 25 D) 24 E) 42

142. (96-7-10) Turist butun yuo'lning $0,35$ qismini o't-ganda unga, yo'lning yarmigacha $18,3$ km qolgani ma'lum bo'ldi. Butun yo'lning uzunligini toping.
A) 110 km B) 102 km C) 122 km
D) 98 km E) $78,2$ km

143. (97-1-4)* Poezdda 936 yulovchi bor edi. Agar erkaklar bolalardan 7 marta, ayollar esa 5 marta ko'p bo'lsa, poezdda qancha ayol bo'lgan?
A) 320 B) 350 C) 360 D) 400 E) 375

144. (99-5-8)* Qishloqda bolalar kattalardan 2marta ko'p, nafaqaxo'rlar esa qolgan aholidan 3 marta kam. Agar 15 sonining o'ng va chap tomoniga bir xil raqam yozilsa, qishloq aholisining soni hosil bo'ladi. Bu qanday raqam?
A) 2 B) 3 C) 4 D 6 E) 8

145. (00-9-17)* Lagerda dam olayotgan o'g'il bolalar va qizlarlarning soni teng. 13 yoshgacha bo'lgan bolalar soni 13 yoshdan katta bolalardan 2 marta ko'p. Agar 4 sonining o'ng va chap tomoniga bir xil raqam yozilsa, lagerdagi bolalar soni hosil bo'ladi. Bu qanday raqam?
A) 2 B) 3 C) 4 D 6 E) 8

1.11.2 Prosentga oid masalalar.

1. a soni $t\%$ ga oshirilsa, $(1+\frac{t}{100})\cdot a$ soni hosil bo'ladi. Masalan, a soni 30% ga oshirilsa, $1,3a$; 40% ga oshirilsa, $1,4a$ hosil bo'ladi.

2. a soni t% ga kamaytirilsa, $(1-\frac{t}{100})\cdot a$ soni hosil bo'ladi. Masalan, a soni
30% ga kamaytirilsa, $(1-0,3)a$=$0,7a$;
40% ga kamaytirilsa, $(1-0,4)a$=$0,6a$ hosil bo'ladi.

(98-3-6) Ishchining maoshi dastlab 20% ga, so'ngra yana 20% oshirilgan bo'lsa, uning maoshi necha foizga oshgan?
A) 40 B) 50 C) 42 D) 44 E) 46

Yechish: Ishchining dastlab maoshi x ga teng bo'lsin. Uning maoshi 20% ga oshgandan keyin ishchi
$x+0,2x=1,2x$
miqdorda maosh oladi. Ikkinshi marta 20% ga oshgandan keyin u
$1,2x+0,2\cdot 1,2x=(1,2+0,24)x=1,44x$
miqdorda maosh oladi. Demak, uning maoshi jami $1,44x-x=0,44x$ ga ortadi ekan. J: 44% (D).

1. (96-1-4) Do'konga 96 t karam keltirildi. Agar karamning 80% i sotilgan bo'lsa, do'konda qancha karam qolgan.
A) 16 B) 19,2 C) 24 D) 20,2 E) 18,4

2. (96-1-9) Ikki sonning ayirmasi 33 ga teng. Agar shu sonlardan kattasining 30% i kichigining $\frac{2}{3}$ qismiga teng bo'lsa, shu sonlarni toping.
A) 56 va 23 B) 27 va 60 C) 17 va 50
D) 37 va 70 E) 63 va 30

3. (98-3-4) Ishchining oylik maoshi 350so'm. Agar uning maoshi 30% ortsa, qancha maosh oladi?
A) 405 so'm B) 380 so'm C) 1050 so'm D) 455 so'm E) 595 so'm

4. (96-3-65) Go'sht qaynatilganda o'z vaznining 40% ini yuqotadi. 6 kg qaynatilgan go'sht hosil qilish uchun qozonga necha kg go'sht solish kerak?
A) 8 B) 9 C) 10 D) 11 E) 12

5. (96-6-3) Magazinga keltirilgan tarvuzlarning 56% i birinchi kuni, qolgan 132 tasi ikkinchi kuni sotildi. Birinchi kuni qancha tarvuz sotilgan?
A) 168 B) 148 C) 178 D) 138 E) 158

6. (96-7-4) Ishchining ish normasini bajarishga ketadigan vaqti 20% ga qisqardi. Uning mehnat unumdorligi necha foiz ortgan?
A) 20 B) 15 C) 5 D) 25 E) 10

7. (96-9-5) 40 dan 32 necha prosentga kam?
A) 18 B) 20 C) 22 D) 25 E) 24

8. (96-9-55) Olxo'ri quritilganda 35% olxo'ri qoqisi hosil bo'ladi. 64 kg olxo'ri quritilsa, gancha olxo'ri qoqisi olinadi?
A) 20 B) 18,2 C) 22,4 D) 25 E) 21,4

9. (96-10-9) Ikki sonning ayirmasi 5 ga teng. Agar shu sonlardan kattasining 20% i kichigining $\frac{2}{9}$ siga teng bo'lsa, shu sonlarni toping.
A) 30 va 35 B) 36 va 41 C) 45 va 50
D) 63 va 68 E) 90 va 95

10. (96-10-59) Ikki sonning yig'indisi 24 ga teng. Agar shu sonlardan birining 85% ikkinchisining $\frac{7}{20}$qismiga teng bo'lsa, shu sonlarni toping.
A) 18 va 6 B) 20 va 4 C) 7 va 17
D) 8 va 16 E) 15 va 9

11. (96-10-4) 1 kg yangi uzilgan nokdan 16% quritilgan nok olinadi.48 kg quritilgan nok olish uchun qancha kg yangi uzilgan nok kerak?
A) 300 B) 640 C) 200 D) 240 E) 360

12. (96-11-4) Nafaqaxo'rning oylik nafaqasi 450 so'm. Agar uning nafaqasi 20% ortsa, qancha nafaqa oladi?
A) 540 so'm B) 470 so'm C) 900 so'm
D) 490 so'm E) 810 so'm

13. (96-12-4) Talabaning stipendiyasi 400 so'm. Agar uning stipendiyasi 25% ortsa, qancha stipendiya oladi?
A) 425 so'm B) 500 so'm C) 600 so'm
D) 700 so'm E) 1000 so'm

14. (96-12-63) Go'sht qaynatilganda o'z vaznining 40% ini yuqotadi. 6 kg go'sht qaynatilganda vazni necha kg kamayadi?
A) 2,4 B) 2,2 C) 1,9 D) 2 E) 2,5

15. (96-13-5) 32 dan 60 necha prosent ortiq?
A) 90 B) 82,5 C) 83,5 D) 85 E) 87,5

16. (97-1-5) Noma'lum sonning 28% i $3\frac{1}{3}$ ning 42% iga teng. Noma'lum sonni toping.
A) $4\frac{2}{3}$ B) 5 C) $6\frac{1}{3}$ D) 4,2 E) 6

17. (96-3-4) Ishchining mehnat unumdorligi 20% ortsa, u ish normasini bajarishga ketadigan vaqti necha foizga qisqaradi?
A) 20% B) 25% C) $10\frac{1}{3}$% D) $16\frac{2}{3}$% E) 24%

18. (97-4-5) 30 ta talabadan 25 tasi qishki sinovlarning hammasini topshirdi. Ba'zi sinovlarni topshira olmagan talabalar barcha sinovlarni topshirgan talabalarning necha foizini tashkil etadi?
A) 10% B) 15% C) 20% D) 25% E) 30%

19. (97-5-5) Qutiga 25 kg massali yuk joylandi. Agar qutining massasi yuk massasining 12% ini tashkil etsa, qutining massasini toping.
A) 3 kg B) 3,5 kg C) 4 kg D) 4,5 kg E) 5 kg

20. (97-6-5) Noma'lum sonning 14% i 80 ning 35% iga teng. Noma'lum sonni toping.
A) 120 B) 168 C) 200 D) 280 E) 140

21. (97-8-3) Kutubxonadagi kitoblarning 55% i o'zbek tilida, qolgan kitoblar rus tilida Rus tilidagi kitoblar 270 ta. Kutubxonada o'zbek tilida nechta kitob bor?
A) 325 B) 310 C) 320 D) 315 E) 330

22. (97-9-5) Qutiga 12 kg massali yuk joylandi. Agar qutining massasi yuk massasining 25% ini tashkil etsa, qutining massasini toping.
A) 4 kg B) 3 kg C) 3,5 kg D) 4,5 kg E) 5 kg

23. (97-9-65) Brigada ekin maydonining 180 gektariga paxta, 60 gektariga sholi ekdi. Sholi maydoni paxta maydonining necha foizini tashkil qiladi?
A) $33\frac{1}{3}$ B) 33 C) $33\frac{2}{3}$ D) 34 E) $32\frac{1}{3}$

24. (97-11-5) Noma'lum sonning 36% i 80 ning 45% iga teng. Noma'lum sonni toping.
A) 92 B) 98 C) 108 D) 120 E) 100

25. (97-12-3) Go'sht qaynatilganda o'z vaznining 40% ini yo'qotadi. 6 kg pishgan go'sht olish ushun qancha go'sht qaynatish kerak?
A) 8 kg B) 10 kg C) 10,5 kg D) 9 kg
E) 7,5 kg

26. (98-1-2) Ushbu $2\frac{3}{5}$; $\frac{1}{2}$ sonlar ayirmasining 10% ini toping.
A) 0,22 B) 0,3 C) 0,021 D) 0,03 E) 0,21

27. (98-5-3) Paxtadan 30% foiz tola olinsa, 60 tonna tola olish uchun qancha paxta kerak?
A) 100 B) 400 C) 200 D) 300 E) 180

28. (98-8-2) $2\frac{5}{6}$ va $\frac{1}{2}$ sonlar yig'indisining 25% foizini toping.
A) $1\frac{1}{3}$ B) $1\frac{1}{6}$ C) $1\frac{2}{3}$ D) $\frac{5}{6}$ E) $\frac{11}{12}$

29. (98-10-5) 21 kg shakar va 129 kg boshqa mahsulotlardan muzqaymoq tayyorlandi. Shakar muzqaymoqning necha foizini tashkil etadi?
A) 13 B) 15 C) 16 D) 14 E) 12

30. (98-10-6) Sayyox muayyan masofaning 70%-ni poezda, 29, 8%-ni paroxodda bosib o'tgandan keyin, yo'l oxirigacha yana 200 m qoldi. Sayyox poezda necha km yo'l bosgan?
A) 80 B) 70 C) 85 D) 75 E) 90

31. (98-3-6) Ishchining maoshi dastlab 25% ga, so'ngra yana 25% oshirilgan bo'lsa,uning maoshi necha foizga oshgan?
A) 50 B) 55 C) 55,25 D) 56 E) 56,25

32. (98-12-88) Ikki sonning yig'indisi ularning ayirmasidan 50% ga ortiq. Bu sonlar kvadratlarining yig'indisi ularning ko'paytmasidan necha foizga ko'p?
A) 420 B) 100 C) 150 D) 240 E) 360

33. (99-1-5) Institutdagi talabalarning 35% ini qizlar tashkil qiladi. Yigitlar qizlardan 252 taga ko'p. Talabalarning umymiy sonini toping.
A) 840 B) 640 C) 546 D) 740 E) 830

34. (99-1-6) 520 sonini shunday ikki bo'lakka bo'lingki, ulardan birining 80% i ikkinchisining 24% ini tashkil qilsin. Bo'laklarning kattasini toping.
A) 400 B) 120 C) 420 D) 460 E) 416

35. (99-3-3) 200 ni 30 foizga orttirildi, hosil bo'lgan son 20 foizga kamaytirildi. Natijada qanday son hosil bo'ladi?
A) 206 B) 210 C) 208 D) 212 E) 205

36. (99-4-8) Reja bo'yicha ikki sex 230 ta kir yuvish mashinasi ishlab chiqarishi kerak. Birinchi sex reja boyicha ishlab chiqargan mahsulotning $\frac{2}{9}$ qismini, ikkinchi sex reja bo'yicha ishlab chiqargan mahsulotning 80% iga teng. Ikkinchi sex reja bo'yicha qancha mahsulot ishlab chiqaradi?
A) 50 B) 60 C) 80 D) 40 E) 72

37. (99-5-7) Korxonada mahsulot ishlab chiqarish birinchi yili 10% ga, ikkinchi yili 15% ga oshdi. Mahsulot ishlab chiqarish ikki yil mobaynida necha foizga ortgan?
A) 25 B) 26 C) 27,5 D) 26,5 E) 28,75

38. (99-5-52) Birinchi son 20% ga ikkinchisi 30% ga orttirilsa, ularning ko'paytmasi necha foizga ortadi?
A) 60 B) 50 C) 65 D) 56 E) 40

39. (99-7-5) Bug'doydan 90% un olinadi. 3 t bug'doydan qancha un olish mumkin.
A) 2,5 B) 2,6 C) 2,1 D) 2,9 E) 2,7

40. (99-9-3) Toshkentga kelgan sayyohlarning 75% i ingliz tilini, 47% i esa fransuz tilini biladi. Shu sayyohlardan 22 tasi ikkala tilni ham biladi. Agar shu sayyohlar ingliz va fransuz tilidan boshqa tilni bilishmasa, ularning umumiy soni nechta?
A) 105 B) 100 C) 90 D) 120 E) 85

41. (99-9-5) Mahsulotning bozordagi narxi uning tannarxidan 20% ga qimmat. Bozorda mahsulot yaxshi sotilmagani uchun uning sotuvdagi narxi 5% ga tushirildi.Shundan keyin uning narxi 285 so'mga teng bo'ldi. Mahsulot tannarxini toping.
A) 210 B) 230 C) 250 D) 240 E) 260

42. (00-1-3) Inflyasiya natijasida mahsulotning narxi 25% ga oshirildi. Lekin mahsulotga talabning kamligi tufayli uning narxi 10% ga kamaytirildi. Mahsulotning oxirgi narxi dastlabkisiga qaraganda necha foiz ortdi?
A) 12,8 B) 11,5 C) 12 D) 12,5 E) 15

43. (00-4-26) Imtihon o'tkazilayotgan xonadagi abiturientlarning 56% i qizlar, qolganlari o'g'il bolalar. Xonadagi abiturientlar soni quyidagi sonlardan qaysi biriga teng bo'lishi mumkin?
A) 44 B) 60 C) 80 D) 99 E) 50

44. (00-5-14) Birinchi son 60 ga teng. Ikkinchi son birinchi sonning 80% ini, uchinchisi esa birinchi va ikkinchi son yig'indisining 50% ini tashkil qiladi. Bu sonlar o'rta arifmetigini toping.
A) 60 B) 48 C) 54 D) 50 E) 81

45. (00-5-16) 1750 kg un elanganda, 105 kg kepak chiqdi. Necha prosent un qoldi.
A) 88 B) 94 C) 90 D) 92 E) 96

46. (00-7-6) Mahsulotning narxi birinchi marta 25% ga, ikkinchi marta yangi bahosi yana 20% oshirildi. Mahsulotning oxirgi bahosi necha foizga kamaytirilsa, uning narxi dastlabki narxiga teng bo'ladi?
A) 45 B) 48 C) 50 D) $33\frac{1}{3}$ E) 42

47. (00-9-16) Korxonada mahsulot ishlab chiqarish birinchi yili 20% ga, ikkinchi yili 10% ortdi. Mahsulot ishlab chiqarish ikki yil mobaynida necha foizga ortgan?
A) 50 B) 28 C) 30 D) 32 E) 36

48. (00-9-57) Agar ikkita sondan biri 20% ga, ikkinchisini $12,5\%$ ga kamaytirilsa, ularning ko'paytmasi necha foizga kamayadi?
A) 40 B) 50 C) 45 D) 35 E) 30

49. (01-1-63) Agar sonning 40% ini 5 ga, ko'paytirganda 8 chiqsa, shu sonning o'zini toping.
A) 2 B) 4 C) 6 D) 8 E) 12

50. (01-2-7) Xo'jalikda 12120 ga erga bug'doy, paxta va beda ekildi. Hamma erning 30% iga bug'doy, bedadan 6244 ga ortiq erga paxta ekilgan. Necha ga yerga paxta ekilgan?
A) 3636 B) 7364 C) 1720 D) 6520 E) 3890

51. (01-2-8) O'quvchi birinchi kuni 240 betli kitobning $7,5\%$ ini, ikkinchi kuni undan 12 bet ortiq o'qidi. Kitobni o'qib tugatish uchun o'quvchi yana necha bet kitob o'qish kerak?
A) 18 B) 30 C) 184 D) 192 E) 198

52. (01-2-71) Uy bekasi kilosi 150 so'mdan yong'oq sotib oldi. Yong'oqlar qobig'idan tozalangach, umumiy og'irligining 60% iqoldi.Uy bekasi bir kilogramm tozalangan yong'oq uchun necha so'm sarflagan?
A) 190 B) 180 C) 220 D) 250 E) 280

53. (01-2-72) Xo'jalikda paxta ishlab chiqarish har yili 10% ga ortsa, 3 yilda paxta ishlab chiqarish necha foizga ortadi?
A) 30 B) 32 C) 33 D) 33,1 E) 33,3

54. (01-5-7) Xodimning oylik maoshi ketma-ket ikki marta bir xil foizga oshirilgandan so'ng dastlabki maoshdan 69% ga, oshgan bo'lsa, maosh har gal necha foizga oshirilgan?
A) 30 B) 34,5 C) 40 D) 35 E) 34

55. (01-7-9) IV razryadli ishchi III razryadli ishchiga qaraganda 25% ga ko'p haq oladi. III razryadli ishchi IV razryadli ishchiga qaraganda necha foiz kam xaq oladi?
A) 25 B) 20 C) 18 D) 15 E) 10

56. (01-8-6) Raqamlarining o'rinlarini almashtirganda, qiymati 75% ga ortadigan ikki xonali natural sonlar nechta?
A) 1 B) 2 C) 3 D) 4 E) 6

57. (01-9-30) 11300 ning 36% i va 8400 ning 28% ining yig'indisi shu sonlar yig'indisining 40% idan qancha kam?
A) 1460 B) 1360 C) 1560 D) 1465 E) 1375

58. (01-9-32) Yig'indisi 62 va 38 larining o'rta arifmetigiga teng bo'lishi uchun 62 ning 60% i olinsa, 38 ning necha foizini olish kerak?
A) $32\frac{7}{15}$ B) 33 C) 32 D) $33\frac{12}{17}$ E) $33\frac{13}{19}$

59. (01-10-5) 17 ning 17% ini toping.
A) 1 B) 3,24 C) 2,89 D) 10 E) 2,79

60. (01-10-7) Ishlab chiqarish samaradorligi birinchi yili 15% ga, ikkinchi yili 12% ga ortdi. Shu ikki yil ichida samaradorlik necha foizga ortgan?
A) 27 B) 28 C) 28,6 D) 27,8 E) 28,8

61. (01-10-9) x ning y ga nisbati $6:7$ kabi. y ning z ga nisbati $14:15$ kabi. z ning necha foizini x tashkil etadi?
A) 30 B) 40 C) 50 D) 60 E) 80

62. (01-11-3) Mahsulotni sotishdan olinadigan foyda uning sotuvdagi bahosining 10% ini tashkil etadi. Bu foyda mahsulot tannarxining necha foizini tashkil qiladi?
A) $11\frac{2}{9}\%$ B) $11\frac{1}{9}\%$ C) $12\frac{1}{3}\%$ D) $12\frac{2}{3}\%$
E) $11,5\%$

63. (01-12-26) Firma mahsulotni 380 so'mga sotib, 4 foiz zarar qildi. Shu mahsulotning tannarxini toping.
A) 400 B) 495 C) $395\frac{5}{9}$ D) $395\frac{1}{9}$ E) $395\frac{2}{9}$

64. (01-12-33) Ikkita musbat sonning o'rta arifmetigi $7,5$. Ularning o'rta geometrigi esa o'rta arifmetigining 80% iga teng. Shu sonlarni toping.
A) 6 va 7 B) 5 va 8 C) 3 va 10 D) 12 va 3 E) 11 va 2

65. (02-1-36) Kitob 200 so'm turadi. Uning narxi 2 marta 5% dan arzonlashtirildi. Kitobning narxi necha so'm bo'ldi?
A) 180 B) 180,2 C) 180,3 D) 180,4 E) 180,5

66. (02-2-7) Mehnat unumdorligi 40% oshgach, korxona kuniga 560 ta buyum ishlab chiqaradigan bo'ldi. Korxonada oldin kuniga nechta buyum ishlab chiqarilgan?
A) 400 B) 420 C) 380 D) 440 E) 360

67. (02-6-12) 19 ning 19% ini toping.
A) 1 B) 2,89 C) 3,69 D) 3,61 E) 3,91

68. (02-6-15) a ning b ga nisbati $4:5$, b ning s ga nisbati $7:8$ kabi. s ning necha foizini a tashkil qiladi?
A) 60 B) 75 C) 70 D) 80 E) 50

69. (02-9-2) Birinchi son $0,6$ ga, ikkinchi son $0,15$ ga teng. Birinchi son ikkinchi sondan necha foiz ortiq?
A) 75 B) 25 C) 300 D) 40 E) 175

70. (02-10-44) 6 foizi 30 ning 22 foiziga teng bo'lgan sonni toping.
A) 110 B) 108 C) 96 D) 90 E) 114

71. (02-11-5) Daftarning narxi ketma-ket ikki marta bir xil foizga pasaytirilgandan keyin, 30 so'mdan $19,2$ so'mga tushdi. Daftarning narxi har gal necha foizga pasaytirilgan?
A) 15 B) 16 C) 18 D) 20 E) 25

72. (02-11-8) 20% i $(\sqrt{3}-\sqrt{2}):(\sqrt{3}+\sqrt{2})+2\sqrt{6}$ ga teng bo'lgan sonni toping.
A) 35 B) 15 C) 30 D) 20 E) 25

73. (02-12-1) Ikki sonning yig'indisi 24 ga teng. Shu sonlardan birining 35% i ikkinchisining 85% iga teng. Shu sonlardan kigichigini toping.
A) 3,5 B) 7 C) 6 D) 9 E) 10

74. (03-1-64) Kilosi 600 so'mdan baliq sotib olindi. Tozalangandan keyin baliqning og'irligi dastlabki og'irligining 80% ini tashkil etadi. 1 kg tozalangan baliq necha so'mga tushgan?
A) 480 B) 500 C) 640 D) 720 E) 750

75. (03-2-36) 12% ga arzonlashtirilgandan keyin mahsulotning bahosi 1100 so'm bo'ldi. Mahsulotning dastlabki bahosini aniqlang.
A) 1200 B) 1240 C) 1280 D) 1250 E) 1260

76. (03-2-37) x y ning 50% ini tashkil etadi. y esa z dan 300% ga ko'p. x z dan necha foiz ko'p?
A) 100 B) 80 C) 200 D)250 E) 150

77. (03-2-65) Yil boshida o'g'il bolalar sinfdagi o'quvchilarning 30% ini, qizlar esa 21 nafarni tashkil etadi. Yilning o'rtasida sinfga 6 ta yangi o'g'il bola keldi va 6 ta qiz boshqa sinfga o'tdi. Shundan so'ng o'g'il bolalar sinfdagi o'quvchilarning necha foizini tashkil etadi?
A) 45 B) 50 C) 55 D) 60 E) 75

78. (03-2-66) Bog'dagi daraxtlarning 60% i teraklar. Qolgan daraxtlarning 30% i chinorlar bo'lsa, boshqalari-tollar. Bog'dagi daraxtlarning necha foizini tollar tashkil etadi?
A) 12 B) 18 C) 28 D) 24 E) 32

79. (03-4-2) Mahsulotning narxi ketma-ket ikki marta 10% ga oshirilgandan so'ng 484 so'm bo'ldi. Birinchi ko'tarilgandan so'ng mahsulotning narxi necha so'm bo'lgan?
A) 420 B) 430 C) 450 D) 440 E) 410

80. (03-6-11) Nodirda bor pulning $\frac{1}{8}$ qismi Jahongirdagi pulning $\frac{1}{2}$ qismiga teng. Nodir pulining necha foizini Jahongirga bersa, ularning pullari teng bo'ladi?
A) 25 B) 37,5 C) 40 D) 50 E) 62,5

81. (03-7-16) Nodirda bor pulning $\frac{1}{8}$ qismi Jahongirdagi pulning $\frac{1}{4}$ qismiga teng. Nodir pulining necha foizini Jahongirga bersa, ularning pullari teng bo'ladi?
A) 25 B) 37,5 C) 40 D) 50 E) 62,5

82. (03-8-8) Ikki sonning yig'indisi 15 ga teng, ularning o'rta arifmetigi shu sonlarning o'rta geometrigidan 25% ga katta. Shu sonlar kvadratlarining yig'indisini toping.
A) 117 B) 153 C) 125 D) 113 E) 173

83. (03-8-32) Umumiy daftarning bahosi oldin 15%, keyin 150 so'm arzonlashgach, 190 so'm bo'ldi. Daftarning oldingi bahosi necha so'm bo'lgan?
A) 400 B) 500 C) 350 D) 340 E) 450

84. (01-6-4) x $(x>0)$ ga teskari bo'lgan son x ning 36%ini tashkil etadi. x ning qiymatini toping.
A) $2\frac{1}{3}$ B) $1\frac{2}{3}$ C) $1\frac{1}{3}$ D) $2\frac{2}{3}$ E) $3\frac{1}{3}$

85. (03-10-22) Mahsulotning narxi ketma-ket ikki marta 100% dan oshirildi. Keyinchalik bu mahsulotga talabning kamligi tufayli uning narxi 20% ga kamaytirildi. Mahsulotning keyingi bahosi dastlabki bahosiga qaraganda qanday o'zgargan?
A) o'zgarmagan B) 1,2% ortgan C) 1,8% ga kamaygan D) 3,2% ga kamaygan E) 3,2% ga ortgan

86. (03-10-23) Biznesmen o'z pulining 50% ini yo'qotdi. Qolgan puliga aksiya sotib olgach, u 40% daromad (foyda) oldi. Uning oxirgi puli dastlabki pulining necha foizini tashkil etadi?
A) 60 B) 70 C) 80 D) 100 E) 75

87. (02-10-25) Ikki musbat sondan biri ikkinchisidan 60% ga katta. Shu sonlarning ko'paytmasi 1000 ga teng bo'lsa, ularning yig'indisini toping.
A) 100 B) 50 C) 75 D) 65 E) 55

88. (03-12-48) 720 ning 50% i va 24 ning 500% idan necha foiz ko'p?
A) 100 B) 200 C) 300 D) 320 E) 400

89. (03-12-49) Mahsulotning bahosi 30% ga oshirildi. Ma'lum vaqtdan keyin 20% ga arzonlashtirildi, shundan so'ng uning narxi 7800 so'm bo'ldi. Mahsulotning dastlabki bahosi necha so'm bo'lgan?
A) 6500 B) 6820 C) 7500 D) 9300 E) 8400

90. (03-12-50) A sonning 25% i B sonning 15% iga teng bo'lsa, A soni B sonining necha foizini tashkil etadi?
A) 8,75 B) 87,5 C) 60 D) 40 E) 18,75

1.11.3 Harakatga oid masalalar.

1. S masofa v tezlik bilan t vaqtda bosib o'tilsa, $S = vt$ bo'ladi.

2. A va B punktlar orasidagi masofa S bo'lsin.

   a) A va B lardan qarama-qarshi ikki yo'lovchi v_1 va v_2 tezliklar bilan yo'lga chiqib, t vaqtdan keyin uchrashsa, $v_1t + v_2t = S$ bo'ladi.

   b) A va B lardan bir tomonga ikki yo'lovchi v_1 va v_2 tezliklar bilan yo'lga chiqib, t vaqtdan keyin 1-yo'lovchi 2- siga etib olsa, $v_1t - v_2t = S$ bo'ladi.

3. Qayiqning turg'un suvdagi tezligi v ga, daryo oqimining tezligi u ga teng bo'lsin. U holda qayiq oqim bo'ylab $v+u$, oqimga qarshi esa $v-u$ tezlik bilan suzadi.

(97-12-6) Motosiklchi va velosipedchi bir tomonga qarab harakat qilishmoqda. Velosipedchining tezligi 12 km/soat, motosiklchiniki 30 km/soat va ular orasidagi masofa 72 km bo'lsa, necha soatdan keyin motosiklchi velosipedchini quvib yetadi?
A) 3 B) 4 C) 3,5 D) 2,5 E) 3,8

Yechish: Motosiklchi velosipedchini t soatdan keyin quvib yetsin. t soatda motosiklchi $30t$ km, velosipedchi esa $12t$ km masofa bosib o'tadi. Bu yerdan $30t - 12t = 72$ tenglamani hosil qilamiz. Uni yechib $t = 4$ ekanini topamiz.
Javob: 4 soatdan keyin (B).

1. (96-3-3) Passajir va yuk poezdi bir-biriga tomon harakatlanmoqda. Ular orasidagi masofa 275 km. Yuk poezdining tezligi 50 km/soat. Passajir poezdining tezligi yuk poezdining tezligidan 20% ortiq. Ular necha soatdan keyin uchrashadi?
A) 3 B) 2 C) 2,5 D) 4 E) 3,5

2. (96-3-69) Uzunligi 400 m bo'lgan poezd uzunligi 500 m bo'lgan tunneldan 30 s da o'tib ketdi. Poezdning tezligini toping.
A) 35 m/s B) 30 m/s C) 40 m/s D) 45 m/s E) 25 m/s

3. (96-6-7) Ikki shahardan bir-biriga qarab ikki turist yo'lga chiqdi. Birinchisi avtomashinada, tezligi 62 km/soat. Ikkinchisi avtobusda tezligi 48 km/soat. Agar ular $0,6$ soatdan keyin uchrashgan bo'lsa, shaharlar orasidagi masofani toping.
A) 70 km B) 64 km C) 62 km D) 66 km E) 72 km

4. (96-9-9) Poezdning uzunligi 800 m. Poezdning ustun yonidan 40 s da o'tib ketgani ma'lum bo'lsa, tezligini toping.
A) 30 m/s B) 15 m/s C) 25 m/s D) 20 m/s E) 22 m/s

5. (99-3-9) Yo'lovchilar poezdining 3 soatda yurgan masofasi yuk poezdining 4 soatda yurgan masofasidan 10 km ortiq. Yuk poezdining tezligi yo'lovchilar poezdining tezligidan 20 km/soat ga kam. Yuk poezdining tezligini toping.
A) 40 B) 45 C) 48 D) 50 E) 52

6. (96-12-3) Motosiklchi va velosipedchi bir-biriga tomon harakatlanmoqda. Ular orasidagi masofa 26 km. Velosipedchining tezligi 20 km/soat. Motosiklchining tezligi velosipedchining tezligidan 60% ortiq. Ular necha soatdan keyin uchrashadi?
A) 3 B) $2\frac{1}{2}$ C) 2 D) $1\frac{1}{2}$ E) 0,5

7. (96-12-67) Uzunligi 600 m bo'lgan poezd uzunligi 1200 m bo'lgan tunneldan 1 minutda o'tib ketdi. Poezdning tezligini toping.
A) 35 m/s B) 40 m/s C) 25 m/s D) 30 m/s E) 20 m/s

8. (96-13-9) Uzunligi 400 m bo'lgan poezd uzunligi 800 m bo'lgan tunneldan 1 minda o'tib ketdi. Poezdning tezligini toping.
A) 22 m/s B) 30 m/s C) 15 m/s D) 25 m/s E) 20 m/s

9. (97-2-7) Harakat boshlangandan $0,8$ soat o'tgach, motosiklchi velosipedchini quvib yetdi. Motosiklchining tezligi 42 km/soat, velosipedchiniki 12 km/soat bo'lsa,harakat boshlanishidan oldin ular orasidagi masofa qancha bo'lgan?
A) 24 km B) 22 km C) 26 km D) 20 km E) 28 km

10. (97-7-4) Agar tezlik 25% ga ortsa, ma'lum masofani bosib o'tish uchun ketadigan vaqt necha foizga kamayadi?
A) 25% B) 30% C) 20% D) 16% E) 24%

11. (97-8-7) Oralaridagi masofa 200 km bo'lgan A va B punktlardan bir vaqtning o'zida ikki turist bir- biriga qarama-qarshi yo'lga chiqdi. Birinchisi avtobusda tezligi 40 km/soat. ikkinchisi avtomobilda. Agar ular 2 soatdan keyin uchrashgan bo'lishsa, avtomobilning tezligini toping.
A) 58 km/soat B) 55 km/soat C) 65 km/soat D) 60 km/soat E) 50 km/soat

12. (97-10-4) Muayyan masofani bosib o'tish uchun ketadigan vaqtni 25% ga kamaytirish uchun tezlikni necha foiz orttirish kerak?
A) 25 B) 20 C) $33\frac{1}{3}$ D) 30 E) $24\frac{2}{3}$

13. (99-2-6) It o'zidan 30 m masofada turgan tulkini quva boshladi. It har sakraganda 2 m, tulki esa 1 m masofani o'tadi. Agar it 2 marta sakraganda, tulki 3 marta sakrasa, it qancha (m) masofada tulkini quvib etadi?
A) 110 B) 120 C) 116 D) 124 E) 130

14. (99-9-4) A va B shaharlar orasidagi masofa 188 km. Bir vaqtning o'zida bir-biriga qarab A shahardan velosipedchi, B shahardan motosiklchi yo'lga tushdi va ular A shahardan 48 km masofada uchrashdi. Agar velasipedchining tezligi 12 km/soat bo'lsa, motosiklchining tezligini toping.
A) 45 B) 42 C) 30 D) 32 E) 35

15. (00-4-13) Agar avtomobil tekis harakatda 3 soatda 324 km ni bosib o'tsa, 20 sekundda necha metr masofani bosib o'tadi?
A) 200 B) 300 C) 600 D) 1000 E) 1200

16. (00-4-18) Ikki shahardan bir vaqtning o'zida turli tezlik bilan ikkita avtomobil bir-biriga qarab yo'lga chiqdi. Avtomobillarning har biri uchrashish joyigacha bo'lgan masofaning yarmini bosib o'tgandan keyin, haydovchilar tezlikni $1,5$ baravar oshirishdi, natijada avtomobillar belgilangan muddatdan 1 soat oldin uchrashishdi. Harakat boshlangandan necha soatdan keyin avtomobillar uchrashishdi?
A) 3 B) 4 C) 5 D) 6 E) aniqlab bo'lmaydi

17. (01-1-14) A va B stansiyalar orasidagi masofa 120 km. A stansiyadan B ga qarab yuk poezdi yo'lga chiqdi, oradan 30 minut o'tgach, B stansiyadan A ga qarab yo'lovchi poezdi yo'lga chiqdi. Agar bu poezdlar yo'lning o'rtasida uchrashgan bo'lsa va yo'lovchi poezdning tezligi yuk poezdnikidan 6 km/soat ga ko'p bo'lsa, yo'lovchi poezdning tezligi qanchaga teng bo'ladi?
A) 24 B) 25 C) 27 D) 30 E) 32

18. (01-2-13) Ikki motosiklchi oraliq masofasi 432 km bo'lgan ikki shahardan bir-biriga qarab bir vaqtda yo'lga chiqdi. Agar ulardan birining tezligi 80 km/soat, ikkinchisiniki birinchisi tezligining 80% ini tashkil etsa, ular necha soatdan keyin uchrashadi?
A) 1,5 B) 2 C) 2,5 D) 3 E) 3,5

19. (01-2-61) Poyezd uzunligi 500 m bo'lgan ko'prikdan 1 minutda, semafor yonidan shu tezlikda 20 sekundda o'tadi. Poyezdning uzunligini toping.
A) 200 B) 150 C) 250 D) 175 E) 125

20. (01-5-8) Bir poyezd A punktdan jo'natilgandan 2 soat o'tgach, ikkinchi poyezd ham shu yo'nalishda jo'nadi va 10 soatdan so'ng birinchi poyezdga yetib oldi.Agar ularning o'rtacha tezliklari yig'indisi 110 km/soat bo'lsa, ikkinchi poyezdning o'rtacha tezligi necha km/soat bo'ladi?
A) 60 B) 50 C) 55 D) 65 E) 70

21. (01-9-37) Yo'lovchi metroning harakatlanayotgan eskalatorida to'xtab turib 56 s da, yurib esa 24 s da pastga tushadi. Yo'lovchi to'xtab turgan eskalatorda xuddi shunday tezlik bilan yursa, necha sekundda pastga tushadi?
A) 40 B) 42 C) 41 D) 44 E) 43

22. (01-10-14) Poyezd yo'lda 30 min to'xtab qoldi. Poyezd jadval bo'yicha yetib kelishi uchun mashinist 80 km masofada tezlikni 8 km/soat ga oshirdi. Poyezd jadval bo'yicha qanday tezlik bilan yurishi kerak edi?
A) 40 B) 32 C) 35 D) 30 E) 36

23. (01-10-15) Uzunligi 200 m bo'lgan poyezd balandligi 40 m bo'lgan ustun yonidan 50 sekundda o'tib ketdi. Uzunligi 520 m bo'lgan ko'prikdan shu poyezd o'sha tezlik bilan necha minutda o'tib ketadi?
A) 2 B) 2,5 C) 3 D) 4 E) 4,2

24. (96-11-3) Kater va teploxod bir-biriga tomon harakatlanmoqda. Ular orasidagi masofa 120 km. Teploxodning tezligi 50 km/ soat. Katerning tezligi teploxodning tezligidan 60% kam. Ular necha soatdan keyin uchrashadi?
A) $1\frac{5}{7}$ B) 2 C) $2\frac{1}{4}$ D) $2\frac{1}{3}$ E) $2\frac{1}{5}$

25. (98-2-7) A va B pristanlar orasidagi masofa 96 km. A pristandan oqim bo'ylab sol jo'natildi. Xuddi shu paytda B pristandan oqimga qarshi motorli qayiq jo'nadi va 4 soatdan keyin sol bilan uchrashdi. Agar daryo oqimining tezligi 3 km/soat bo'lsa, qayiqning turg'un suvdagi tezligini toping.
A) 20 km/soat B) 19 km/soat C) 17 km/soat
D) 24 km/soat E) 21 km/soat

26. (98-9-6) Ikki pristan orasidagi masofa 63 km. Bir vaqtning o'zida oqim bo'ylab birinchi pristandan sol, ikkinchisidan motorli qayiq jo'natildi va motorli qayiq solni 3 soatda quvib yetdi. Agar daryo oqimining tezligi 3 km/soat bo'lsa, qayiqning turg'o'n suvdagi tezligi qanchaga teng bo'ladi?
A) 21 B) 20 C) 22 D) 19 E) 18

27. (98-10-10) Daryodagi ikki pristan orasidagi masofa 240 km. Ulardan bir vaqtda ikki paroxod bir-biriga qarab yo'lga tushdi. Paroxodlarning tezligi 20 km/soatga teng. Agar daryo oqimining tezligi 3 km/soat bo'lsa, paroxodlar necha soatdan keyin uchrashishadi?
A) 5,5 B) 6 C) 5 D) 6,5 E) 4

28. (00-3-25) Paroxod oqim bo'yicha A dan B ga 9 sutkada borib, B dan A ga 15 sutkada qaytadi. A dan B ga sol necha sutkada boradi?
A) 45 B) 15 C) 22,5 D) 18 E) 30

29. (00-7-8) Daryodagi A va B pristan orasidagi masofa 84 km ga teng. Bir vaqtning o'zida oqim bo'ylab A pristandan kater (turg'un suvdagi tezligi 21 km/soat), B pristandan sol jo'natildi. Agar daryo oqimining tezligi 3 km/soat bo'lsa qancha vaqtdan keyin kater solga yetib oladi?
A) 3,5 B) 4 C) 4,2 D) 3,6 E) 4,4

30. (01-9-34) Matorli qayiqning daryo oqimi bo'yicha tezligi 21 km/soat dan ortiq va 23 km/soat dan

kam. Oqimga qarshi tezligi esa 19 km/soat dan ortiq va 21 km/soatdan kam. Qayiqning turg'un suvdagi tezligi qanday oraliqda bo'ladi?
A) (18;20) B) (19;21) C) (18;19)
D) (20;21) E) (20;22)

31. (02-1-2) Katerning daryo oqimi bo'ylab va oqimga qarshi tezliklari yig'indisi 30 km/soat. Katerning turg'un suvdagi tezligi (km/soat)ni toping.
A) 15 B) 16 C) 10 D) 18 E) 20

32. (02-5-16) Aerodromdan bir vaqtning o'zida ikkita samolyot biri g'arbga, ikkinchisi janubga uchib ketdi. Ikki soatdan keyin ular orasidagi masofa 2000 km ga teng bo'ldi. Agar samolyotlardan birining tezligi boshqasi tezligining 75% iga teng bo'lsa, ularning tezliklari (km/soat) yig'indisini toping.
A) 1000 B) 800 C) 1200 D) 1400 E) 1500

33. (02-6-19) Kishi harakatsiz eskalatorida 4 minutda, harakatlanayotgan eskalatorda esa 48 sekunda yuqoriga ko'tarildi. Shu kishi harakatdagi eskalatorda to'xtab turgan holda necha minutda yuqoriga ko'tariladi?
A) 1 B) 1,2 C) 1,5 D) 1,8 E) 2

34. (02-9-4) Motosiklchi yo'lga 5 minut kechikib chiqdi. Manzilga o'z vaqtida yetib olish uchun u tezlikni 10 km/soatga oshirdi. Agar masofa 25 km bo'lsa, motosiklchi qanday tezlik (km/soat) bilan harakatlangan?
A) 50 B) 60 C) 40 D) 55 E) 48

35. (02-12-4) Uzunligi 4 km bo'lgan ko'prikdan mashina yuk bilan o'tgandagi vaqt, shu ko'prikdan qaytishda yuksiz o'tgandagi vaqtdan 2 minut ko'p. Mashinaning yuk bilan va yuksiz paytdagi tezliklari orasidagi farq 20 km/soatga teng bo'lsa, uning tezliklarini toping.
A) 30 va 50 B) 35 va 55 C) 45 va 65
D) 42 va 62 E) 40 va 60

36. (03-2-64) Toshbaqa 1 minutda 50 sm yo'l bosadi.U 0,1 km masofani qancha soatda o'tadi?
A) $2\frac{2}{3}$ B) $2\frac{1}{2}$ C) $3\frac{1}{3}$ D) $3\frac{1}{2}$ E) $3\frac{2}{3}$

37. (03-3-10) Paroxod daryo oqimi bo'ylab 48 km va oqimga qarshi shuncha masofani 5 soatda bosib o'tdi. Agar daryo oqimining tezligi soatiga 4 km bo'lsa, Paroxodning turg'un suvdagi tezligini toping.
A) 12 B) 16 C) 20 D) 24 E) 18

38. (03-4-8) Bir vaqtda A va B shaharlardan birbiriga qarab passajir va yuk poezdi yo'lga tushdi. Passajir poyezdining tezligi 60 km/soat, yuk poyezdiniki esa 40 km/soatga teng. poyezdlar 3 soatdan keyin uchrashdi. Uchrashgandan qancha vaqt o'tganidan kiyin yuk poyezdi A shaharga yetib keladi?
A) 4 soat 10 m B) 4 soat 15 m C) 4 soat 20 m
D) 4 soat 25 m E) 4 soat 30 m

39. (03-6-10) Avtomobil butun yo'lning $\frac{3}{7}$ qismini 1 soatda qolgan qismini $1,5$ soatda bosib o'tdi. Uning birinchi tezligi ikkinchi tezligidan necha marta katta?
A) $\frac{2}{3}$ B) $\frac{3}{2}$ C) $\frac{9}{8}$ D) $\frac{8}{9}$ E) $\frac{5}{4}$

40. (03-6-49) Daryo oqimi bo'yicha matorli qayiqda 28 km va oqimga qarshi 25 km o'tildi. Bunda butun yo'lga sarflangan vaqt turg'un suvda 54 km ni o'tish uchun ketgan vaqtga teng. Agar daryo oqimining tezligi 2 km/soat bo'lsa, matorli qayiqning turg'un suvdagi tezligini toping.
A) 10 B) 12 C) 8 D) 11 E) 15

41. (03-7-15) Avtomobil butun yo'lning $\frac{3}{7}$ qismini 1 soatda, qolgan qismini 2 soatda bosib o'tdi. Uning birinchi tezligi ikkinchi tezligidan necha marta katta?
A) $\frac{2}{3}$ B) $\frac{3}{2}$ C) $\frac{9}{8}$ D) $\frac{8}{9}$ E) $\frac{5}{4}$

42. (03-10-4) Orasidagi masofa 384 km bo'lgan ikki mashina bir vaqtda bir tomonga harakat qilmoqda. 12 soatdan keyin orqadagi mashina oldingi mashinaga yetib oldi. Keyingi mashinaning tezligi oldingi mashinaning tezligidan qancha ortiq?
A) 32 B) 16 C) 28 D) 30 E) 42

43. (03-10-35) Soat 9^{00} da ma'lum marshrut bo'yicha tezligi 60 km/soat bo'lgan avtobus jo'natildi. Oradan 40 minut o'tgandan keyin, shu mashrut bo'yicha tezligi 80 km/soat bo'lgan ikkinchi avtobus jo'natildi. Soat nechada ikkinchi avtobus birinchi avtobusni quvib yetadi?
A) 10^{40} B) 11^{20} C) 11^{40} D) 12^{00} E) 12^{20}

44. (03-11-56) Motosiklchi mo'ljaldagi tezlikni 15 km /soatga oshirib, 6 soatda 7 soatda bosib o'tishi kerak bo'lgan masofaga qaraganda 40 km ko'p yo'lni bosib o'tdi. Motosiklchining mo'ljaldagi tezligini toping (km/soat).
A) 60 B) 45 C) 55 D) 50 E) 40

1.11.4 Ishga oid masalalar.

1. Foydali mulohazalar: agar ishchi ishni 48 kunda tugatsa,
   a) 1 kunda ishning $\frac{1}{48}$ qismini tugatadi;
   b) 6 kunda ishning $\frac{1}{48}\cdot 6=\frac{1}{8}$ qismini tugatadi;
   c) 4 ta shunday ishchi 6 kunda ishning $\frac{1}{48}\cdot 4\cdot 6=\frac{1}{2}$ qismini tugatadi;
2. Agar 1-kombayn hosilni x soatda, 2-kombayn y soatda, ikkala kombayn birgalikda hosilni z soatda yig'ib olsa, u holda
$$\frac{1}{x}+\frac{1}{y}=\frac{1}{z}$$
bo'ladi.

(98-10-11) Bir kombayn daladagi hosilni 15 soatda, boshqasi esa shu hosilni 10 soatda yig'ib olishi mumkin. Ikkala kombayn birgalikda hosilni qancha soatda yig'ib olishi mumkin?

A) 7 B) 8 C) 5,5 D) 5 E) 6

Yechish: Yuqoridagi tenglikka $x = 15$, $y = 10$ ni qo'yib z ni topamiz:

$$\frac{1}{z} = \frac{1}{15} + \frac{1}{10} = \frac{2+3}{30} = \frac{5}{30} = \frac{1}{6}, \qquad z = 6.$$

J: $z = 6$ (E).

1. (96-3-67) Qadimiy masala. Meshdagi suv Anvarning o'ziga 20 kunga, ukasiga esa 60 kunga yetadi. Meshdagi suv ikkalasiga necha kunga yetadi?
A) 15 B) 14 C) 12 D) 16 E) 13

2. (96-9-7) Qadimiy masala. Meshdagi suv Anvarning o'ziga 14 kunga, ukasi ikkalasiga esa 10 kunga yetadi. Meshdagi suv Anvarning ukasiga necha kunga yetadi?
A) 35 B) 39 C) 28 D) 26 E) 32

3. (96-12-65) Qadimiy masala. Meshdagi suv Anvarning o'ziga 14 kunga, ukasiga esa 35 kunga yetadi. Meshdagi suv ikkalasiga necha kunga yetadi?
A) 12 B) 10 C) 8 D) 9 E) 7

4. (96-13-7) Qadimiy masala. Meshdagi suv Anvarning o'ziga 35 kunga, akasi ikkalasiga esa 10 kunga yetadi. Meshdagi suv Anvarning akasiga necha kunga yetadi?
A) 20 B) 14 C) 16 D) 15 E) 18

5. (98-2-4) Hovuzdagi suv ikki quvur orqali orqali chiqariladi. Birinchi quvur to'la hovuzni 30 minutda, ikkala quvur birgalikda uni 18 minutda bo'shatadi. Ikkinchi quvur to'la hovuzni necha minutda bo'shatadi?
A) 50 B) 45 C) 42 D) 48 E) 52

6. (98-4-14) Birinchi quvur hovuzni 2 soatda to'ldiradi, ikkinchisi esa uch marta tezroq. Ikkala quvur birgalikda hovuzni qancha vaqtda to'ldiradi?
A) 45 min B) 40 min C) $\frac{1}{2}$ soat D) 25 min E) 35 min

7. (98-12-73) Birinchi quvur hovuzni 3 soatda to'ldiradi, ikkinchisi esa 5 soatda. Ikkala quvur birgalikda hovuzni qancha vaqtda to'ldiradi?
A) $1\frac{7}{8}$ B) $2\frac{1}{2}$ C) $2\frac{1}{5}$ D) $1\frac{4}{5}$ E) 2

8. (99-2-7) Hovuzga 2 ta quvur o'tkazilgan. Birinchi quvur bo'sh hovuzni 10 soatda to'ldiradi, ikkinchisi esa 15 soatda bo'shatadi. Hovuz bo'sh bo'lgan vaqtda ikkala quvur birdaniga ochilsa, hovuz necha soatdan keyin to'ladi?
A) 25 B) 28 C) 30 D) 32 E) 24

9. (00-4-19) Usta muayyan ishni 12 kunda, uning shogirdi esa 30 kunda bajaradi. Agar 3 ta usta va 5 ta shogird birga ishlasalar, o'sha ishni necha kunda bajarishadi?
A) 2,4 B) 3,6 C) 2,5 D) 1,2 E) 2,8

10. (00-7-9) Muayyan ishni bajarishga bir ishchi 3 soat, ikkinchi ishchi esa 6 soat vaqt sarflaydi. Birinchi ishchi 1 soat ishlagandan keyin, unga ikkinchi ishchi qo'shildi. Ikkala ishchi birgalikda qolgan ishni necha soatda tugatishadi?
A) 2 soat 30 min B) 1 soat 40 min C) 1 soat 20 min D) 2 soat E) 1soat 30 min

11. (01-6-7) Bir ishchi buyurtmani 6 soatda, boshqasi esa 10 soatda bajaradi. Ular birgalikda 3 soat ishlaganlaridan keyin ishning qancha qismi bajarilmay qolgan bo'ladi?
A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{5}$ D) $\frac{2}{5}$ E) $\frac{4}{5}$

12. (01-10-13) Birinchi brigada ishni 24 kunda, ikkinchisi esa 16 kunda tamomlay oladi. Agar birinchi brigadaga ikkinchi brigada 4 kun yordamlashsa, birinchi brigada ishni necha kunda tamomlay oladi?
A) 12 B) 14 C) 15 D) 16 E) 18

13. (02-1-32) Biror topshiriqni usta 20 kunda, shogird 30 kunda bajaradi. Ular birgalikda ishlasa, bu topshiriqni necha kunda bajarishadi?
A) 10 B) 12 C) 14 D) 15 E) 16

14. (02-6-18) 12 ta ishchi ma'lum miqdordagi ishni 4 soatda bajaradi. Xuddi shu ishni 3 soatda bajarish uchun necha ishchi kerak?
A) 9 B) 15 C) 16 D) 14 E) 8

15. (03-8-23) Hovuzga uchta quvur o'tkazilgan bo'lib, birinchi va ikkinchi quvurlar birgalikda hovuzni 12 soatda,birinchi va uchinchi quvurlar birgalikda hovuzni 15 soatda, ikkinchi va uchunchi quvurlar birgalikda hovuzni 20 soatda to'ldiradi. Uchala quvur birgalikda ochilsa, hovuzni necha soatda to'ldiradi?
A) 10 B) 8 C) 9 D) 11 E) 7

16. (03-9-7) Ikkita ishchi birgalikda ishlab, ma'lum ishni 12 kunda tamomlaydi. Agar ishchilarning bittasi shu ishning yarmini bajargandan keyin, ikkinchi ishchi qolgan yarmini bajarsa, shu ishni 25 kunda tamomlashi mumkin. Ishchilardan biri boshqasiga qaraganda necha marta tez ishlaydi?
A) 1,2 B) 1,5 C) 1,6 D) 1,8 E) 2,0

17. (03-10-24) Eski traktor maydonni 6 soatda, yangisi esa 4 soatda haydaydi. Shu maydonni 3 ta eski va 2 ta yangi traktor qancha vaqtda haydaydi?
A) 1 soatda B)1,5 soatda C) 2 soatda D) 2,5 soatda E) 45 minutda

18. (03-12-46) Mehnat unumdorligi bir xil bo'lgan 9 kishi ma'lum hajmdagi ishni 15 kunda tugatishdi. 12 kishi o'shancha mehnat unumdorligi bilan ishlasa, o'sha hajmdagi ishni necha kunda tugatishi mumkin?
A) 20 B) $18\frac{1}{2}$ C) $14\frac{1}{4}$ D) $12\frac{3}{4}$ E) $11\frac{1}{4}$

1.11.5 Aralashmaga oid masalalar.

1. Massasi m, konsentrasiyasi $x\%$ bo'lgan eritma massasi n, konsentrasiyasi $y\%$ bo'lgan eritma bilan aralashtirilsa, massasi $m+n$, konsentrasiyasi $z = \frac{mx+ny}{m+n}\%$ bo'lgan eritma hosil bo'ladi.

(98-4-4) Massasi 300 g va konsentrasiyasi 15% bo'lgan eritma massasi 500 g va konsentrasiyasi 9% bo'lgan eritma bilan aralashtirildi.Hosil bo'lgan aralashmaning konsentrasiyasini % ni toping.
A) 12,75 B) 11,75 C) 12,25 D) 11,25 E) 10,75
Yechish: 300 g li eritmada konsentrasiyasi 15% bo'lgan modda miqdori $0,15 \cdot 300 = 45$ g ga, 500 g li eritmada konsentrasiyasi 9% bo'lgan modda miqdori $0,09 \cdot 500 = 45$ g ga teng.Shuning uchun aralashmada bu moddaning miqdori $45 + 45 = 90$ ga teng.Aralashma $300g + 500g = 800g$ bo'lgani uchun 90 g uning $\frac{90}{800} \cdot 100\% = 11,25\%$ ini tashkil qiladi.
J: 11,25% (D).

1. (97-2-3) Qotishma mis va qo'rg'oshindan iborat. Qotishmaning 60% i mis bo'lib, mis qo'rg'oshindan 2 kg ko'p. Qotishmada qancha mis bor?
A) 5 B) 7 C) 6 D) 5,5 E) 6,2

2. (97-5-12) Qo'rg'oshin va misdan quyilgan ikkita quyma bor. Birinchi quymada 3 kg qo'rg'oshin va 2 kg mis bor. Ikkinchi quymada 13 kg qo'rg'oshin va 7 kg mis bor. Qaysi quymada qo'rg'oshinning foiz miqdori ko'p va necha foiz?
A) 1-quymada 5% B) 2-quymada 65%
C) 2-quymada 5% D) 1-quymada 60%
E) 2-quymada 20%

3. (97-9-12) Qo'rg'oshin va misdan quyilgan ikkita quyma bor. Birinchi quymada 2 kg qo'rg'oshin va 6 kg mis bor. Ikkinchi quymada 12 kg qo'rg'oshin va 3 kg mis bor. Qaysi quymada qo'rg'oshinning foiz miqdori ko'p va u necha foiz ko'p?
A) 2-quymada 55% B) 1-quymada 25%
C) 2-quymada 80% D) 2-quymada 45%
E) 1-quymada 55%

4. (98-12-65) Massasi 400 g va konsentrasiyasi 8% bo'lgan eritma massasi 600 g va konsentrasiyasi 13% bo'lgan eritma bilan aralashtirildi.Hosil bo'lgan aralashmaning konsentrasiyasini ($\%da$) ni toping.
A) 11 B) 12 C) 9 D) 10 E) 10,5

5. (00-4-28) Yig'ilgan 1 t mevaning 82% i suvdan iborat. Ma'lum vaqtdan keyin bu mevadagi suvning miqdori 70% ga tushdi. Endi bu mevaning og'irligi necha kg chiqadi?
A) 810 B) 820 C) 700 D) 780 E) 600

6. (00-4-29) Yog'liligi 2% bo'lgan 80 l sut bilan yog'liligi 5% bo'lgan necha litr sut aralashtirilsa, yog'liligi 3% bo'lgan sut olish mumkin?
A) 20 B) 30 C) 40 D) 50 E) 60

7. (00-5-15) 140 g suvga 60 g tuz qo'shish natijasida hosil bo'lgan tuzli eritmada necha prosent tuz bor?
A) 20 B) 30 C) 25 D) 35 E) 45

8. (00-5-20) Bir idishda 40% li, ikkinchi idishda 35% li eritma bor. Ularni aralashtirib, 37% li 1 l eritma olish uchun har bir eritmadan necha litrdan olish kerak?
A) 0,3 va 0,7 B) 0,2 va 0,8 C) 0,4 va 0,6
D) 0,1 va 0,9 E) 0,55 va 0,45

9. (01-11-4) Kumush va misdan iborat qotishmaning og'irligi 2 kg. Kumushning og'irligi mis og'irligining $\frac{1}{7}$ qismini tashkil etadi. Qotishmadagi kumushning og'irligini toping.
A) 310 g B) 300 g C) 270 g
D) 250 g E) 350 g

10. (01-12-14) 15 kg eritmaning 35 foizi tuzdan iborat. Tuzning miqdori 25 foiz bo'lishi uchun eritmaga necha kg chuchuk suv qo'shish kerak?
A) 6 B) 5 C) 5,5 D) 5,25 E) 7

11. (01-12-35) 800 kg mevaning tarkibida 80% suv bor. Bir necha kundan keyin mevaning og'irligi 500 kg ga tushdi. Endi uning tarkibida necha foiz suv bor?
A) 62 B) 68 C) 66 D) 60 E) 64

12. (02-7-52) 20 litr tuzli suvning tarkibida 12% tuz bor. Bu eritmada tuz miqdori 15% bo'lishi uchun necha litr suv bug'lantirishi kerak?
A) 4 B) 3 C) 5 D) 4,2 E) 4,8

13. (03-5-15) Massasi 36 kg bo'lgan mis va rux qotishmasining tarkibida 45% mis bor. Qotishmaning tarkibida 60% mis bo'lishi uchun unga yana necha kg mis qo'shish kerak?
A) 13,5 B) 14 C) 12 D) 15 E) 12,8

14. (03-8-7) Siment va qumdan iborat 30 kg qorishmaning 60%ini siment tashkil etadi. Qorishmaning 40%i simentdan iborat bo'lishi uchun qorishmaga qancha qum qo'shish kerak?
A) 10 B) 12 C) 15 D) 18 E) 20

15. (03-8-25) Qotishma kumush va oltindan iborat bo'lib, o'zaro 3 : 5 nisbatda. Agar qotishmada 0,45 kg oltin bo'lsa, qotishmaning og'irligini (kg) toping.
A) 0,72 B) 0,21 C) 1,21 D) 0,8 E) 0,9

16. (03-10-6) Eritma tarkibida 60 g tuz bor. Unga 400 g toza suv qo'shilsa, tuzning konsentrasiyasi 1,5 marta kamaydi. Dastlabki eritma necha gramm bo'lgan?
A) 800 B) 840 C) 780 D) 900 E) 640

17. (03-12-12) A aralashmaning bir kilogrammi 1000 so'm, B aralashmaning bir kilogrammi esa 2000 so'm turadi. B va A aralashmadan 3 : 1 nisbatda tayyorlangan 1 kg aralashma necha so'm turadi?
A) 1500 B) 1750 C) 1650 D) 1800 E) 1850

1.12 FUNKSIYALAR.

1.12.1 Funksiyalarning xossalari.

1. (96-3-16) Ushbu $f(x) = \frac{x-2}{x^2-1}$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty;1) \cup (1;\infty)$ B) $(0;\infty)$ C) $(-\infty;\infty)$
D) $(-\infty;-1) \cup (-1;1) \cup (1;\infty)$ E) $(-\infty;0)$

2. (96-11-17) Ushbu $F(x) = \frac{x-3}{x^2-4}$ funksiyaning aniqlanish sohasini toping.
A) $(-2;\infty)$ B) $(-\infty;\infty)$

C) $(-\infty;-2)$ D) $(-\infty;-2)\cup(-2;\infty)$
E) $(-\infty;-2)\cup(-2;2)\cup(2;\infty)$

3. (96-12-17) Funksiyaning aniqlanish sohasini toping.

$$f(x)=\frac{x+2}{x^2-1}$$

A) $(-\infty;\infty)$ B) $(-\infty;-1)\cup(-1;1)\cup(1;\infty)$
C) $(-\infty;0)$ D) $(0;\infty)$ E) $(-\infty;-1)\cup(-1;\infty)$

4. (97-4-15) k ning qanday butun qiymatlarida

$$y=\frac{x^2+3x}{x^2+kx+1}$$

funksiyaning aniqlanish sohasi $(-\infty;1)\cup(1;\infty)$ bo'ladi?
A) 4 B) -2 C) 2 D) 1 E) -1

5. (99-1-12) Funksiyaning aniqlanish sohasini toping.
$y=\frac{2x-3}{x(x+2)}$
A) $(-\infty;-2)\cup(-2;0)\cup(0;\infty)$
B) $(-\infty;0)\cup(2;\infty)$ C) $(-\infty;-2)\cup(0;\infty)$
D) $(-\infty;1,5)\cup(1,5;\infty)$ E) $(-\infty;\infty)$

6. (96-1-16) Agar $f(x)=(1+\frac{1}{x}).(7+4x)$ bo'lsa, $f(-\frac{1}{2})$ ni toping.
A) 9 B) -3 C) 15 D) -5 E) 1

7. (96-9-67) Agar $f(x)=(x-\frac{1}{3}).(2x+\frac{1}{4})$ bo'lsa, $f(1)$ ni toping.
A) -4,5 B) $\frac{7}{12}$ C) 4,5 D) 1,5 E) -1

8. (96-10-17) Agar $f(x)=(2x+1)(\frac{3}{x}-3)$ bo'lsa, $f(-1)$ ni toping.
A) 0 B) 6 C) -6 D) -3 E) 18

9. (98-12-93) $f(x)=\begin{cases}2x^2+1, & |x|<3\\ 5x-1, & |x|\geq 3\end{cases}$ funksiya berilgan. $f(x^2+7)$ funksiyani toping.
A) $5x^2-34$ B) $2x^2+8$ C) $5x^2+36$
D) $5x^2+34$ E) $2(x^2+7)^2+1$

10. (00-2-8) Agar $f(x)=x^2-8x+7$ bo'lsa, $f(4-\sqrt{11})$ ni hisoblang.
A) 2 B) $2-\sqrt{2}$ C) $2+\sqrt{11}$ D) 3 E) $5-\sqrt{11}$

11. (96-7-26) Quyidagi funksiyalardan qaysi biri juft?
A) $g(x)=\frac{5x^3}{(x-3)^2}$ B) $g(x)=\frac{x(x-2)(x-4)}{x^2-6x+8}$
C) $g(x)=\frac{9x^2}{x^2-25}$ D) $g(x)=x^2+|x+1|$
E) $g(x)=\frac{x^4-2x^2}{3x}$

12. (97-3-26) Quyidagi funksiyalardan qaysi biri toq?
A) $y=\frac{5x^3}{(x-3)^2}$ B) $y=\frac{x(x-4)(x-2)}{x^2-6x+8}$
C) $y=\frac{9x^2}{x^2-25}$ D) $y=|x+1|+x^2$
E) $y=\frac{x^4-2x^2}{3x}$

13. (97-7-26) Quyidagilardan qaysi biri juft funksiya?
A) $y=\frac{(x-8)^2}{3}$ B) $y=2x|x|+5$
C) $y=\frac{x^4+x^2+1}{2}$ D) $y=\frac{7x}{x^2-9}$
E) $y=|x-3|+5x^2$

14. (97-10-26) Quyidagi funksiyalardan qaysi biri toq?
A) $y=\frac{7x}{x+3}$ B) $y=\frac{3x^4+x^2}{8}$
C) $y=|x+3|-6x$ D) $y=\frac{2x}{x^2-9}$
E) $y=\frac{x(x-8)}{5x+3}$

15. (99-1-13) $y=x|x|$ funksiya uchun qaysi tasdiq to'g'ri?
A) toq funksiya B) juft funksiya
C) kamayuvchi funksiya D) juft funksiya ham emas, toq funksiya ham emas
E) aniqlanish sohasi musbat sonlardan iborat

16. (02-1-13) $g(x)=\frac{x^2+1}{x^2-1}$ funksiya berilgan. $g(\frac{\sqrt{a^2-1}}{a-1})$ ni toping. $(|a|>1)$
A) a B) a^{-1} C) $\sqrt{a}$ D) $2\sqrt{a}$
E) $2a-1$

17. (02-1-26) $y(x)=x^2$ funksiya berilgan. $0,5y(x)-2y(\frac{1}{x})$ ni toping.
A) $\frac{x^4-4}{2x^2}$ B) $\frac{x^3-4}{2x^2}$ C) $\frac{x^4+4}{2x^2}$ D) $\frac{x^4-4}{2}$
E) to'g'ri javob keltirilmagan

18. (02-1-44) Agar $f(x)=\frac{x^2-1}{x^2}$, $g(x)=\frac{1}{x^2}$ bo'lsa, $f(g(2))$ ni hisoblang.
A) -15 B) $\frac{1}{2}$ C) $\frac{3}{4}$ D) $-1\frac{1}{3}$ E) $-\frac{1}{2}$

19. (02-4-5) $y=(x+3)(x^2+x+1)$ funksiya grafigining Oy o'qi bilan kesishish nuqtasi otdinatasini toping.
A) -3 B) 3 C) -1 D) 1 E) 0

20. (02-8-17) Agar $f(x)=\sqrt{x^3-1}$ bo'lsa, $f(\sqrt[3]{x^2+1})$ nimaga teng?
A) $|x|$ B) x C) -x D) 0 E) $\sqrt{2}$

21. (03-1-15) Agar $f(x)=\begin{cases}|x+1|, & x>-2\\ 3-4|x|, & x\leq -2\end{cases}$ bo'lsa, $f(-1)-f(-3)$ ni hisoblang.
A) 0 B) 3 C) 6 D) 4 E) 9

22. (03-2-6) $y=f(x)$ funksiyani aniqlanish sohasi [-1;2] dan iborat. $y=f(1+x)$ funksiyaning aniqlanish sohasini toping.
A) [-2;-1] B) [-2;1] C) [-4;2] D) [-1;0] E) [0;3]

23. (03-3-48) Agar $f(x)=\frac{2x+1}{3x-1}$ bo'lsa, $f(\frac{1}{x})+f(\frac{x}{9})$ funksiyani aniqlang.
A) $\frac{1}{3}$ B) $\frac{x}{3}$ C) $-\frac{x}{3}$ D) $-\frac{1}{3}$ E) $\frac{1}{3x-1}$

24. (03-6-13) $f(\frac{3x-2}{2})=x^2-x-1$. $f(0)-?$
A) $-\frac{5}{9}$ B) $-\frac{13}{9}$ C) $-\frac{7}{9}$ D) -1 E) $-\frac{11}{9}$

25. (03-7-18) $f(\frac{3x-2}{2})=x^2-x-1$. $f(1)-?$
A) $-\frac{5}{9}$ B) $-\frac{13}{9}$ C) $-\frac{7}{9}$ D) -1 E) $-\frac{11}{9}$

26. (03-9-42) Agar $f(x+1)=3-2x$ va $f(\varphi(x))=6x-3$ bo'lsa, $\varphi(x)$ funksiyani aniqlang.
A) $4-3x$ B) $3x-4$ C) $4x+3$
D) $4x-3$ E) $6x-8$

27. (03-11-17) Agar $f(x+2)=x^3+6x^2+12x+8$ bo'lsa, $f(\sqrt{3})$ ni toping.
A) $3\sqrt{3}$ B) $2\sqrt{3}$ C) $4\sqrt{3}$ D) 12 E) $5\sqrt{3}$

1.12.2 Chiziqli funksiya.

1. $y = kx + b$ funksiyaning grafigi Oy o'qini $(0; b)$ nuqtada kesib o'tuvchi to'g'ri chiziqdir. Funksiya
   a) $k > 0$ da o'suvchi;
   b) $k < 0$ da kamayuvchi;
   c) $k = 0$ da o'zgarmas.

2. $y = kx + b$ funksiyaning grafigi Ox o'qi bilan α burchak tashkil etsa, $tg\alpha = k$ bo'ladi.

3. $y = k_1x + b_1$ va $y = k_2x + b_2$ to'g'ri chiziqlar
   a) $k_1 \neq (k_2)$ da kesishadi;
   b) $k_1 = k_2$ da parallel bo'ladi.
   Xususan, $k_1 = k_2$, $b_1 = b_2$ da ustma-ust tushadi;
   $k_1 = k_2$, $b_1 \neq b_2$ da ustma-ust tushmaydi;

4. $a_1x + b_1y = c_1$ va $a_2x + b_2y = c_2$ to'g'ri chiziqlar
   a) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ da kesishadi;
   b) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ da parallel bo'ladi. Xususan,

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

   da ustma-ust tushadi;

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

   da ustma-ust tushmaydi;

5. $(x_0; y_0)$ nuqtadan $ax + by + c = 0$ to'g'ri chiziqqacha masofa:

$$d = \frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}}$$

(99-1-47) $2y = 2x+3$ to'g'ri chiziqning OX o'qi bilan hosil qilgan burchagini toping.
A) 45^0 B) 30^0 C) 60^0 D) 75^0 E) 135^0
Yechish: Tenglikdan y ni topamiz:

$$y = 1 \cdot x + \frac{3}{2}$$

Agar $y = kx + b$ to'g'ri chiziqning OX o'qi bilan hosil qilgan burchagi α bo'lsa, $tg\alpha = k$ formula o'rinli ekanidan foydalanamiz. Bizning holda $k = 1$ bo'lgani uchun $tg\alpha = 1$, ya'ni $\alpha = 45^0$. **Javob:** $\alpha = 45^0$ (A).
(98-3-44) k ning qanday qiymatlarida $kx + 3y + 5 = 0$ va $(k + 1) \cdot x - 2y - 1 = 0$ to'g'ri chiziqlar parallel bo'ladi?
A) -3 va 5 B) $\frac{3}{5}$ C) -5 va 3 D) -3 va 2 E) $-\frac{3}{5}$
Yechish: $kx + 3y + 5 = 0$ tenglikdan $y = -\frac{k}{3}x - \frac{5}{3}$ ni, $(k + 1)x - 2y - 1 = 0$ tenglikdan esa $y = \frac{k+1}{2}x - \frac{1}{2}$ ni topamiz. Ma'lumki ikkita $y = k_1x + b_1$ va $y = k_2x + b_2$ to'g'ri chiziqlar parallel bo'lishi uchun $k_1 = k_2$ bo'lishi kerak. Bu erdan

$$\frac{k+1}{2} = -\frac{k}{3}$$

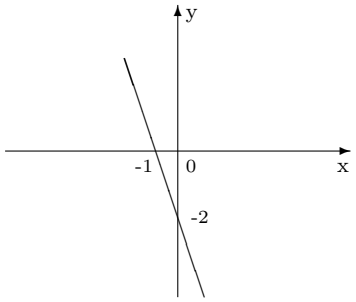
tenglikni hosil qilamiz. Uni yechamiz.

$$3k + 3 = -2k, \quad k = -\frac{3}{5}$$

J: $-\frac{3}{5}$ (E).
(98-3-41) $y = 1$ ga nisbatan $y = 2x + 1$ ga simmetrik bo'lgan to'g'ri chiziqning tenglamasini toping.
A) $y = 2x - 1$ B) $y = 2x + 1$ C) $y = 1 - 2x$
D) $y = 2x$ E) $y = -2x$
Yechish: $y = 2x+1$ to'g'ri chiziqning ikkita nuqtasini olamiz. Masalan,$(0; 1), (1; 3)$. Endi ularga $y = 1$ ga nisbatan simmetrik bo'lgan $(0; 1), (1; -1)$ nuqtalar orqali o'tuvchi to'g'ri chiziq tenglamasini topamiz:
Javob: $y = 1 - 2x$ (C).

1. (96-3-15) Quyidagi nuqtalarning qaysi biri $f(x) = -3x + 4$ funksiyaning grafigiga tegishli?
   A) $(3; -5)$ B) $(-3; 5)$ C) $(5; -3)$
   D) $(2; 4)$ E) $(4; 2)$

2. (96-3-23) Grafigi rasmda tasvirlangan funksiyaning qiymatlari x ning qanday qiymatlarida manfiy bo'lishini tengsizlik yordamida ifodalang?



   A) $x > 0$ B) $x \geq 0$ C) $x \geq -1$
   D) $x > -1$ E) $x \leq -1$

3. (96-7-16) k ning qanday qiymatda $y = kx + 6$ funksiyaning grafigi $M(0,5; 4,5)$ nuqtadan o'tadi?
   A) 3 B) -3 C) -2 D) 4 E) -30

4. (96-12-16) Quyidagi nuqtalarning qaysi biri $f(x) = -4x + 3$ funksiyaning grafigiga tegishli?
   A) $(-1; 1)$ B) $(2; 5)$ C) $(-5; 2)$
   D) $(1; -1)$ E) $(0; -3)$

5. (98-2-14) Koordinata o'qlari $\frac{x}{5} + \frac{y}{12} = 1$ to'g'ri chiziqdan qanday uzunlikdagi kesma ajratadi?
   A) 12,5 B) 13 C) 14 D) 13,5 E) 11,5

6. (98-9-15) Koordinata o'qlari

$$\frac{x}{8} - \frac{y}{6} = 1$$

   to'g'ri chiziqdan qanday uzunlikdagi kesma ajratadi?
   A) 12 B) 14 C) 9 D) 8 E) 10

7. (98-10-42) n ning qanday qiymatida $2y = 8+n-(3n+4)x$ va $3y = 5-2n-(4n-3)x$ tenglamalar bilan berilgan to'g'ri chiziqlarning kesishish nuqtasi OY o'qda yotadi?
   A) 2 B) 1,5 C) $-1,5$ D) 3,5 E) -2

8. (99-3-10) a ning qanday qiymatlarida $2ax+3y = 3$ va $4x + 3y = 7$ to'g'ri chiziqlar kesishish nuqtasining abssissasi manfiy bo'ladi.
   A) $a < 3$ B) $a > 3$ C) $a < 2$
   D) $a > 2$ E) $a > 1$

9. (96-1-26) a ning qanday qiymatlarida $ax+2y=3$ va $2x-y=-1$ to'g'ri chiziqlar kesishadi?
A) $a=3$ B) $a\neq 2$ C) $a\in R$
D) $a\neq -4$ E) $a\neq -2$

10. (99-6-4) k ning qanday qiymatida $y=kx-10$ funksiyaning grafigi $A(-4;14)$ nuqtadan o'tadi?
A) -2 B) -1 C) -6 D) -3 E) -4

11. (99-8-33) $f(-2)=3$ va $f(2)=5$ shartni qanoatlantiruvchi chiziqli funksiyani aniqlang.
A) $f(x)=\frac{1}{2}x+4$ B) $f(x)=2x-1$
C) $f(x)=2x+1$ D) $f(x)=3x+9$
E) $f(x)=x+3$

12. (99-9-13) $y=\sqrt{3}x+2$ va $y=-x+2$ to'g'ri chiziqlarning kesishishidan hosil bo'lgan o'tkir burchakni toping.
A) 65^0 B) 75^0 C) 60^0 D) 85^0 E) 55^0

13. (96-6-13) Agar $k<0$ va $l>0$ bo'lsa, $y=kx+l$ funksiyaning grafigi koordinatalar tekisligining qaysi choraklarida joylashgan?
A) I;II B) I;II;III C) II;I;IV
D) I;III;IV E) II;III;IV

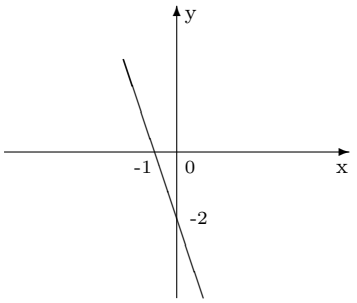
14. (97-2-13) Agar $k<0$ va $l>0$ bo'lsa, $y=kx+l$ funksiyaning grafigi koordinatalar tekisligining qaysi choragida joylashadi?
A) I;II va III B) I va II C) I;III va IV
D) II;III va IV E) I;II va IV

15. (97-8-13) Ushbu $y=kx+l$ ($k<0$ va $l<0$) funksiyaning grafigi qaysi choraklarda joylashgan?
A) I;II va III B) I;III va IV C) II va IV
D) II;III va IV E) I;II va IV

16. (97-12-12) Agar $k>0$ va $l<0$ bo'lsa, $y=kx+l$ funksiyaning grafigi qaysi choraklardan o'tadi?
A) I;II va IV B) III va IV C) II;III va IV
D) I;II va III E) I;III va IV

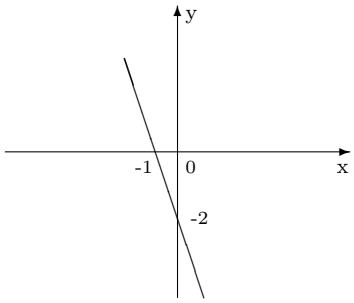
17. (96-11-16) Quyidagi nuqtalarning qaysi biri $f(x)=-2x+5$ funksiyaning grafigiga tegishli?
A) $(1;2)$ B) $(2;1)$ C) $(3;1)$
D) $(2;3)$ E) $(1;-3)$

18. (96-11-24) Grafigi rasmda tasvirlangan funksiyaning qiymatlari x ning qanday qiymatlarida -2 dan kichik bo'lmaydi?



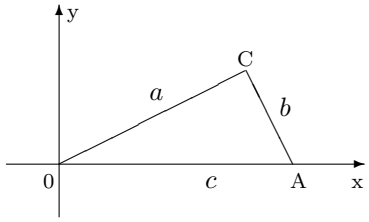
A) $x<0$ B) $x>0$ C) $x\geq 0$
D) $x\leq 0$ E) $x>-1$

19. (96-12-24) Grafigi rasmda tasvirlangan funksiyaning qiymatlari x ning qanday qiymatlarida -2 dan kichik bo'ladi?



A) $x\geq 0$ B) $x>0$ C) $x<0$
D) $x\leq 0$ E) $x>-1$

20. (97-8-60) Rasmda $a=4$; $b=3$ va $c=5$ bo'lsa, OC to'g'ri chiziqning burchak koefisentini toping.



A) $\frac{4}{3}$ B) $\frac{3}{5}$ C) $\frac{4}{5}$ D) $\frac{3}{4}$ E) $\frac{5}{4}$

21. (96-9-77) a va b ning qanday qiymatlarida $ax+by=-4$ va $2x-2y=4$ to'g'ri chiziqlar ustma-ust tushadi?
A) $a=2$; $b=-2$ B) $a=-2$; $b=2$
C) $a=b=2$ D) $a=2$; $b=-1$
E) $a=4$; $b=2$

22. (96-10-27) a ning qanday qiymatlarida $ax+2y=4$ va $y-x=4$ to'g'ri chiziqlar parallel bo'ladi?
A)$a=1$ B) $a=2$ C) $a=-2$
D) $a\in R$ E) $a=-1$

23. (98-10-91) k ning qanday qiymatlarida $kx+3y+1=0$ va $2x+(k+1)y+2=0$ to'g'ri chiziqlar parallel bo'ladi?
A)2 B) -2 C) -3 D) 2 va -2 E) -3 va 2

24. (98-11-14) $y_1=-\frac{41}{5}x$ funksiyaning grafigi $y=kx+\frac{41}{5}$ funksiyaning grafigiga k ning qaysi qiymatida parallel bo'ladi?
A) $(\frac{5}{41})^{-1}$ B) $\frac{5}{41}$ C) $-(\frac{5}{41})^{-1}$ D) $-\frac{5}{41}$ E) $\emptyset$

25. (99-1-46) $x+y=1$ tenglama bilan berilgan to'g'ri chiziqqa parallel to'g'ri chiziqni toping.
A)$2x+2y+3=0$ B) $y=x-1$ C) $x-y=2$
D) $y=x+1$ E) $y=-\frac{1}{2}x+1$

26. (00-5-68) $A(-2;5)$ nuqtadan $5x-7y-4=0$ to'g'ri chiziqqa parallel ravishda o'tuvchi to'g'ri chiziqning tenglamasini ko'rsating.
A)$3x-4y+35=0$ B) $3x+4y-35=0$
C) $5x-7y-45=0$ D) $5x-7y+45=0$
E) $4x-5y+45=0$

27. (00-10-10) k ning qanday qiymatlarida $y_1 = -\frac{21}{5}x$ $y_2 = kx - \frac{21}{5}$ funksiyaning grafiklari o'zaro parallel bo'ladi?
A) $\frac{21}{5}$ B) $\frac{5}{21}$ C) $-(\frac{5}{21})^{-1}$ D) $-\frac{5}{41}$ E) $\emptyset$

28. (98-7-31) OY o'qqa nisbatan $y = -3x + 1$ to'ri chiziqqa simmetrik bo'gan to'g'ri chiziqning tenglamasini ko'rsating.
A)$y = 3x - 1$ B) $y = -3x - 1$ C) $y = 3x + 1$
D) $y = -3x + 1$ E) $y = -\frac{1}{3}x + 1$

29. (98-10-88) $y = x$ ga nisbatan $y = 2x + 1$ ga simmetrik bo'gan to'g'ri chiziqning tenglamasini toping.
A)$y = 2x - 1$ B) $y = \frac{x}{2} - 1$ C) $y = \frac{x}{2} + 1$
D) $y = \frac{x-1}{2}$ E) $y = \frac{x+1}{2}$

30. (98-12-29) OX o'qqa nisbatan $y = 2x + 3$ to'ri chiziqqa simmetrik bo'gan to'g'ri chiziqning tenglamasini ko'rsating.
A)$y = -2x - 3$ B) $y = 2x - 3$ C) $y = -2x + 3$
D) $y = 3x - 2$ E) $y = \frac{1}{2}x + \frac{1}{3}$

31. (01-2-51) $A(3;1)$ nuqtadan o'tuvchi va $y = 2x - 3$ to'ri chiziqqa parallel
bo'lgan to'g'ri chiziqning tenglamasini yozing.
A)$y = 2x - 1$ B) $y = 2x - 5$ C) $y = 3x - 2$
D) $y = 2x - 4$ E) $y = x - 5$

32. (01-2-53) $A(-1;7)$ va $B(3;3)$ nuqtalar orqali o'tuvchi to'g'ri chiziqqa parallel va $C(1;3)$ nuqtadan o'tuvchi to'g'ri chiziq tenglamasini tuzing.
A)$y = -x + 4$ B) $y = 2x + 4$ C) $y = -x - 4$
D) $y = -2x + 4$ E) $y = -2x - 4$

33. (01-3-12) Ushbu

$$(a+3)x + (a^2 - 16)y + 2 = 0$$

to'g'ri chiziq a ning qanday qiymatida abssissa o'qiga parallel bo'ladi?
A) -3 B) 2 C) -2 D) 3 E) 4

34. (01-12-3) $y_1 = \sqrt{3}x + \frac{1}{\sqrt{3}}$ va $y_2 = -\frac{1}{\sqrt{3}}x - \sqrt{3}$ to'g'ri chiziqlar orasidagi burchakni toping.
A)90^0 B) 60^0 C) 80^0 D) 95^0 E) 0^0

35. (01-12-40) m va n ning qanday qiymatlarida $2xm - 3ny = 12$ va $3xm + 2ny = 44$ to'g'ri chiziqlar $(1;2)$ nuqtada kesishadi?
A) $m = 10$, $n = 4$ B) $m = 8$, $n = 6$
C) $m = 4$, $n = 10$ D) $m = 12$, $n = 2$
E) $m = 7$, $n = 7$

36. (02-1-45) Agar barcha x lar uchun $f(x) = 6x - 3$ bo'lsa, $y = f(x-1)$ tenglama bilan aniqlanadigan to'g'ri chiziqning burchak koeffisientini toping.
A) 6 B) 5 C) 7 D) -6 E) -5

37. (02-2-55) $(-4;-1)$ nuqtadan o'tuvchi to'g'ri chiziq Oy o'qini $(0;3)$ nuqtada kesib o'tadi. To'g'ri chiziqning Ox o'qini musbat yo'nalishiga og'ish burchagini toping.
A)45^0 B) 30^0 C) 60^0 D) $arctg2$ E) 35^0

38. (02-5-11) $y = 2x + 5$ va $6x - 3y = 2$ to'g'ri chiziqlar Oxy tekislikning qaysi choragida kesishadi?
A) I B) II C) III D) IV E) kesishmaydi

39. (02-11-11) a ning qanday qiymatlarida $3x - 4y = 3$ va $3x - 2ay = 5$ to'g'ri chiziqlarning kesishish nuqtasi musbat ordinataga ega?
A)$a < 2$ B) $a = 2$ C) $a > 2$
D) $a \in (2;3)$ E) $a > 3$

40. (02-12-5) $y = 2x + 1$ va $y = -2 - x$ funksiyalarning grafiklari qaysi koordinatalar choragida kesishadi?
A) I B) II C) III D) IV E) kesishmaydi

41. (01-4-12) $M(x,y)$ nuqtaning koordinatalari yig'indisi 3 ga teng. Bu nuqta va koordinata boshi orasidagi eng qisqa masofa qanchaga teng bo'ladi?
A)$3\sqrt{2}$ B) $2\sqrt{3}$ C) $1,5\sqrt{2}$ D) $4,5\sqrt{2}$ E) 9

42. (96-3-30) $M(2,2)$ nuqtadan $y = x - 1$ to'g'ri chiziqqacha bo'lgan eng qisqa masofani toping.
A)$\frac{1}{2}$ B) 2,5 C) $\frac{\sqrt{2}}{2}$ D) $\frac{1}{4}$ E) 6,25

43. (96-11-31) $M(2,1)$ nuqtadan $y = x + 2$ to'g'ri chiziqqacha bo'lgan eng qisqa masofani toping.
A)2,25 B) $1,5\sqrt{2}$ C) $\frac{1}{4}$ D) $\frac{1}{2}$ E) $\frac{\sqrt{2}}{2}$

44. (96-12-31) $M(2,2)$ nuqtadan $y = x + 1$ to'g'ri chiziqqacha bo'lgan eng qisqa masofani toping.
A)1,5 B) $\frac{\sqrt{2}}{2}$ C) $\frac{1}{2}$ D) 2,25 E) $\frac{1}{4}$

45. (01-12-2) $y = 2x - 1$ va $y = 2x + 1$to'g'ri chiziqlar orasidagi masofani toping.
A) 1 B) $\frac{\sqrt{3}}{2}$ C) 2 D) $\frac{2}{\sqrt{5}}$ E) $\frac{3\sqrt{3}}{5}$

46. (03-2-35) k ning qanday qiymatida $2x + y = 9$ va $kx + 5y = 18$ to'g'ri chiziqlarning kesishgan nuqtasi to'rtinchi koordinat burchagining bissektrisasiga tegishli?
A)3 B) 7 C) 4 D) 5 E) 9

47. (03-11-30) Koordinatalar boshidan $5x + 12y = 60$ to'g'ri chiziqqacha bo'lgan masofani aniqlang.
A) $4\frac{8}{13}$ B) 5 C) $5\frac{3}{13}$ D) $4\frac{7}{13}$ E) 4,8

48. (03-12-14) a parametrning qanday qiymatida $3x + ay - 13 = 0$ va $2x - 3y + 5 = 0$ to'g'ri chiziqlarning kesishish nuqtasi birinchi koordinat choragining bissektrisasiga yotadi?
A) 0,6 B) $-0,8$ C) 0,4 D) $-0,6$ E) $-0,4$

49. (03-12-32) $3x + 4y + 7 = 0$ va $3x + y - 5 = 0$ to'g'ri chiziqlarning kesishish nuqtasi birinchi koordinata boshidan qanday masofada joylashgan?
A) 5 B) 6 C) 8 D) $8\sqrt{2}$ E) 10

1.12.3 Kvadrat funksiya.

1. $y = ax^2 + bx + c$ $(a \neq 0)$ kvadrat uchhadning grafigi paraboladan iborat va
a) $a > 0$ da parabola shoxlari yuqoriga yo'nalgan;
b) $a < 0$ da parabola shoxlari pastga yo'nalgan;
c) $D > 0$ da parabola Ox o'qi bilan 2 ta umumiy nuqtaga ega;

d) $D=0$ da parabola Ox o'qi bilan 1 ta umumiy nuqtaga ega;
e) $D<0$ da parabola Ox o'qi bilan umumiy nuqtaga ega emas.

2. Parabola uchining koordinatalari:

$$x_0=-\frac{b}{2a},\quad y_0=ax_0^2+bx_0+c=-\frac{D}{4a}.$$

3. Parabola simmetriya o'qining tenglamasi: $x=x_0$.

4. $ax^2+bx+c=0$ tenglamaning x_1, x_2 ildizlari $y=ax^2+bx+$ funksiyaning nollari deyiladi va $\frac{x_1+x_2}{2}=x_0$ bo'ladi.

5. Qiymatlar sohasi:
$a>0$ da $[y_0;\infty)$; $a<0$ da esa $(-\infty;y_0]$

6. $y=f(x)$ funksiyani (a;b) vektorga parallel ko'chirsak $y=f(x-a)+b$ funksiya hosil bo'ladi.

(98-8-24) Agar $B(-2;-7)$ nuqta $y=kx^2+8x+m$ parabolaning uchi bo'lsa, k va m ning qiymatini toping.
A) $k=1$, $m=-9$ B) $k=2$, $m=-1$
C) $k=-1$, $m=-16$ D)$k=-2$, $m=-16$
E) $k=2$, $m=1$
Yechish: Ma'lumki $y=ax^2+bx+c$ parabola uchining abssissasi $x_0=-\frac{b}{2a}$ formuladan topiladi. Shuning uchun $-2=-\frac{8}{2k}$, yani k=2 bo'ladi. Endi $y=2x^2+8x+m$ tenglikka B nuqtaning koordinatalarini qo'yib m ning qiymqtini topamiz. $-7=8-16+m$, $m=1$
J: $k=2, m=1$. (E).

1. (96-6-21) Ushbu $y=x^2-4x+3$ parabolaning uchi koordinatalar tekisligining qayerida joylashgan.
A) to'rtinchi chorakda B) Ox o'qida
C) uchinchi chorakda D) ikkinchi chorakda
E) birinchi chorakda

2. (97-1-15) Ushbu $y=\frac{3+4x-x^2}{2}$ funksiyaning qiymatlari sohasini toping.
A) $(0;\infty)$ B) $(-\infty;1,5]$ C) $[-\frac{1}{2};\infty)$
D)$(-\infty;3,5]$ E) $(-\infty;\infty)$

3. (97-2-21) Ushbu $y=x^2+4x-2$ parabolaning uchi koordinatalar tekisligining qayerida joylashgan.
A) I chorakda B) II chorakda C) OY o'qida
D) III chorakda E) IV chorakda

4. (97-3-16) k ning qanday qiymatida $y=kx^2-2$ funksiyaning grafigi $A(-1;1)$ nuqtadan o'tadi?
A) 4 B) -3 C) 3 D) 2 E) -1

5. (97-8-21) $y=x^2-6x+10$ parabolaning uchi koordinatalar tekisligini qayerida joylashgan.
A) II chorakda B) III chorakda C) OY o'qida
D) IV chorakda E) I chorakda

6. (98-1-17) Agar $f(x)=5+ax^2$ va $q(x)=b-x$ funksiyalar $x=0$ va $x=1$ da bir xil qiymatlar qabul qilsa,a va b ning qiymatini toping.
A) $a=-1$, $b=5$ B) $a=1$, $b=-5$
C) $a=5$, $b=-1$ D)$a=-5$, $b=1$
E) $a=-1$, $b=-5$

7. (98-3-10) $A(0;-2)$, $B(2;-1)$ va $C(4;-2)$ nuqtalardan o'tuvchi parabola qaysi funksiyaning grafigi hisoblanadi?
A) $y=-\frac{1}{2}x^2+2x-3$ B) $y=-\frac{1}{4}x^2+x-2$
C) $y=-\frac{1}{4}x^2+x-3$ D) $y=-\frac{1}{3}x^2+\frac{4}{3}x-\frac{7}{3}$
E) $y=-\frac{1}{2}x^2+2x-2$

8. (98-4-45) $y=kx^2-2kx+3$ va $y=2-kx$ funksiyalarning grafiklari k ning nechta butun qiymatlarida kesishmaydi?
A) 3 B) 2 C) cheksiz ko'p D) 4 E) 5

9. (98-6-31) $y=2x^2+bx+c$ parabolaning uchi $(-3;-5)$ nuqtada joylashgan.Bu funksiya nollarining o'rta arifmetigini toping.
A) -1 B) -2 C) -3 D) 1 E) 5

10. (98-8-17) Agar $f(x)=2-ax^2$ va $g(x)=2b+x$ funksiyalarning qiymatlari $x=-1$ va $x=0$ da teng bo'lsa, a va b ning qiymatini toping.
A) $a=-1$, $b=1$ B) $a=1$, $b=1$
C) $a=1$, $b=-1$ D)$a=5$, $b=-1$
E) $a=2$, $b=2$

11. (98-10-14) t ning qanday qiymatlarida $y=tx^2-4x+t$ funksiyaning grafigi OX o'qining yuqori qismida joylashadi?
A) $t\in[0;2)$ B) $t\in(0;2)$ C) $t\in(-2;2)$
D) $t\in[-2;2]$ E) $t\in(2;\infty)$

12. (98-10-59) $A(1;1)$, $B(0;3)$ va $C(2;3)$ nuqtalardan o'tuvchi parabola qaysi funksiyaning grafigi hisoblanadi?
A) $y=2x^2+2x-3$ B) $y=2x^2-2x-3$
C) $y=2x^2-4x+3$ D) $y=2x^2-3x+2$
E) $y=2x^2+3x-2$

13. (98-11-79) m ning qaysi qiymatida $y=1$ to'g'ri chiziq, $y=x^2-2x+m$ parabolaga urinadi?
A) 4 B) 1 C) 3 D) 2 E) 5

14. (98-12-94) $y=(k-2)x^2-3kx+2$ va $y=kx^2+kx+4$ funksiyalarning grafiklari kesishmaydigan k ning barcha butun qiymatlari yig'indisini toping.
A) 0 B) 1 C) -2 D) 3 E) 5

15. (99-3-11) a ning qanday qiymatlarida $y=9x^2-12x+35a$ parabola abssissalar o'qi bilan ikkita umumiy nuqtaga ega bo'ladi?
A) $a=\frac{4}{35}$ B) $a<\frac{4}{35}$ C) $a>\frac{4}{35}$
D) $a<\frac{18}{35}$ E) $a>\frac{18}{35}$

16. (99-9-15) Quyidagi parabolalardan qaysi biri OX o'qi bilan kesishadi?
1) $y=2x^2-5x+8$; 2) $y=-2x^2-8x-8$;
3) $y=x^2-3x-8$; 4) $y=-3x^2+6x-12$
A) 1 B) 2 C) 3 D) 4 E) hech qaysisi

17. (99-10-20) Koordinatalar boshidan $y=x^2-4x+3$ parabolaning simmetriya o'qigacha bo'lgan masofani toping.
A) 3 B) 1 C) 2,5 D) 1,5 E) 2

18. (00-1-9) t ning qanday qiymatlarida tenglamasi

$$y = tx^2 + 16tx + 68t$$

bo'lgan parabola OX o'qidan yuqorida yotmaydi?
A) $(-\infty; 0)$ B) $(0; 4)$ C) $(-\infty; -4)$
D) $(-\infty; -4) \cup (4; \infty)$ E) $(-4; 0)$

19. (00-2-26) $A(1; 9)$ nuqta $y = -x^2+ax+4$ parabola grafigiga tegishli. Parabola uchining ordinatasini toping.
A) 13 B) 6 C) 4 D) 2 E) 7

20. (00-2-28) $y = x^2$ parabolani $\vec{a}(-3; 2)$ vektor bo'yicha parallel ko'chirganda, uning tenglamasi qanday bo'ladi?
A) $y = x^2+6x+11$ B) $y = x^2+5$ C) $y = x^2-1$
D) $y = x^2 + 9$ E) $y = x^2 + 4x - 9$

21. (00-5-37) $y = -6x^2+7x-2$ kvadrat funksiyaning nollari yig'indisini toping.
A) $-1\frac{1}{6}$ B) $1\frac{5}{6}$ C) $\frac{1}{6}$ D) $1\frac{1}{6}$ E) $\frac{5}{6}$

22. (00-6-11) a ning qanday qiymatlarida $y = ax^2 + 4x + c$ parabolaga koordinata o'qlarini A(1;0) va B(0;4) nuqtalarda kesib o'tadi?
A) -8 B) 4 C) -4 D) 1 E) $\emptyset$

23. (00-7-22) a ning qanday qiymatida $y = x^2 - 4x + 12 - a$ parabolaganing uchi M(2;4) nuqtada yotadi?
A) 3 B) 2 C) 4 D) 5 E) 6

24. (00-10-50) Ushbu $10x^2 + 20x - 30 < 0$ tengsizlikning yechimlari to'plamida $q = 10x^2-20x-30$ qanday qiymatlar qabul qiladi?
A) $-40 < q < 120$ B) $q \in R$ C) $q > 0$
D) $0 < q < 30$ E) $q < 0$

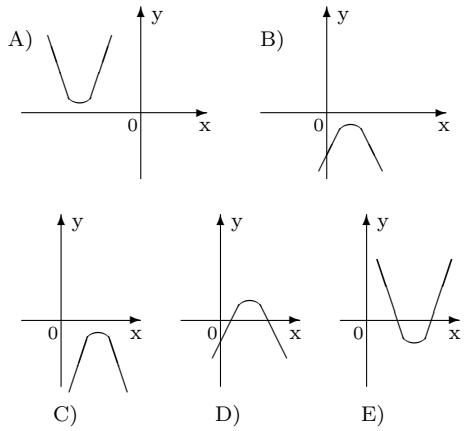
25. (97-12-21) Agar $a < 0$ va $b^2 - 4ac < 0$ bo'lsa, $y = ax^2 + bx + c$ funksiya grafigi koordinatalar tekisligining qaysi choraklarida joylashgan?
A) I, II B) III, IV C) II, III D) I, II va IV
E) I,II,III va IV

26. (98-11-13) Ushbu $y = -3x^2+8x-8$ funksiyaning grafigi qaysi choraklarda joylashgan?
A) II, III, IV B) barcha choraklarda
C) III, IV D) I, II, III E) I, III ,IV

27. (00-8-11) Ushbu $f(x) = -4x^2+2x-1$ funksiyaning grafigi koordinatalar tekisligining qaysi choraklarida joylashgan?
A) III; IV B) I; II; III C) I; III D) II; IV
E) I; II; III; IV

28. (00-10-9) Ushbu $y = -2x^2 + 4x - 8$ funksiyaning grafigi qaysi choraklarda joylashgan?
A) II, III, IV B) I, II, III, IV C) I, III, IV
D) I, II, III E) III ,IV

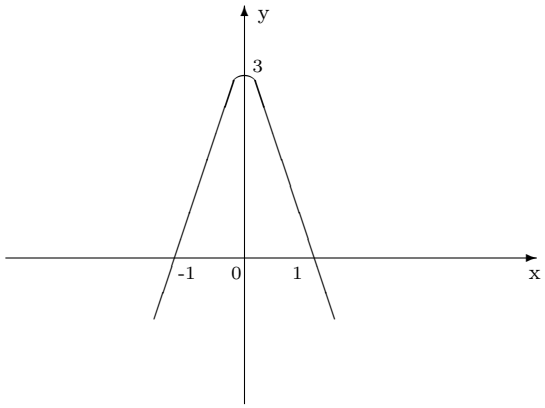
29. (96-6-22) Ushbu $y = ax^2 + bx + c$ ($a > 0$, $b^2-4ac > 0$) funksiyaning grafigi quyidagilardan qaysi biri bo'lishi mumkin?



A) A rasm B) B rasm C) C rasm
D) D rasm E) E rasm

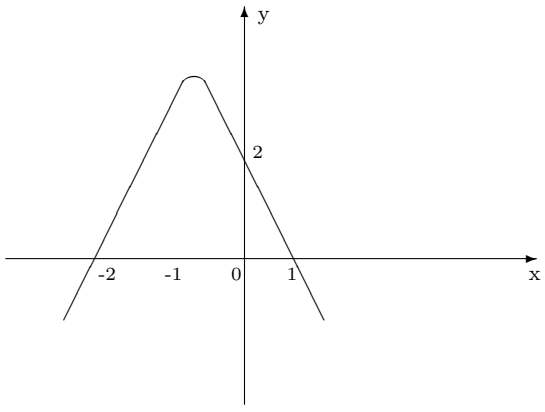
30. (97-2-22) Agar $a > 0$ va $b^2 - 4ac < 0$ bo'lsa, $y = ax^2 + bx + c$ funksiya grafigi koordinatalar tekisligining qaysi choraklarida joylashgan?
A) I, IV B) I, II va IV C) faqat IV
D) III, IV
E) I, II

31. (98-1-16) Rasmda qanday funksiyaning grafigi tasvirlangan?



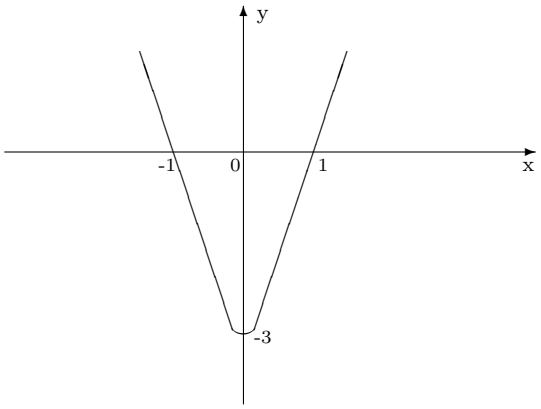
A) $y = 3x-x^2$ B) $y = 3x^2-3$ C) $y = 3(1-x^2)$
D) $y = x^2 + 3x$ E) $y = 3x^2 + 3$

32. (98-2-12) Quyida keltirilgan funksiyalardan qaysi birining grafigi rasmdagi paraboladan iborat?



A) $y = (x+2)\cdot(x+1)$ B) $y = (x-2)\cdot(1-x)$
C) $y = (x+2)\cdot(x-1)$ D) $y = (x+2)\cdot(1-x)$
E) $y = (2-x)\cdot(1-x)$

33. (98-8-16) Rasmda qaysi funksiyaning grafigi tasvirlangan?



A) $y = x^2+3x$ B) $y = 3(x^2+1)$ C) $y = 3-3x^2$
D) $y = 3(x^2-1)$ E) $y = 2x^2-3$

34. (01-9-38) $y = x^2+px+q$ parabola $x = 5$ nuqtada OX o'qiga urinadi. $\frac{q}{p}$ ni toping.
A) 1 B) -2 C) 2,5 D) -2,5 E) 2

35. (01-9-40) a ning qanday qiymatlarida $y = x^2 - 2(a+1)x + 1$ parabolaning uchi $y = \frac{3}{4}$ to'g'ri chiziqdan pastda, $y = ax^2 - x + d$ parabolaning uchi esa shu to'g'ri chiziqdan yuqorida yotadi?
A) $(-0,5;1)$ B) $(-0,25;0) \cup (1;\infty)$
C) $(-1,5;-0,5) \cup (2;\infty)$ D) $(-1,5;-0,25)$
E) $(-0,25;1)$

36. (01-12-9) a ning qanday haqiqiy qiymatlarida $y_1 = x^2 - x + a$ parabola $y_2 = x^2 - x - a^2$ parabola ichida yotadi?
A) $(0;1)$ B) $[-1;0]$ C) $(-1;0)$ D) $[-1;0)$
E) $(-\infty;-1) \cup (0;\infty)$

37. (01-12-18) a ning qanday qiymatlarida $y = 2ax+1$ va $y = (a-6)x^2 - 2$ funksiyalarning grafiklari kesishmaydi?
A) $(-3;6)$ B) $(-\infty;6) \cup (3;\infty)$
C) $\emptyset$ D) $(-6;0)$ E) $(-6;3)$

38. (01-12-41) t ning qanday qiymatlarida $f(x) = 3x^2+2tx-(t-1)^2$ funksiya $f(-1) = -2$ shartni qanoatlantiradi?
A) ± 3 B) ± 1 C) 3 D) -3 E) ± 2

39. (01-2-25) Ushbu

$$y = 4x^2 + 4x + 1 \quad \text{va} \quad y = 2x + 1$$

funksiyalar grafiklari kesishish nuqtalarining koordinatalarining yig'indisini toping.
A) -0,5 B) 1 C) 0,5 D) 1,5 E) -1

40. (00-9-64) Ushbu $y = \sqrt{x - x^2}$ funksiyaning qiymatlar sohasini toping.
A) $[0;1]$ B) $[\frac{1}{2};1]$ C) $[0;\frac{1}{2}]$ D) $[0;2]$ E) $[1;\sqrt{2}]$

41. (98-11-66) Ushbu $y = \sqrt{9 - x^2}$ funksiyaning qiymatlar sohasini ko'rsating.
A) $(-\infty;\infty)$ B) $[-3;3]$ C) $[0;\infty)$
D) $[0;3]$ E) $[0;9]$

42. (02-3-30) $y = kx - 7$ to'g'ri chiziq va $y = ax^2 - 13x+17$ parabola absissalari 4 va 2 ga teng bo'lgan nuqtalarda kesishadi. $k-a$ ayirmaning qiymatini toping.
A) 2 B) -2 C) 3 D) -3 E) 1

43. (02-5-12) m ning qanday qiymatlarida $y = (m+4)x^2 - 2(m+2)x + 1$ kvadrat uch hadning grafigi absissalar o'qidan pastda joylashgan?
A) $(-\frac{1}{4};1)$ B) $(-2;1)$ C) $\emptyset$
D) $(-\infty;\infty)$ E) $(-\infty;-4) \cup (-4;\infty)$

44. (02-7-40) $y = x^2 - 4x + 7$ parabola $\vec{a}(2;3)$ vektor yordamida parallel ko'chirishdan hosil bo'lgan kvadrat funksiyani yozing.
A) $y = x^2 - 8x + 22$ B) $y = 2x^2 - 6x + 10$
C) $y = x^2 - 6x + 10$ D) $y = x^2 - 8x + 7$
E) $y = x^2 - 6x - 10$

45. (02-10-50) $y = 2x^2 - 6x + 17$ funksiya grafigining simmetriya o'qi tenglamasini ko'rsating.
A) $x = 1,5$ B) $y = 4x - 6$ C) $y = 3$
D) $x = 6$ E) $y = 2x + 17$

46. (02-11-18) $y = -3x^2+12x-16$ parabola uchining koordinatalari yig'indisini toping.
A) -1 B) 1 C) 0 D) -2 E) 2

47. (02-11-19) a ning nechta butun qiymatida $y = (x-4a)^2 + a^2 + 10a + 21$ parabola uchining absissasi musbat, ordinatasi esa manfiy bo'ladi?
A) 0 B) 1 C) 2 D) 3 E) 4

48. (02-12-28) k ning qanday qiymatlarida $(k+2)^2-4x-1$ uchhadning qiymati x ning barcha haqiqiy qiymatlarida noldan kichik bo'ladi?
A) $k < -4$ B) $k < -2$ C) $k < -5$
D) $k < -5,5$ E) $k < -6$

49. (03-1-4) $y = x^2 + bx + 4$ parabola b ning nechta butun qiymatida absissalar o'qiga urinadi?
A) 0 B) 1 C) 2 D) 3 E) 4

50. (03-5-22) $y = x^2+4(a-2)x+5$ parabolaning uchi $x + a = 0$ to'g'ri chiziqda yotsa, a ning qiymatini toping.
A) 4 B) 8 C) -4 D) -2 E) 1

51. (03-5-23) $y = (a-2)x^2 - (a-2)x + 6$ va istalgan x haqiqiy son uchun $y > 5$ bo'lsa, a soni qaysi oraliqda bo'ladi?
A) $(2;6)$ B) $(1;5)$ C) $[2;6)$ D) $(0;5)$ E) $\emptyset$

52. (03-5-34) $y = ax^2+c$ funksiyaning grafigi $A(-1;-3)$ va $B(3;0)$nuqtalardan o'tishi ma'lum bo'lsa, $\frac{c}{a}$ ning qiymati nechaga teng.
A) -9 B) 9 C) -8 D) -10 E) $\frac{8}{27}$

53. (03-6-50) x ning qanday qiymatlarida $y = x^2$ funksiyaning qiymati 9 dan katta bo'ladi?
A) $-3 < x < 3$ B) $x < -3$ C) $x > 3$
D) $x \le -3$ E) $x < -3$, $x > 3$

54. (03-7-57) m ning qanday qiymatida $y = mx + 2$ to'g'ri chiziq va $y = -5x^2$ parabola absissasi $x = -1$ bo'lgan nuqtada kesishadi?
A) 3 B) -3 C) -7 D) 7 E) 5

55. (03-8-18) a ning nechta butun qiymatida $y=(x-2a)^2+a^2-9a+14$ parabola uchining absissasi musbat, ordinatasi esa manfiy bo'ladi?
A) 1 B) 2 C) 4 D) 5 E) 6

56. (03-8-46) $y=-2x^2+5x-3$ funksiyaning eng katta qiymatini toping.
A) $\frac{1}{8}$ B) $\frac{1}{4}$ C) 5 D) -3 E) $\frac{1}{2}$

57. (03-11-69) $y=-3x^2+bx+c$ parabolaning uchi $M(-4;3)$ nuqtada yotadi. $b+c$ ning qiymatini toping.
A) -72 B) -55 C) -57 D) -48 E) -69

1.12.4 Aralash bo'lim.

1. $y=f(x)$ va $y=g(x)$ funksiyalar grafiklari kesishgan nuqtalarning absissalari $f(x)=g(x)$ tenglamaning ildizlari bo'ladi.

(00-3-59) Agar $f(x+1)=x^2-3x+2$ bo'lsa, $f(x)$ ni toping.
A) x^2-3x-1 B) x^2-5x+1 C) x^2-5x+6
D) x^2-4 E) $4-x^2$

Yechish: $x+1=t$ deb olamiz. U holda $x=t-1$ bo'ladi. uni $f(x+1)=x^2-3x+2$ tenglikka qo'yamiz. U holda

$f(t)=(t-1)^2-3(t-1)+2=t^2-2t+1-3t+3+2=t^2-5t+6.$

J: $f(x)=x^2-5x+6$ (C).

1. (96-3-28) $x\to 3$ da $f(x)=\frac{x^2-9}{x+3}$ funksiya qanday songa intiladi?
A) 0 B) 3 C) 6 D) -6 E) -3

2. (96-11-29) Funksiya qanday songa intiladi?
$x\to 2$ da $F(x)=\frac{x^2-4}{x-2}$
A) -4 B) 4 C) 6 D) 8 E) -8

3. (96-12-29) $x\to -3$ da $f(x)=\frac{x^2-9}{x-3}$ funksiy qanday songa intiladi?
A) 6 B) 0 C) -3 D) -6 E) 3

4. (97-7-16) k ning qanday qiymatlarida $y=\frac{k}{x}-1$ funksiyaning grafigi $C(-\frac{1}{2};-3)$ nuqtadan o'tadi?
A) 1 B) -2 C) -1 D) $\frac{1}{2}$ E) 4

5. (97-10-16) k ning qanday qiymatida $y=kx^3+2$ funksiyaning grafigi $B(-2;10)$ nuqtadan o'tadi?
A) 2 B) 1 C) $-0,5$ D) -1 E) -3

6. (98-4-41) $f(x)=1-2x$ funksiya berilgan. Agar $f(\varphi(x))=x$ bo'lsa, $\varphi(x)$ funksiyani toping.
A) $\frac{1-x}{2}$ B) $\frac{x+1}{2}$ C) $\frac{x-1}{2}$ D) $\frac{2x-1}{4}$ E) $\frac{1-2x}{3}$

7. (98-11-12) $y=|x-2|+1$ va $y=5$ funksiyalar grafiklari kesishgan nuqtalar absissalari kvadratlarining yig'indisini toping.
A) 52 B) 32 C) 40 D) 36 E) 48

8. (98-12-41) Parallel ko'chirish natijasida grafiklari ustma-ust tushadigan funksiyalarni ko'rsating.
1) $y=3x^3$; 2) $y=-3x^3$
3) $y=-\frac{1}{3}x^3$; 4) $y=\frac{1}{3}x^3$
A) bundaylari yo'q B) 1;2 C) 3;4
D) 1;3 E) hammasi

9. (99-2-22) Ushbu $y=x^2$, $y=|x|$ funksiyalar grafiklarining OX o'qida yotmaydigan kesishish nuqtalari orasidagi masofani toping.
A) 2 B) 2,5 C) 2,3 D) 1,5 E) 1,8

10. (99-4-15) $y=\frac{k}{x+2}$, $(k>0)$ funksiyaning grafigi qaysi choraklar orqali o'tadi?
A) I va III B) II va IV C) I, III, IV
D) I, II va III E) I, II va IV

11. (99-5-40) Ushbu $f(x)=|x-1|+|x-3|$ funksiyaning qiymatlar sohasini toping.
A) $[0;\infty)$ B) $[1;\infty)$ C) $[2;\infty)$
D) $[3;\infty)$ E) $[4;\infty)$

12. (99-7-32) Ushbu $y=\sqrt[4]{x}$ funksiya uchun quyidagi mulohazalardan qaysi biri noto'g'ri?
A) toq funksiya
B) grafigi $(16;2)$ nuqtadan o'tadi
C) aniqlanish sohasida o'suvchi
D) grafigi I chorakda joylashgan
E) aniqlanish sohasi $[0;\infty)$ oraliqdan iborat

13. (99-10-19) $y=\frac{1}{x^2}$ va $y=x^2$ funksiyalarning grafiklari kesishgan nuqtalaridan o'tuvchi to'g'ri chiziqning tenglamasini toping.
A) $y=x$ B) $y=-1$ C) $y=1$
D) $y=x+1$ E) $y=x-1$

14. (00-1-42) Funksiyaning qiymatlar to'plamini toping.

$$f(x)=\frac{|x-2|}{x-2}+2$$

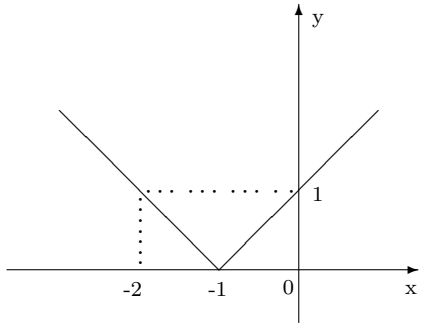
A) $[1;3]$ B) $(1;3)$ C) $[1;3)$ D) $\{1;3\}$ E) $(1;3]$

15. (00-3-60) Argumentning qaysi qiymatida

$$y=\frac{5x}{2|x+1|-5}$$

funksiya 2 ga teng?
A) $-\frac{4}{3}$ B) $-\frac{5}{3}$ C) -2 D) $-\frac{14}{9}$ E) 1

16. (96-1-15) Rasmda qiyidagi funksiyalardan qaysi birining grafigi keltirilgan?



A) $y=|x-1|$ B) $y=|x+1|$ C) $y=|x|-1$
D) $y=\frac{1}{|x|+1}$ E) $y=\frac{1}{|x|-1}$

17. (00-7-17) Koordinata boshidan $y=x^2$ va $y=\frac{1}{x}$ funksiyalarning grafiklari kesishgan nuqtagacha bo'lgan masofani aniqlang.
A) 2 B) 1,5 C) $\sqrt{2}$ D) $\frac{1}{2}\sqrt{2}$ E) 1

18. (00-9-43) $f(x) = 2x^2$ va $\varphi(x) = x + 1$ bo'lsa , x ning nechta qiymatida $f(\varphi(x)) = \varphi(f(x))$ bo'ladi?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

19. (00-9-45) Funksiyaning qiymatlar sohasini toping.

$$f(x) = |x + 2| + |x + 8|$$

A) $[0; \infty)$ B) $[3; \infty)$ C) $[4; \infty)$
D) $[6; \infty)$ E) $[5; \infty)$

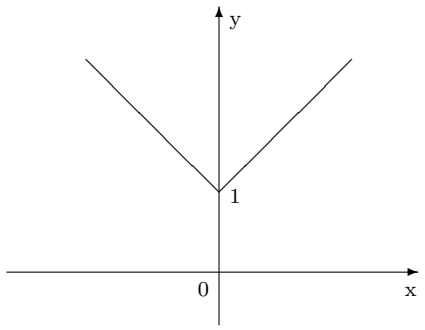
20. (00-9-60) Agar

$$f(x - 1) = x^2 + 3x - 2$$

bo'lsa, $f(x)$ ni aniqlang.
A) $x^2 + 2x - 3$ B) $x^2 + 5x - 4$ C) $x^2 + 5x + 2$
D) $x^2 - x - 2$ E) $x^2 - 6x + 5$

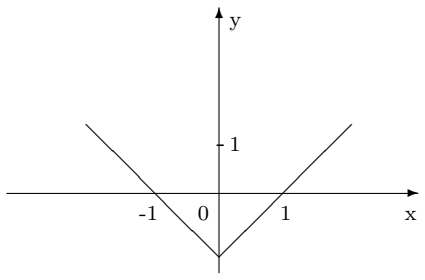
21. (00-10-8) $y = |x - 1| - 5$ va $y = 0$ funksiyalar grafiklari kesishgan nuqtalar absissalarining kvadratlari
yig'indisini toping.
A) 36 B) 48 C) 24 D) 52 E) 32

22. (96-9-66) Rasmda qiyidagi funksiyalardan qaysi birining grafigi keltirilgan?



A) $y = |x-1|$ B) $y = |x+1|$ C) $y = |x|+1$
D) $y = \frac{1}{|x|}$ E) $y = |x| - 1$

23. (96-10-16) Rasmda qiyidagi funksiyalardan qaysi birining grafigi keltirilgan?



A) $y = |x-1|$ B) $y = |x+1|$ C) $y = |x|-1$
D) $y = 1 + |x|$ E) $y = 2|x|$

24. (01-6-18) p ning qanday qiymatida tenglamasi $x^2 + y^2 = 64$ bo'lgan aylana va $y = x^2 + p$ funksiyaning grafigi uchta umumiy nuqtaga ega bo'ladi.
A) 8 B) 6 C) -8 D) -6 E) -7

25. (01-7-46) Agar $f(x) = \frac{1-x}{1+x}$ bo'lsa, $f(\frac{1}{x}) + \frac{1}{f(x)}$ ning qiymatini toping.
A) $\frac{4x}{1-x^2}$ B) $\frac{4x}{x^2-1}$ C) $\frac{x^2+1}{x^2-1}$
D) $\frac{2(x^2+1)}{x^2-1}$ E) $\frac{2(x^2+1)}{1-x^2}$

26. (01-11-14) Ushbu $y = x^4$ va $y = 2x^2-1$ funksiyalarning grafiklari nechta umumiy nuqtaga ega?
A) 4 B) 3 C) 1 D) 2
E) umumiy nuqtaga ega emas

27. (02-1-53) Agar $y = x^3 + 1$ va $-1 < x < 2$ bo'lsa, y qanday oraliqda o'zgaradi?
A) $(-1; \infty)$ B) $(0; 9)$ C) $(1; 8)$
D) $(-1; 9)$ E) $(2; 9)$

28. (02-7-13) $f(x) = \frac{3}{x-4}$ funksiyaning qiymatlar to'plamini toping.
A) $(-\infty; 0) \cup (0; \infty)$ B) $(-\infty; 4) \cup (4; \infty)$
C) $(-\infty; 3) \cup (3; \infty)$ D) $(-\infty; -1) \cup (-1; \infty)$
E) $(-\infty; \infty)$

29. (02-7-22) x ning qanday qiymatlarida $y = \frac{3x-1}{x+2}$ funksiyaning qiymatlari 2 dan kichik emas?
A) $(-\infty; -2) \cup [5; \infty)$ B) $(-2; 5]$ C) $[5; \infty)$
D) $(-2; \frac{1}{3}]$ E) $[4; 5]$

30. (02-12-42) $y = x^2$ va $y = \sqrt{8x}$ funksiyalar grafiklarining kesishish nuqtalaridan o'tadigan to'g'ri chiziqning tenglamasini yozing.
A) $y = 1,5x$ B) $y = x$ C) $y = 2,5x$
D) $y = 2x$ E) $y = 0,5x$

31. (02-12-47) $y = ax^3 + b$ kubik parabolaning grafigi $A(1; 18)$ va $B(-1; 14)$ nuqtalardan o'tadi. Qaysi nuqtada bu funksiyaning grafigi OX o'qini kesib o'tadi?
A) $(0; 2)$ B) $(-3; 0)$ C) $(3; 0)$
D) $(-2; 0)$ E) $(-2,5; 0)$

32. (03-6-40)

$$y = \frac{x}{|x|}$$

funksiyaning grafigi koordinatalar tekisligining qaysi choragida joylashgan?
A) III B) IV C) II, III D) I E) I, III

33. (03-9-47) $f(x) = \frac{4}{\sqrt{x^2+16}}$ $(-3 \le x \le 3)$ funksiyaning eng katta va eng kichik qiymatlari ayirmasini toping.
A) $-0,2$ B) 0,2 C) 0,4 D) $-0,8$ E) 0,8

34. (03-11-16) $y = \frac{2}{5+|3x^2+x-2|} - 2$ funksiyaning eng katta qiymati nechaga teng?
A) $-1,6$ B) $-1,2$ C) $1,4$ D) $-0,8$ E) $-1,8$

35. (03-11-79) $y_1 = x - 2, y_2 = \sqrt{(x-2)^2}, y_3 = (\sqrt{x-2})^2$ funksiyalarga nisbatan quyidagi mulohazalarning qaysi biri to'g'ri?
A) uchala funksiyaning grafigi bir xil
B) birinchi va ikkinchi funksiyaning grafigi ustma-ust tushadi
C) birinchi va uchinchi funksiyaning grafigi ustma-ust tushadi

D) ikkinchi va uchunchi funksiyaning grafigi ustma-ust tushadi
E) uchala funksiyaning grafigi turlicha

36. (03-12-26) $y = |x-1| + |x-3|$ funksiyaning eng kichik qiymatini toping.
A) 3 B) 4 C) 2 D) 1 E) 0

37. (03-12-70) Agar $f(x) = x^4 - 2x^2 + 1$ bo'lsa, $f(1+a) - f(1-a)$ nimaga teng?
A) $8a^3$ B) $4a^2 + 2a$ C) $a^3 + 8$
D) $a^4 + 4a^3$ E) 4

1.12.5 Teskari funksiya.

(98-6-14) Qaysi nuqta $y = x^3 + 5x - 2$ funksiyaga teskari funksiyaning grafigiga tegishli?
A) $(-2;1)$ B) $(0;-2)$ C) $(4;1)$ D) $(-8;1)$ E) $(4;5)$
Yechish: Agar (x_0, y_0) nuqta berilgan funksiyaning grafigiga tegishli bo'lsa, u holda (y_0, x_0) nuqta unga teskari funksiyaning grafigiga tegishli bo'ladi. Shu sababli javoblarda keltirilgan nuqtalarning ordinatalarini berilgan funksiyaga qo'yib tekshiramiz. $y(1) = 4$ bo'lgani uchun $(1;4)$ nuqta berilgan funksiyaning grafigiga tegishli bo'ladi. Demak, $(4;1)$ nuqta unga teskari funksiyaning grafigiga tegishli ekan.
Javob: $(4;1)$ (C).

1. (97-1-9) Quyidagilardan qaysi biri $y = \frac{3}{x+1} - 2$ funksiyaga teskari funksiya?
A) $y = \frac{3}{x-2}$ B) $y = \frac{x+1}{3} - 2$ C) $y = \frac{x+1}{3} - \frac{1}{2}$
D) $y = \frac{3}{x-2} + 1$ E) $y = \frac{3}{x+2} - 1$

2. (97-6-9) Quyidagilardan qaysi biri $y = \frac{2}{x-1} - 1$ funksiyaga teskari funksiya?
A) $y = 1 - \frac{2}{x+1}$ B) $y = 2 - \frac{3}{x}$ C) $y = -\frac{2}{x+1}$
D) $y = \frac{3}{x-2}$ E) $y = \frac{2}{x+1} + 1$

3. (97-11-9) Quyidagilardan qaysi biri $y = \frac{3}{2-x} - 1$ funksiyaga teskari funksiya?
A) $y = x - 2$ B) $y = \frac{3}{x-2} + 1$ C) $y = \frac{x-2}{3} + 1$
D) $y = 2 - \frac{3}{x+1}$ E) $y = \frac{2-x}{3} + 1$

4. (98-11-15) Ushbu $y = 2x^2 - \frac{1}{2}$ $(x \geq 0)$ funksiyaga teskari bo'lgan funksiyani aniqlang.
A) $\sqrt{2x+1} \cdot 2^{-1}$ B) $\sqrt{2x+1} \cdot 4^{-1}$
C) $\sqrt{2x+1} \cdot 2^{-1} - \frac{1}{2}$ D) $\sqrt{2x+1} \cdot 4^{-1} - \frac{1}{2}$
E) $\sqrt{2x+1} \cdot 2^{-1} + \frac{1}{2}$

5. (99-3-29) Funksiyaga teskari funksiyani toping.

$$y = \frac{x-1}{2-3x}$$

A) $y = \frac{2-3x}{x-1}$ B) $y = -\frac{2-3x}{x-1}$ C) $y = \frac{2-3x}{1-x}$
D) $y = \frac{2x+1}{3x+1}$ E) $y = \frac{3x+1}{2x+1}$

6. (00-3-61) Ushbu $y = x^2 - 4x + 7$ funksiyaga $(-\infty; 2]$ oraliqda teskari funksiyani toping.
A) $2 \pm \sqrt{x-3}$ B) $2 - \sqrt{x-3}$ C) $2 + \sqrt{x-3}$
D) $2 + \sqrt{3-x}$ E) $2 \pm \sqrt{3-x}$

7. (00-10-11) $y = \frac{6x+2}{x}$ funksiyaga teskari funksiyani aniqlang.
A) $y = \frac{4}{x-6}$ B) $y = \frac{2}{x-6}$ C) $y = \frac{4}{x+6}$
D) $y = \frac{2}{x+6}$ E) $y = -\frac{2}{x-6}$

8. (01-1-66) Ushbu $y = x^2 - 8$ $(x \geq 0)$ funksiyaga teskari bo'lgan funksiyaning aniqlanish sohasini toping.
A) $(-8;\infty)$ B) $[-8;\infty)$ C)$(-8;8)$
D) $[-8;8]$ E) $(-8;8]$

9. (01-8-19) Ushbu $y = \frac{4}{2-x} - 3$ funksiyaga teskari bo'lgan funksiyani ko'rsating.
A) $y = \frac{4}{x-3} - 2$ B) $y = \frac{4}{3-x} - 2$
C) $y = \frac{4}{x+3} + 2$ D) $y = \frac{4}{x-2} + 3$
E) $y = -\frac{4}{x+3} + 2$

1.13 Ko'rsatkichli tenglama va tengsizliklar.

1.13.1 Ko'rsatkichli funksiya va uning xossalari.

$a > 0, \quad b > 0$ uchun

1. $a^{x+y} = a^x \cdot b^y$;
2. $(a^x)^y = a^{xy}$;
3. $\frac{a^x}{a^y} = a^{x-y}$;
4. $(a \cdot b)^x = a^x \cdot b^x$;
5. $(\frac{a}{b})^x = \frac{a^x}{b^x}$

(98-7-23) Quyidagilardan qaysilari kamayuvchi funksiyalar?
1) $y = 0,37^x$; 2) $y = (\sqrt[3]{11})^x$;
3) $y = 3 \cdot (\frac{1}{2})^x$; 4) $y = (\frac{3}{4})^x$;
5) $y = \frac{1}{2} \cdot 3^x$
A) 1; 3; 5 B) 2; 3; 4 C) 1; 4 D) 3; 5 E) 1; 3; 4
Yechish: $y = a^x$ funksiya $0 < a < 1$ da kamayuvchi bo'lgani uchun 1), 3), 4) funksiyalar kamayuvchi bo'ladi. **Javob:** 1), 3), 4) (E).

1. (98-2-30) Quyidagi sonlardan qaysi biri 1 dan katta?
$a = 0,7^{2,3} \cdot 0,3^{0,8}$, $b = 3,2^{-4,2} \cdot 1,2^{-0,8}$,
$c = 0,7^{-1,2} \cdot 0,6^{-0,4}$, $d = 0,6^{0,4} \cdot 0,3^{0,6}$,
$e = 0,4^0 \cdot 3,5^{-1,3}$
A) a B) b C) c D) d E) e

2. (98-5-31) Ushbu $y = a^x$ funksiya uchun qaysi mulahaza noto'g'ri?
A) aniqlanish sohasi barcha haqiqiy sonlar to'plami
B) qiymatlari to'plami barcha musbat haqiqiy sonlar to'plami
C) garifigi (0;1) nuqtadan o'tadi
D) aniqlanish sohasida uzluksiz
E) aniqlanish sohasida har doim o'suvchi

3. (98-9-28) Ushbu
$a = 0,2^{-0,7} \cdot 0,3^{-0,6}$; $b = 0,8^{-1/3} \cdot 3^{0,4}$;
$c = 2^{0,7} \cdot 0,2^{-0,1}$; $d = 1,2^{0,4} \cdot 1,1^{1,5}$
sonlardan qaysi biri 1 dan kichik?
A) a B) b C) c D) d E) bunday son yo'q

4. (98-12-22) Quyidagilardan qaysilari o'suvchi funksiyalar hisoblanadi?
   $1)y = 3^x$; $2)y = (\sqrt[3]{10})^x$; $3)y = (\frac{9}{11})^x$
   $4)y = (\frac{5}{3})^x$; $5)y = (0,84)^x$
   A) 1; 2; 4 B) 1; 2; 3 C) 3; 4; 5
   D) 2; 3; 4 E) 1; 4; 5

5. (99-3-27) Funksiyalardan qaysi biri juft funksiya?
   $y_1 = \frac{a^x+a^{-x}}{2}$; $y_2 = \frac{a^x+1}{a^x-1}$;
   $y_3 = \frac{x}{a^x-1}$; $y_4 = x\frac{a^x-1}{a^x+1}$;
   A) y_1 B) y_2 C) $y_1; y_2$ D) $y_1; y_3$ E) $y_1; y_4$

6. (03-1-10) $y = \left(tg\frac{\pi}{6}\right)^{x^2-4x+2}$ funksiyaning qiymatlar sohasini toping.
   A) $[\frac{1}{\sqrt{3}}; \sqrt{3}]$ B) $(0; \sqrt{3}]$ C) $(0; 3]$
   D) $(-\infty; 3]$ E) $[-\frac{1}{\sqrt{3}}; \sqrt{3}]$

1.13.2 Ko'rsatkichli tenglamalar.

$a > 0, \quad a \neq 1, \quad b > 0$ uchun

1. $a^{f(x)} = b \Rightarrow f(x) = log_a b$;
2. $a^{f(x)} = a^{g(x)} \Leftrightarrow f(x) = g(x)$;

(97-9-94) Tenglamani yeching.

$$\left(\frac{25}{64}\right)^{7x^2-6} = \left(\frac{64}{25}\right)^{2+3x-6x^2}$$

A) $-4; 1$ B) $-1; 4$ C) 1; 4 D) $-4; -1$ E) 3; 4

Yechish: Tenglamaning har ikkala qismini bir xil asosga keltiramiz.

$$\left(\frac{64}{25}\right)^{-(7x^2-6)} = \left(\frac{64}{25}\right)^{2+3x-6x^2}$$

Daraja ko'rsatkichlarini tenglaymiz.
$-7x^2 + 6 = 2 + 3x - 6x^2$. Bu erdan $x^2 + 3x - 4 = 0$ kvadrat tenglamani hosil qilamiz va uni yechib $x_1 = 1.x_2 = -4$ ildizlarni hosil qilamiz.
Javob: $1; -4$ (A).

A. $a^{f(x)} = a^{g(x)}$ **tenglama.**

1. (96-1-34) Tenglamani yeching.

$$3^1 \cdot 3^2 \cdot 3^3 \cdot ... \cdot 3^x = \frac{1}{9^{-33}}$$

   A) 12 va -11 B) 11 C) 12
   D) 33 E) -12 va 11

2. (96-6-51) Ushbu

$$\left(\frac{4}{3}\right)^x \cdot \left(\frac{3}{8}\right)^x = 2$$

   tenglamaning ildizi x_0 bo'lsa, quyidagi munosabatlardan qaysi biri o'rinli?
   A) $x_0 > -1$ B) $x_0 < -1$ C) $x_0 = -1$
   D) $\frac{x_0}{2} = -1$ E) to'g'ri javob keltirilmagan

3. (96-9-85) Tenglamani yeching.

$$4^4 \cdot 4^8 \cdot 4^{12} \cdot ... \cdot 4^{4x} = 0,25^{-144}$$

   A) 14 B) 9 C) $-4va3$ D) 6 E) 8

4. (97-1-67) Tenglamani yeching.

$$\sqrt[3]{9^{x-3}} = \frac{3}{\sqrt[3]{3}}$$

   A) 3 B) 4 C) 5 D) 1 E) 0

5. (97-1-76) Tenglamani yeching.

$$(0,75)^{x-1} = \left(1\frac{1}{3}\right)^3$$

   A) 1 B) -1 C) 2 D) -2 E) 0

6. (97-2-51) Tenglamaning ildizlari ko'paytmasini toping.

$$(3^{-x} - 9)(x^2 - 36) = 0$$

   A) 72 B) -6 C) 36 D) -18 E) 18

7. (97-4-34) Tenglamaning ildizini toping.

$$\left(\frac{6}{5}\right)^{x^3+27(x-1)} = \left(\frac{5}{6}\right)^{-9x^2}$$

   A) -3 B) 4 C) 5 D) 3,5 E) 3

8. (97-6-57) Tenglamani yeching.

$$(0,8)^{3-2x} = (1,25)^3$$

   A) 0 B) 1 C) 2 D) 3 E) 4

9. (97-6-69) Tenglamani yeching.

$$\sqrt[3]{25^{x-1}} = \frac{5}{\sqrt[5]{5}}$$

   A) 1 B) 5 C) $\frac{1}{4}$ D) 2,2 E) 0

10. (97-8-51) Tenglamani yeching.

$$\left(\frac{5}{4}\right)^x = \left(\frac{16}{5}\right)^9 = 2\sqrt{2}$$

    A) 1,25 B) 0,5 C) 0,25 D) 1,5 E) 0,75

11. (97-12-50) Tenglamaning ildizlari yig'indisini toping.

$$(3^{-x} - 9)(x^2 - 49) = 0$$

    A) 5 B) 9 C) -2 D) 10 E) -3

12. (99-1-29) Tenglamani yeching.

$$4^{x-4} = 0,5$$

    A) 3,5 B) 4,5 C) $-4,5$ D) $-3,5$ E) $\emptyset$

13. (99-6-8) Tenglamani yeching.

$$(3,5)^{x-5} = \left(\frac{4}{49}\right)^2$$

    A) 3 B) 2 C) 1 D) 4 E) 5

14. (99-6-27) Tenglamani yeching.

$$\frac{1}{27}\cdot\sqrt[4]{9^{3x-1}}=27^{-\frac{2}{3}}$$

A) -1 B) 2 C) 1 D) -2 E) 3

15. (99-6-58) Tenglamani yeching.

$$(0,1(6))^{3x-5}=1296$$

A) $\frac{1}{3}$ B) 3 C) -3 D) $-\frac{1}{3}$ E) 2

16. (99-10-39) Tenglamaning ildizi 10 dan qancha kam?

$$3^{x+1}\cdot 27^{x-1}=9^7$$

A) 5 B) 4 C) 8 D) 6 E) 7

17. (00-1-36) Tenglamaning ildizi 1 dan qancha kam?

$$\left(\frac{2}{3}\right)^x=\sqrt[4]{1,5}$$

A) 1,75 B) 0,75 C) 1,5 D) 2,1 E) 1,25

18. (00-1-40) Tenglamani yeching.

$$\frac{2^{2x-1}\cdot 4^{x+1}}{8^{x-1}}=64$$

A) 3 B) 2 C) 4 D) -2 E) -3

19. (00-3-32) Tenglamani yeching.

$$0,125\cdot 4^{2x-3}=\left(\frac{\sqrt{2}}{8}\right)^{-x}$$

A) 2 B) -2 C) 4 D) -6 E) 6

20. (00-7-36) Tenglamani yeching.

$$2^{|x-5|+2x}=64$$

A) 1,5 B) 1 C) 2 D) 0,5 E) 1,8

21. (99-10-36) Tenglamaning ildizlarining ko'paytmasini toping.

$$2^x\cdot x^2-2x^2+2-2^x=0$$

A) 1 B) -1 C) 2 D) -2 E) $-0,5$

22. (00-10-41) Tenglamani yeching.

$$3^2\cdot 3^4\cdot 3^6\cdot\ldots\cdot 3^{2n}=\left(\frac{1}{81}\right)^{-5}$$

A) 4 B) 8 C) 12 D) 10 E) 7

23. (96-10-37) Tenglamani yeching.

$$5^2\cdot 5^4\cdot 5^6\cdot\ldots\cdot 5^{2x}=0,04^{-28}$$

A) 5 B) 10 C) 14 D) 7 E) 28

24. (01-5-13) Tenglama ildizlarining ko'paytmasini toping.

$$2^{x^2-6x-\frac{5}{2}}=16\sqrt{2}$$

A) -7 B) -2 C) 3 D) 2 E) 7

25. (01-6-35) Agar

$$\frac{2^x\cdot 3^y}{2^y\cdot 3^x}=\frac{24}{81}$$

bo'lsa, $x-y$ ning qiymatini toping.
A) 6 B) 5 C) 4 D) 3 E) 7

26. (01-7-30) Tenglamani yeching.

$$(0,25)^{2-x}=\frac{1}{2^{x+3}}$$

A) 2 B) 3 C) $\frac{1}{2}$ D) $\frac{1}{3}$ E) $\frac{1}{4}$

27. (01-10-23) Ushbu

$$f(x)=\frac{\sqrt{-x^2+6x-8}}{7^{x-3}-1}$$

funksiyaning aniqlanish sohasiga tegishli bo'lgan barcha butun sonlarining ko'paytmasini toping.
A) 48 B) 12 C) 24 D) 8 E) 32

28. (01-11-31) Tenglamani yeching.

$$9^{x^2+1}+3^{2x^2-1}=\frac{28}{81}$$

A) $-2,5$ B) -2 C) 2 D) $-1,5$ E) ildizi yo'q

29. (01-12-37) x ning qanday qiymatlarida 2^{x-2}, 2^x va 2^{x^2} ifodalar geometrik progressiyaning dastlabki uchta hadidan iborat bo'ladi?
A) -2 va -1 B) -2 va 1 C) -1 va 2
D) -2 va 2 E) -1 va 1

30. (02-2-23)

$$\left(\frac{1}{4}\right)^{\frac{4-x^2}{2}}=8^x$$

tenglama ildizlarining ko'paytmasini aniqlang.
A) -4 B) 6 C) 4 D) -6 E) -5

31. (02-3-17) Agar $3^{\alpha-3}=11$ bo'lsa, $3^{5-\alpha}$ ning qiymatini toping.
A) $\frac{9}{11}$ B) 99 C) $\frac{3}{16}$ D) $\frac{11}{9}$ E) $\frac{27}{11}$

32. (02-5-21) Agar $2^{3x}\cdot 7^{x-2}=4^{x+1}$ bo'lsa, $\frac{x^2-1}{x+2}$ ning qiymatini hisoblang.
A) $\frac{2}{3}$ B) 0,75 C) 0,6 D) 0 E) 2,5

33. (02-6-28)

$$f(x)=\frac{\sqrt{6x-x^2-5}}{5^{x-2}-1}$$

funksiyaning aniqlanish sohasiga tegishli barcha butun sonlarning yig'indisini toping.
A) 15 B) 13 C) 11 D) 10 E) 9

34. (02-7-53) $\sqrt[4]{9^{\frac{n-3}{5}}}=243$ bo'lsa, n nechaga teng?
A) 53 B) 38 C) 47 D) 43 E) 55

35. (02-10-26) $8^{|x^2-1|}=16$ tenglamani yeching?
A) $\pm\sqrt{\frac{7}{2}}$ B) $\sqrt{3}$ C) $\pm\sqrt{3};-1$ D) $0;\pm 1$ E) ± 2

36. (02-11-29) $16\sqrt{0,25^{5-\frac{x}{4}}} = 2^{\sqrt{x+1}}$ tenglamani yeching?
A) 0 B) 3 C) 24;0 D) 15 E) 24

37. (03-1-22) $2^{3-\frac{x}{2}} = 3$ tenglamani yeching?
A) $\log_2\sqrt{3}$ B) $\log_3(2\frac{2}{3})$ C) $\log_2(3\frac{3}{5})$
D) $\log_2(2\frac{2}{3})$ E) $\log_2(7\frac{1}{9})$

38. (03-3-31) $\left(\frac{\sqrt{5}}{3}\right)^{2x^2-5x} = 1,8$ tenglamaning ildizlari yig'indisini toping.
A) 5 B) -5 C) 2,5 D) $-2,5$ E) 1,25

39. (03-4-29) $\frac{2^{2x-1}\cdot 4^{x+1}}{8^{x-1}} = 64$ tenglamaning ildizi 12 dan qancha kam?
A) 8 B) 9 C) 6 D) 10 E) 4

40. (03-6-45)
$$\sqrt{5^2-4^2} = \sqrt[x]{81}$$
tenglamani yeching.
A) 2 B) 4 C) 3 D) 6 E) 5

41. (03-12-19)
$$\left(\cos\frac{5\pi}{3}\right)^{5x-3} = \sqrt{8}$$
tenglamani yeching.
A) 0,2 B) 0,3 C) 0,4 D) 0,6 E) 0,8

42. (03-12-22)
$$f(x) = \frac{\sqrt{9-x^2}}{5^{x-2}-1}$$
funksiyaning aniqlanish sohasini toping.
A) $(2;3]$ B)$[-3;2)\cup(2;3]$ C) $[-3;3]$
D) $[-3;2)$ E) $[-3;-2)\cup(-2;2)\cup(2;3]$

43. (97-1-26) Tenglamani yeching.
$$3^{4x+5} - 2^{4x+7} - 3^{4x+3} - 2^{4x+4} = 0$$
A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) 2 E) $-\frac{3}{4}$

44. (97-6-26) Tenglamani yeching.
$$2^{3x+7} + 5^{3x+4} + 2^{3x+5} - 5^{3x+5} = 0$$
A) 1 B) 0 C) -1 D) 2 E) $\frac{1}{3}$

45. (97-11-26) Tenglamani yeching.
$$2^{5x+6} - 7^{5x+2} - 2^{5x+3} - 7^{5x+1} = 0$$
A) 1 B) 2 C) 3 D) 0 E) $\frac{1}{5}$

46. (98-1-34) Tenglamani yeching.
$$6^{x-2} - \left(\frac{1}{6}\right)^{3-x} + 36^{\frac{x-1}{2}} = 246$$
A) 3 B) 5 C) 2 D) 6 E) 4

47. (98-2-31) Tenglamaning kichik ildizini toping.
$$2^{-4x^2+2} - 3\cdot 2^{-4x^2} = 2^{-16}$$
A) 2 B) -3 C) -2 D) -1 E) 4

48. (98-8-34) Tenglamani yeching.
$$\left(\frac{1}{7}\right)^{-2x+3} + 49^{x-1} + 7^{2x-1} = 399$$
A) 5 B) 4 C) 3 D) 2 E) 1,5

49. (98-9-31) 18 va $2^{x-4} + 2^{x+1} = 132$ tenglamaning ildizi orasidagi ayirmani toping.
A) 9 B) 10 C) 8 D) 11 E) 12

50. (99-3-18) Agar
$$3^{5x+1} + 3^{5x-1} = 30$$
bo'lsa, $\frac{x}{x+1}$ ning qiymatini hisoblang.
A) $\frac{2}{5}$ B) $\frac{1}{3}$ C) $\frac{2}{7}$ D) $\frac{4}{9}$ E) $\frac{2}{3}$

51. (00-3-27) Tenglamani yeching.
$$4^x - 3^{x-0,5} = 3^{x+0,5} - 2^{2x-1}$$
A) 1 B) -1 C) 2 D) -2 E) 1,5

52. (01-7-31) Tenglamani yeching.
$$6\cdot 9^{0,5x-2} + 2\cdot 3^{x-6} = 56$$
A) 1 B) 2 C) 6 D) 3 E) -2

53. (02-2-22)
$$2^{\sqrt{x}+2} - 2^{\sqrt{x}+1} = 12 + 2^{\sqrt{x}-1}$$
tenglamaning ildizi qaysi sonlar oralig'iga tegishli?
A) $(6;13)$ B) $(2;7)$ C) $(10;17)$
D) $(1;6)$ E) $(3;8)$

54. (02-5-19) Tenglamani yeching.
$$5^{x-3} - 5^{x-4} - 16\cdot 5^{x-5} = 2^{x-3}$$
A) 2 B) 3 C) 4,5 D) 5 E) 6

55. (02-12-43) Agar
$$4^{x-1} - \frac{1}{2}\cdot 2^{2x} = -64$$
bo'lsa, $x+13$ ning qiymatini toping.
A) 19 B) 15 C) 17 D) 13 E) 21

56. (03-7-12)
$$\frac{\sqrt[3]{3^x+3^x+3^x}}{\sqrt{3^x+3^x+3^x}} = \frac{1}{3}. \quad x = ?$$
A) 4 B) 5 C) 6 D) 7 E) 8

57. (03-8-31) Tenglamani yeching.
$$2^{x-4} + 2^{x-2} + 2^{x-1} = 6,5 + 3,25 + 1,625 + \cdots$$
A) 4 B) 2 C) 1 D) 0 E) aniqlab bo'lmaydi

58. (03-9-18)
$$12\cdot 4^{x^2} - 2\cdot 4^{x^2+2} + 16\cdot 4^{x^3-2} = 19\cdot 4^{6x+2}$$
tenglama ildizlarining yig'indisini toping.
A) 2 B) 6 C) -2 D) -6 E) 8

B. Kvadrat yoki 3-darajali tenglamaga keltiring.

59. $(98-7-43)^*$ Tenglama ildizining uch baravarini toping.

$$27^x + 12^x - 2\cdot 8^x = 0$$

A) -6 B) 3 C) -3 D) 6 E) 0

60. (98-11-69) Tenglama ildizlarining yig'indisini toping.

$$4^x - 5\cdot 2^x + 3 = 0$$

A) 5 B) $\log_2 3$ C) 3 D) $\log_2 5$ E) 8

61. (98-12-43) Tenglama ildizlarining yig'indisini toping.

$$9\cdot 16^x - 7\cdot 12^x - 16\cdot 9^x = 0$$

A) 2 B) -2 C) 3 D) -1 E) 1

62. (99-6-49) Tenglamani yeching.

$$3^{\sqrt{x}} - 3^{1-\sqrt{x}} = \frac{26}{3}$$

A) $\emptyset$ B) 9 C) 2 D) 0 E) 4

63. (99-8-2) Tenglamani yeching.

$$5^x - 5^{3-x} = 20$$

A) -5 B) 1 C) $-5;1$ D) $2;-5$ E) 2

64. (00-3-29) Tenglama ildizlarining yig'indisini toping.

$$3\sqrt[x]{81} - 10\sqrt[x]{9} + 3 = 0$$

A) 2 B) 3 C) 4 D) 5 E) 7

65. $(00-5-40)^*$ Tenglamaning ildizlari nisbatini toping.

$$\left(\sqrt{2+\sqrt{3}}\right)^x + \left(\sqrt{2-\sqrt{3}}\right)^x = 4$$

A) -1 B) -2 C) -3 D) 1 E) 3

66. (01-1-20) Tenglamani yeching.

$$5^x - 24 = 5^{2-x}$$

A) -2 B) 0 C) -1 D) 1 E) 2

67. (01-2-65)* Ushbu

$$\left(\sqrt{3+2\sqrt{2}}\right)^x + \left(\sqrt{3-2\sqrt{2}}\right)^x = 6$$

tenglama ildizlarining ko'paytmasini toping.
A) 2 B) 4 C) -4 D) -2 E) 6

68. (01-7-32) Tenglamani yeching.

$$9^x + 6^x = 2\cdot 4^x$$

A) 1 B) 0 C) $0;1$ D) 2 E) -1

69. (02-3-38) x soni

$$4\sqrt[x]{81} - 12\sqrt[x]{36} + 9\sqrt[x]{16} = 0$$

tenglamaning ildizi bo'lsa, $x+3$ soni nechaga teng?
A) 5 B) 4 C) 6 D) 7 E) 3

70. (02-9-37)

$$25^{x^2+0,5} - 5^{x^2} = 5^{x^2+3} - 25$$

tenglamaning ildizlari yig'indisini toping.
A) 0 B) 1 C) $2\sqrt{2}$ D) 2 E) 4

71. (02-11-28)

$$8\cdot 4^{|x|} - 33\cdot 2^{|x|} + 4 = 0$$

tenglama ildizlarining ko'paytmasini toping.
A) 4 B) $\frac{1}{4}$ C) -4 D) $-\frac{1}{4}$ E) 12

72. (03-2-21)*

$$\left(\sqrt{2-\sqrt{3}}\right)^x + \left(\sqrt{2+\sqrt{3}}\right)^x = 4$$

tenglama ildizlarining ko'paytmasini hisoblang.
A) -1 B) 1 C) 4 D) -4 E) 2

73. (03-6-14)

$$4^{x+1} - 2^{x+4} + 3\cdot 2^{x+2} + 48 = 0$$

tenglamani yeching.
A) 1 B) 2 C) 3 D) 4 E) $\emptyset$

74. (03-7-19)

$$4^{x+1} - 2^{x+4} + 3\cdot 2^{x+2} = 48$$

tenglamani yeching.
A) 1 B) 2 C) 3 D) 4 E) $\emptyset$

75. (03-8-39)

$$4\cdot 9^x + 12^x - 3\cdot 16^x = 0$$

tenglamani yeching.
A) 1 B) $-1;1$ C) 2 D) 3; 4 E) 4

76. (03-9-16)

$$\sqrt{x+0,5}\cdot\left(4^{1+x} + 4^{1-x} - 17\right) = 0$$

tenglama ildizlarining ko'paytmasini toping.
A) 2,5 B) 1,5 C) 0,5 D) $-0,5$ E) -1

77. (03-12-55)

$$e^x + 7e^{-x} = 8$$

tenglamaning ildizlari yig'indisini toping.
A) 8 B) $\ln 7e$ C) $\ln 7$ D) $\ln 8$ E) $\ln 56$

78. (03-12-74)

$$(4\cdot 2^x + 2\cdot 2^{-x} - 9)\cdot\sqrt{x+1} = 0$$

tenglamaning ildizlari yig'indisini toping.
A) 0 B) -3 C) -2 D) -1 E) 4

C. Tenglamalar sistemasi.

79. (96-7-17) Agar $\begin{cases} 3^x = 9^{y+1} \\ 4y = 5 - x \end{cases}$ ekanligi ma'lum bo'lsa, $x + y$ ning qiymatini toping.
A) 3,5 B) 5 C) 2 D) -4 E) -3

80. (97-3-17) Agar $3^{x-1} = 9^y$ va $2x - y = 5$ bo'lsa, $x - y$ ni toping.
A) 2 B) 3 C) -1 D) $-0,5$ E) -3

81. (97-7-17) Agar $2^{x+1} = 4^y$ va $x + y = -4$ bo'lsa, $y - x$ ni toping.
A) 4 B) -2 C) 2 D) -3 E) $-1,5$

82. (97-10-17) $2^x = 4^{y+1}$ va $3x = 6 - 2y$ ekanligi ma'lum bo'lsa, $x + y$ ning qiymatini toping.
A) 4 B) $-1,5$ C) -3 D) 2 E) 1

83. (99-2-34) a ning qanday qiymatida $2^{4x} \cdot 4^a = 32$ va $3^x \cdot 3^a = 27$ tenglamalarning ildizlari bir-biriga teng bo'ladi?
A) 2,5 B) 3 C) 3,5 D) 1,5 E) 2

84. (00-10-55) Sistema ildizlarini ifodalovchi nuqtalar orasidagi masofani toping ($x > 0$)

$$\begin{cases} x^{\sqrt{y}} = y \\ y^{\sqrt{y}} = x^4 \end{cases}$$

A) $\sqrt{7}$ B) 4 C) $\sqrt{10}$ D) $2\sqrt{2}$ E) 9

85. (00-3-30) $x^2 - y^2$ ni toping.

$$\begin{cases} 9^{x+y} = 729 \\ 3^{x-y-1} = 1 \end{cases}$$

A) 1 B) 4 C) 3 D) 2 E) -2

86. (00-3-41) Tenglamalar sistemasini yeching.

$$\begin{cases} x^{y+1} = 27 \\ x^{2y-5} = \frac{1}{3} \end{cases}$$

A) $(2;3)$ B) $(2;4)$ C) $(4;2)$ D) $(3;2)$ E) $(2;2)$

87. (01-2-74) Ushbu

$$\begin{cases} x^y = 9 \\ 324^{\frac{1}{y}} = 6x \end{cases}$$

tenglamalar sistemasi nechta yechimga ega?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

88. (02-1-58)

$$\begin{cases} 2^x + 2^y = 5 \\ 2^{x+y} = 4 \end{cases}$$

$x \cdot y =$?
A) 0 B) 1 C) 2 D) 3 E) 6

89. (03-4-31) Agar $2^{x^2} \cdot 2^{y^2} = 64$ va $2^{xy} = \sqrt{8}$ bo'lsa, $|x + y|$ ning qiymatini toping.
A) 4,5 B) 3,5 C) 2,5 D) 4 E) 3

90. (03-5-6) $5^a = 3$ va $75^b = 81$ bo'lsa, a ni b orqali ifodalang.
A) $\frac{2b}{1+b}$ B) $\frac{b}{1+b}$ C) $\frac{3b}{1+b}$ D) $\frac{2b}{1-b}$ E) $\frac{b}{1-b}$

91. (03-6-12) $2^a = 5$ va $20^b = 125$ bo'lsa, b ni a orqali ifodalang.
A) $\frac{3-a}{2a}$ B) $\frac{a}{3-a}$ C) $\frac{2a}{3-a}$ D) $\frac{3a}{2+a}$ E) $\frac{3-a}{a}$

92. (03-7-17) $2^a = 5$ va $20^b = 125$ bo'lsa, a ni b orqali ifodalang.
A) $\frac{3-b}{2b}$ B) $\frac{b}{3-b}$ C) $\frac{2b}{3-b}$ D) $\frac{3b}{2+b}$ E) $\frac{3-b}{b}$

D.Darajali – ko′rsatkichli tenglamalar.

93. (98-3-31) Tenglama nechta ildizga ega?

$$|x^2 - 6x + 8|^{x-6} = |x^2 - 6x + 8|$$

A) 1 B) 2 C) 3 D) 4 E) 5

94. (98-4-46) Tenglamaning ildizlari yig'indisini toping.

$$x^{\sqrt{x}} = \sqrt{x^x}$$

A) 5 B) 10 C) 11 D) 4 E) 8

95. (98-10-78) Tenglama nechta ildizi bor?

$$|x^2 - 2x - 1|^{x-7} = |x^2 - 2x - 1|$$

A) 1 B) 2 C) 3 D) 4 E) 5

E. Grafik usul.

96. (97-3-35) Tenglama nechta ildizga ega?
$(0,5)^x = x + 3$
A) 1 B) 2 C) 3 D) ildizi yo'q
E) aniqlab bo'lmaydi

97. (01-7-29) Ushbu $2^{-x} = 2x - x^2 - 1$ tenglama nechta ildizga ega?
A) 4 B) 3 C) 2 D) 1 E) $\emptyset$

98. (96-7-35) Tenglamaning nechta ildizi bor?

$$e^{-x} = x - 2$$

A) 1 B) 2 C) 3 D) ildizi yo'q
E) aniqlab bo'lmaydi

99. (00-9-30) Tenglama nechta ildizga ega?

$$3^{-x} = 4 + x - x^2$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

100. (03-5-24)

$$2^x = x^3$$

tenglama nechta haqiqiy ildizga ega?
A) 2 B) 1 C) 3 D) $\emptyset$
E) aniqlab bo'lmaydi

1.13.3 Ko'rsatkichli tengsizliklar.

$a > 0, \quad a \neq 1, \quad b > 0$ uchun

1. Agar $0 < a < 1$ bo'lsa,

$$a^{f(x)} > a^{g(x)} \Leftrightarrow f(x) < g(x);$$

2. Agar $a > 1$ bo'lsa,

$$a^{f(x)} > a^{g(x)} \Leftrightarrow f(x) > g(x);$$

(98-2-32) Tengsizlikning eng katta butun yechimini toping.

$$\left(\frac{4}{9}\right)^x \cdot \left(\frac{3}{2}\right)^x > \left(\frac{2}{3}\right)^6 \cdot \left(\frac{2}{3}\right)^{-2x}$$

A) 2 B) 3 C) 4 D) 1 E) 5
Yechish: Tengsizlikning chap qismiga $a^x \cdot b^x = (ab)^x$ formulani,o'ng qismiga esa, $a^x \cdot a^y = a^{x+y}$ formulani qo'llab

$$\left(\frac{4}{9} \cdot \frac{3}{2}\right)^x > \left(\frac{2}{3}\right)^{6-2x}$$

tengsizlikni, bu yerdan esa

$$\left(\frac{2}{3}\right)^x > \left(\frac{2}{3}\right)^{6-2x}$$

tengsizlikni hosil qilamiz. Asosdagi son $\frac{2}{3} < 1$ bo'lgani uchun asoslari tashlab yuborilganda tengsizlik belgisi qarama-qarshisiga o'zgaradi. Shuning uchun

$$x < 6 - 2x, \quad 3x < 6, \quad x < 2.$$

Bu oraliqda eng katta butun son $x = 1$ ga teng.
Javob: 1 (D).

1. (96-6-54) Tengsizlikni yeching.

$$0,25^x \geq 0,5^{4x-8}$$

A) $(-\infty; 4)$ B) $(-\infty; 2]$ C) $[2; \infty)$
D) $[4; \infty)$ E) $(-\infty; 4]$

2. (97-6-55) Tengsizlikni yeching.

$$2^{\sqrt{x}-1} \cdot (4x^2 - 4x + 1) > 0$$

A) $(1; \infty)$ B) $[1; \infty)$ C) $[\frac{1}{2}; \infty)$
D) $(-\infty; \infty)$ E) $[0; \frac{1}{2}) \cup (\frac{1}{2}; \infty)$

3. (97-8-54) Tengsizlikning eng katta butun manfiy yechimini toping.

$$\sqrt{0,2^{x(x+5)}} > 1$$

A) -5 B) -4 C) -3 D) -1 E) -2

4. (97-9-76) x ning qanday qiymatlarida $y = 5^x - 5$ funksiya musbat qiymatlar qabul qiladi?
A) $x < 1$ B) $x > 1$ C) $x \geq 1$
D) $x \leq 2$ E) $x > 3$

5. (98-5-16) Ushbu $14 \leq 2^n < 64$ qo'sh tengsizlikni qanoatlantiruvchi natural sonlar nechta?
A) 2 B) 3 C) 1 D) 4 E) 5

6. (98-9-30) Tengsizlikning eng kichik butun yechimi 10 dan qancha kam?

$$0,6^{x^2} \cdot 0,2^{x^2} > (0,12^x)^4$$

A) 10 ta B) 8 ta C) 7 ta D) 9 ta E) 6 ta

7. (98-11-72) Tengsizlikni yeching.

$$(\sin 40^0)^{x^2-4x+4} \geq 1$$

A) $\{2\}$ B) $[2; \infty)$ C) $(-\infty; 2]$
D) $(-\infty; \infty)$ E) $\emptyset$

8. (99-1-30) Tengsizlikni yeching.

$$(\sqrt{6})^x \leq \frac{1}{36}$$

A) $(-\infty; -4]$ B) $[-4; \infty)$ C) $[-4; 4]$
D) $\emptyset$ E) $(-\infty; 6]$

9. (99-2-35) Ushbu $\left(\frac{1}{2}\right)^{20-2x} > 1$ tengsizlikning eng kichik butun yechimini toping.
A) 6 B) 11 C) 10 D) 9 E) 8

10. (99-6-16) Tengsizlikning eng katta butun yechimini toping.

$$2^{3-6x} > 1$$

A) 0 B) 1 C) -1 D) -2 E) 3

11. (99-7-18) n ning nechta natural qiymati $9 \leq 3^n \leq 79$ qo'sh tengsizlikni qanoatlantiradi?
A) 1 B) 3 C) 4 D) 2 E) 5

12. (00-3-31) Tengsizlikni yeching.

$$x^2 \cdot 5^x - 5^{2+x} < 0$$

A) $(-\infty; -5)$ B) $(5; \infty)$ C) $(-\infty; -5) \cup (5; \infty)$
D) $(-5; 5)$ E) $(-\infty; \infty)$

13. (00-8-10) Tengsizlikni yeching.

$$\left(\frac{1}{2}\right)^{2x-1} > \frac{1}{16}$$

A) $(-\infty; 2,5)$ B) $(2,5; \infty)$ C) $(-\infty; 0) \cup (0; 2,5)$
D) $(-2,5; \infty)$ E) $2,5$

14. (97-2-54) Tengsizlikni yeching.

$$0,2^{x^2+1} + 0,2^{x^2-1} < 1,04$$

A) $(-\infty; -1)$ B) $(1; \infty)$ C) $(-\infty; -1] \cup [1; \infty)$
D) $(-\infty; -1) \cup (1; \infty)$ E) $[-1; 1]$

15. (99-3-19) Tengsizlikning eng katta butun yechimini toping.

$$2 \cdot 3^x + \frac{7}{3^x} < 61 \cdot 3^{-x}$$

A) 2 B) -2 C) 1 D) 4 E) 0

16. (00-6-31) Tengsizlikning butun yechimlari yig'indisini toping.

$$3^{8x} - 4 \cdot 3^{4x} \leq -3$$

A) 8 B) 7 C) 4 D) 2 E) 0

17. (01-1-21) Tengsizlikni yeching.

$$3^{\frac{1}{x+1}} > 9$$

A) $(-1; 1)$ B) $(-1; -\frac{1}{2})$ C) $(-\frac{1}{2}; 1)$
D) $(0; 1)$ E) $(-\frac{1}{2}; 0)$

18. (01-2-70) Nechta natural son
$$(0,7)^{2+4+\ldots+2n} > (0,7)^{72}$$
tengsizlikni qanoatlantiradi?
A) 7 B) 8 C) 9 D) 10 E) 12

19. (01-4-30) Tengsizlikni yeching.
$$9^{-x} - 28 \cdot 3^{-x-1} + 3 < 0$$
A) $(-2;1)$ B) $(-\infty;2]$ C) $[1;\infty)$
D) $(-2;0)$ E) $(0;1)$

20. (01-7-33) Ushbu $x^2 \cdot 5^x - 5^{2+x} \le 0$ tengsizlikning tub sonlardan iborat yechimlari nechta?
A) 0 B) 1 C) 2 D) 3 E) 4

21. (01-7-34) Tengsizlikni yeching.
$$\left(\frac{1}{3}\right)^{\sqrt{x+2}} \ge 3^{-x}$$
A) $[-1;2]$ B) $(-\infty;\infty)$ C) $(-\infty;-1)\cup[2;\infty)$
D) $[-1;\infty)$ E) $[2;\infty)$

22. (01-8-32) Ushbu $3^{|x|+2} \le 81$ tengsizlikning butun yechimlari yig'indisini toping.
A) -1 B) 3 C) 4 D) 0 E) 5

23. (01-9-18) Ushbu $0,5^{x^2-4} > 0,5^{3x}$ tengsizlikning butun yechimlari o'rta arifmetigini toping.
A) 1,5 B) 2 C) 1 D) 3 E) 2,5

24. (02-2-25) $5^{\frac{1}{x}} + 5^{\frac{1}{x}+2} > 130$ tengsizlikni yeching.
A) $(0;1)$ B) $(0;3)$ C) $(0;\frac{3}{4})$
D) $(1;2)$ E) $(1;\frac{3}{2})$

25. (02-3-39) $3^{\frac{1}{x}} + 3^{\frac{1}{x}+3} > 84$ tengsizlikni yeching.
A) $(0;1)$ B) $(-\infty;0)$ C) $(0;1)\cup(1;\infty)$
D) $(1;\infty)$ E) $(0;\infty)$

26. (02-4-41) $f(x) = \sqrt{5^x - 1/25} + 2\sqrt{-x}$ funksiyaning aniqlanish sohasiga tegishli barcha butun sonlarning o'rta arifmetigini toping.
A) -2 B) -1 C) 0 D) 1 E) 2

27. (02-5-20)
$$4^x - 5 \cdot 2^{x+1} + 16 \le 0$$
tengsizlikni yeching.
A) $(0;1)\cup(3;\infty)$ B) $(1;3)$ C) $[1;3]$
D) $[0;1]\cup[3;\infty)$ E) $[3;\infty)$

28. (02-5-22)
$$(1,25)^{1-x} > (0,64)^{2(1+\sqrt{x})}$$
tengsizlikning yechimlari orasida nechta tub son bor?
A) 5 B) 7 C) 9 D) 12 E) cheksiz ko'p

29. (02-10-70)
$$\left(\cos\frac{\pi}{3}\right)^{x-0,5} > \sqrt{2}$$
tengsizlikni yeching.
A) $(-\infty;0)$ B) $(0;\infty)$ C) $(0;0,5)$
D) $(1;\infty)$ E) $(0;1)$

30. (02-11-30)
$$\left(\cos\frac{\pi}{6}\right)^{x^2-3x-10} < \left(\sin\frac{\pi}{6}\right)^{x^2-3x-10}$$
tengsizlikning butun sonlardan iborat yechimlaridan eng kattasini toping.
A) -2 B) 1 C) 3 D) 4 E) 5

31. (02-12-45)
$$x^2 \cdot 3^x - 3^{x+2} \le 0$$
tengsizlikning butun sonlardan iborat eng katta va eng kichik yechimlari ko'paytmasini toping.
A) -8 B) -12 C) -9 D) -6 E) -15

32. (03-3-32)
$$x^2 \cdot 3^x - 3^{x+1} \le 0$$
tengsizlikning butun sonlardan iborat yechimlari nechta?
A) $\emptyset$ B) 1 C) 2 D) 3 E) cheksiz ko'p

33. (03-4-30)
$$\frac{1}{8} \cdot 2^{4x-2} > (\sqrt{2})^{10}$$
tengsizlikni qanoatlantiruvchi eng kichik butun sonni toping.
A) 2 B) 1 C) 3 D) 4 E) 5

34. (03-5-31) $f(x) = \sqrt{3^x - 4^x}$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty;0]$ B) $(0;1)$ C) $[0;1)$
D) $[0;\infty)$ E) $\{0\}$

35. (03-6-58)
$$3^{3x-2} + 3^{3x+1} - 3^{3x} < 57$$
tengsizlikni yeching.
A) $x > 1$ B) $x < 1\frac{1}{2}$ C) $x < 1$
D) $x > \frac{2}{3}$ E) $x < \frac{2}{3}$

36. (03-7-79)
$$3^{x+2} + 3^{x+3} \le 972$$
tengsizlikning natural sonlardan iborat yechimlari yig'indisini toping.
A) 1 B) 3 C) 6 D) 10 E) 15

37. (03-9-12)
$$\left(ctg\frac{\pi}{6}\right)^{4x-12} \le \left(\frac{1}{3}\right)^{x^2-x}$$
tengsizlikning butun sonlardan iborat yechimlaridan eng kattasini toping.
A) 2 B) 5 C) 6 D) 9 E) 11

38. (03-9-17)
$$\frac{2 \cdot 7^x}{7^{2x}-1} \ge \frac{7^x}{7^x-1} - \frac{1}{7^x+1}$$
tengsizlikni yeching.
A) $(0;\infty)$ B) $(-\infty;0)$ C) $(-\infty;0]$
D) $(-1;1)$ E) $(1;\infty)$

39. (03-10-32)
$$\begin{cases} 5^x + 5^{-x} = 13 \\ 28^x < 17^x. \end{cases}$$
$5^x - 5^{-x} = ?$
A)$\sqrt{135}$ B) $-\sqrt{145}$ C) $\sqrt{175}$
D)$\sqrt{165}$ E) $-\sqrt{155}$

1.14 Logarifm.

$a > 0, \quad a \neq 1, \quad b > 0, \quad b \neq 1$ uchun

1. $a^{\log_a {}^x x}$;
2. $\log_a a = 1, \quad \log_a 1 = 0$;
3. $\log_a(xy) = \log_a x + \log_a y, \quad x, y > 0$;
4. $\log_a \frac{x}{y} = \log_a x - \log_a y \quad x, y > 0$;
5. $\log_a x^p = p \log_a x, \quad x > 0$;
6. $\log_a x = \frac{\log_b x}{\log_b a}$;
7. $\log_a b \cdot \log_b a = 1$;
8. $\log_a b = \log_{a^p}(b^p), \quad p \neq 0$;
9. $a^{\log_b c} = c^{\log_b a}$
10. $a^{\sqrt{\log_a b}} = b^{\sqrt{\log_b a}}$

1.14.1 Logarifmik funksiya va uning xossalari.

(97-2-52) Ushbu $y = \log_{x^2}(4-x)$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty; 4)$ B) $(-\infty; -1) \cup (-1; 0) \cup (0; 1) \cup (1; 4)$
C) $(-\infty; -1) \cup [-1; 1] \cup (1; 4)$ D)
$(-\infty; 1) \cup (4; \infty)$ E) $(4; \infty)$
Yechish: $\log_a b$ son b¿0, a¿0, $a \neq 1$ da aniqlangani uchun
$\begin{cases} 4 - x > 0 \\ x^2 > 0 \\ x^2 \neq 1. \end{cases}$ sistemani hosil qilamiz. Uni yechamiz.
$\begin{cases} x < 4 \\ x \neq -1, 0, 1. \end{cases}$
Demak,berilgan funksiya $(-\infty; -1) \cup (-1; 0) \cup (0; 1) \cup (1; 4)$
to'plamda aniqlangan ekan. **Javob:** (B).

1. (96-6-52) Ushbu $y = \log_3(2 - x)$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty; 2)$ B) $(2; \infty)$ C) $(0; 2)$
D) $(0; 2]$ E) $(0; \frac{1}{3}) \cup (\frac{1}{3}; 2)$

2. (97-1-63) Ushbu $y = \log_x(3 - x)$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty; 3)$ B) $(0; \infty)$ C) $(0; 1) \cup (1; 3)$
D) $(0; 3)$ E) $(3; \infty)$

3. (97-6-64) Ushbu $f(x) = \log_x(6 - x)$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty; 6)$ B) $(1; 6)$ C) $(0; 1)$
D) $(0; 1) \cup (1; 6)$ E) $[1; 6)$

4. (97-8-52) Ushbu $y = \log_{x-1}(x - \frac{1}{4})$ funksiyaning aniqlanish sohasini toping.
A) $(\frac{1}{4}; \infty)$ B) $(1; 2) \cup (2; \infty)$ C) $(-0,25; 2) \cup (2; \infty)$ D) $[-0,25; 2) \cup [2; \infty)$ E) $[-0,25; 2) \cup (2; 4]$

5. (97-9-75) n ning qanday butun qiymatlarida $y = \lg(nx^2 - 5x + 1)$ funksiyaning aniqlanish sohasi
$(-\infty; \frac{1}{4}] \cup [1; \infty)$ bo'ladi?
A) 1 B) 4 C) 3
D) hech qanday butun qiymatida E) 5

6. (97-12-51) Ushbu $y = \log_{x^3}(6 - x)$ funksiyaning aniqlanish sohasini toping.
A) $D(y) = (0; 6)$ B) $D(y) = [1; 6]$
C) $D(y) = (0; 6]$ D) $D(y) = (1; 6)$ E) $(0; 1) \cup (1; 6)$

7. (98-7-42) Ushbu $y = -\log_5 x$ funksiyaning grafigi koordinatalar tekisligining qaysi choraklarida yotadi?
A) I, III B) III, IV C) II, III
D) I, IV E) I, II

8. (98-5-15) Juft funksiyalarni toping.
$y_1 = 3^x + 3^{-x}, \quad y_2 = 3x^5 + x^3,$
$y_3 = \sqrt{20 - x + x^2} + \sqrt{20 + x + x^2},$
$y_4 = log_3 4x + 1, \quad y_5 = x^2 + lg|x|$
A) y_1, y_2 B) y_1, y_4 C) y_2
D) y_1, y_3, y_5 E) y_2, y_3, y_5

9. (98-12-42) $y = \log_3 x$ funksiyaning grafigi koordinatalar tekisligining qaysi choraklarida yotadi?
A) I, IV B) I, II C) II, III
D) III, IV E) II, IV

10. (99-2-36) Argumentning nechta butun qiymati $f(x) = \frac{\sqrt{8-x}}{lg(x-1)}$ funksiyaning aniqlanish sohasiga tegishli?
A) 4 B) 8 C) 7 D) 6 E) 5

11. (99-3-26) Funksiyaning aniqlanish sohasini toping.
$$y = \frac{1}{ln(1-x)} + \sqrt{x+2}$$
A) $[-2; \infty)$ B) $[-2; 1]$ C) $(-\infty; 1)$
D) $[-2; 0) \cup (0; 1)$ E) $(-\infty; -2) \cup (-2; 1]$

12. (99-5-39) Ushbu $f(x) = \log_2(64^{-x} - 8^{1-x})$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty; 0)$ B) $(-\infty; -1)$ C) $(-\infty; -2)$
D) $(1; \infty)$ E) $(2; \infty)$

13. (99-6-29) Ushbu $y = \log_3(x(x-3)) - log_3 x$ funksiyaning aniqlanish sohasini toping.
A) $(3; \infty)$ B) $(-\infty; 3)$ C) $[3; \infty)$
D) $(-\infty; 3]$ E) $(-3; 3)$

14. (99-7-15) k ning qanday qiymatlarida $y = \lg(kx^2 - 2x + 1)$ funksiya faqat $x = 1$ nuqtada aniqlanmagan?
A) $k < 2$ B) $k < 3$ C) $k \leq 1$
D) $k = -1$ E) $k = 1$

15. (99-8-34) Quyidagi funksiyalardan qaysi birining aniqlanish sohasi $(0,1)$ oraliqdan iborat?
A) $y=\sqrt{1/(1-x)}+log_2 x$ B) $y=1/\sqrt{1-x^2}$
C) $y=\sqrt{1-x}-\sqrt{x}$ D) $y=\frac{1}{1-x}$ E) $y=\frac{2}{1-x^2}$

16. (99-8-36) Ushbu $f(x)=\log_3(x^2-6x+36)$ funksiyaning eng kichik qiymatini toping.
A) 1 B) 9 C) 2 D) 3 E) aniqlab bo'lmaydi

17. (99-9-50) $y=\ln(\frac{1}{4}x^2-2x)+\sqrt{9-x}$ funksiyaning aniqlanish sohasini toping.
A) $(8;9]$ B) $[8;9]$ C) $(-\infty;0)\cup[8;9]$
D) $(8;9)$ E) $(-\infty;0)\cup(8;9]$

18. (00-9-44) Funksiyaning aniqlanish sohasini toping.
$$f(x)=log_5(81^{-x}-3^{x^2+3})$$
A) $(-\infty;-3)\cup(-2;\infty)$ B) $(-\infty;1)\cup(3;\infty)$
C) $(1;3)$ D) $(-3;-1)$ E) $(0;\infty)$

19. (96-3-90) Agar $a=log_{\frac{1}{2}}5$, $b=log_{\frac{1}{4}}3$, $c=log_{\frac{1}{2}}3$ bo'lsa, a, b va c sonlar uchun quyidagi munosabatlarning qaysi biri o'rinli?
A) $a<b<c$ B) $c<a<b$ C) $b<c<a$
D) $b<a<c$ E) $a<c<b$

20. (96-9-25) Agar $a=log_{\frac{1}{3}}3$, $b=log_{\frac{1}{4}}3$, $c=log_{\frac{1}{3}}4$ bo'lsa, a, b va c sonlar uchun quyidagi munosabatlarning qaysi biri o'rinli?
A) $c<a<b$ B) $c<b<a$ C) $a<b<c$
D) $b<a<c$ E) $b<c<a$

21. (96-12-90) Agar $a=log_{\frac{1}{6}}4$, $b=log_{\frac{1}{5}}6$ va $c=log_{\frac{1}{5}}4$ bo'lsa, a, b va c sonlar uchun quyidagi munosabatlarning qaysi biri o'rinli?
A) $c<b<a$ B) $b<c<a$ C) $c<a<b$
D) $a<b<c$ E) $a<c<b$

22. (96-13-31) Agar $a=log_{\frac{1}{5}}4$, $b=log_{\frac{1}{5}}6$, $c=log_{\frac{1}{6}}4$ bo'lsa, a, b va c sonlar uchun quyidagi munosabatlarning qaysi biri o'rinli?
A) $b<c<a$ B) $c<a<b$ C) $a<c<b$
D) $a<b<c$ E) $b<a<c$

23. (98-9-32) Ushbu $p=log_{1,2}\frac{3}{8}$, $q=log_{0,8}\frac{2}{5}$, $r=log_{1,4}0,3$ va $l=log_{0,4}\frac{3}{4}$ sonlardan qaysilari musbat?
A) faqat p B) p va q C) q va l
D) p va l E) faqat l

24. (02-2-20) Qaysi javobda manfiy son ko'psatilgan?
A) $log_{\frac{1}{2}}2$ B) $log_{\sqrt{2}}\sqrt{3}$ C) $log_{\frac{1}{7}}\frac{1}{\sqrt{45}}$
D) $log_2 1,2$ E) $log_3\sqrt{5}$

25. (99-9-47) Agar $0<p<1$ va $1<n<m$ bo'lsa, quyidagi ko'paytmalardan qaysi biri musbat?
A) $log_p m\cdot log_m 1$ B) $log_p n\cdot log_p m$ C) $log_m p\cdot log_n m$ D) $log_p m\cdot log_m 1$ E) $log_p n\cdot log_n m$

26. (00-3-43) Ushbu $a=log_{0,2}8$, $b=log_3 0,8$, $c=log_{0,9}2$ $d=log_4 2$ va $l=log_{0,9}0,6$ sonlardan qaysilari musbat?
A) b va d B) a va d C) c va d
D) a, c va d E) l va d

27. (99-2-30) Quyida keltirilgan tengsizliklardan qaysi biri to'g'ri?
1) $log_{\frac{1}{2}}\frac{b^4+b^2}{b^2}>0$ 2) $log_3 8+log_3 2>4$
3) $log_4 a^2<\dfrac{log_2 a^2}{2}$ 4) $log_5 10-log_5 2>1$
A) 1 B) 2 C) 3
D) 4 E) hech qaysisi to'g'ri emas

28. (01-1-29) Funksiyaning aniqlanish sohasini toping
$$y=\frac{ln(6x-x^2-5)}{5^{2-x}-1}$$
A) $(-\infty;2)\cup(2;\infty)$ B) $(1;2)\cup(2;5)$
C) $(-\infty;1)\cup(5;\infty)$ D) $(1;5)$ E) $[1;5]$

29. (01-3-21) Ushbu
$$y=log_{\sqrt{10}}(6+x-x^2)$$
funksiyaning aniqlanish sohasidagi butun sonlarning yig'indisini toping.
A) 0 B) 3 C) 2 D) 5 E) 4

30. (01-6-19) Ushbu
$$y=10^{lg(9-x^2)}$$
funksiyaning grafigi qaysi koordinat choraklarida joylashgan?
A) I va III B) I, II, III va IV C) I va II
D) III va IV E) I va IV

31. (01-6-40) Ushbu
$$f(x)=\frac{log_{x^2+1}(6-x)}{\sqrt{x+2}}$$
funksiyaning aniqlanish sohasini toping.
A) $(-2;6)$ B) $[-2;0)\cup(0;6)$ C) $(-2;0)\cup(0;6)$
D) $[-2;6)$ E) $[-2;0)\cup(0;6]$

32. (01-7-44) Ushbu
$$f(x)=\sqrt{9-x^2}+lg(x-1)-\sqrt{x}$$
funksiyaning aniqlanish sohasini toping.
A) $(0;\infty)$ B) $(0;3]$ C) $(0;9]$
D) $(1;\infty)$ E) $(1;3]$

33. (01-9-46) Ushbu
$$y=log_\pi\frac{x^2-13x-30}{25-9x^2}$$
funksiyaning aniqlanish sohasiga nechta natural son tegishli?
A) 13 B) 15 C) $\emptyset$ D) 8 E) 3

34. (01-9-47) Ushbu
$$y=log_{15}\frac{x^2-2x-15}{2x+3}$$
funksiyaning aniqlanish sohasiga tegishli eng katta manfiy butun sonni va funksiyaning shu nuqtadagi qiymatini toping.
A) $y(-1)=log_{15}2$ B) $y(-5)=log_{15}20$
C) $y(-3)=4$ D) $y(-4)=-3$
E) $y(-2)=log_{15}7$

35. (98-7-21) Tenglamada x ning qabul qilishi mumkin bo'lgan qiymatlar to'plaminim ko'rsating.

$$lg(x-3)-lg(x+9)=lg(x-2)$$

A) $(2;3)$ B) $(9;\infty)$ C) $(-9;\infty)$
D) $(3;\infty)$ E) $(-\infty;9)$

36. (02-3-42) $y=5lg\frac{x}{3}$ funksiyaga teskari funksiyani aniqlang.
A) $y=3\cdot 10^{\frac{x}{5}}$ B) $y=3\cdot 10^{\sqrt[5]{x}}$ C) $y=5\cdot 10^{\frac{x}{3}}$
D) $y=5\cdot 10^{\sqrt[3]{x}}$ E) $y=10^{\frac{x}{15}}$

37. (02-3-43) $y=lg(3x-1)+\frac{1}{\sqrt{6+x-x^2}}$ funksiyaning aniqlanish sohasini toping.
A) $(\frac{1}{3};3)$ B) $(-2;3)$ C) $(\frac{1}{3};\infty)$
D) $(3;\infty)$ E) $(-2;\frac{1}{3})$

38. (02-4-39) $y=\sqrt{10^{lg(x+4)}}$ funksiya grafigining Oy o'qi bilan kesishish nuqtasi ordinatasini toping.
A) -2 B) -1 C) 0 D) 1 E) 2

39. (02-7-20) $y=lg\left(\frac{3x+1}{x+2}-1\right)$ funksiyaning aniqlanish sohasini toping.
A) $(-\infty;-2)\cup(\frac{1}{2};\infty)$ B) $(-2;\frac{1}{2})$ C) $(-\infty;-2)$
D) $(\frac{1}{2};\infty)$ E) $(-\infty;-2)\cup(-2;\infty)$

40. (02-9-29) $y=\sqrt{2+log_{\frac{1}{2}}(3-x)}$ funksiyaning aniqlanish sohasini toping.
A) $(-1;3)$ B) $[-1;3)$ C) $(-\infty;3)$
D) $(-\infty;-1]$ E) $[-2;3)$

41. (02-12-51)

$$f(x)=\sqrt{x+4}+log_2(x^2-4)$$

funksiyaning aniqlanish sohasini toping.
A) $[-2;2]$ B) $(-4;2)$ C) $(-2;2)$
D) $[-4;2)$ E) $[-4;-2)\cup(2;\infty)$

42. (03-4-40) $f(x)=log_{x^2}(x-1)+\sqrt{2-x}$ funksiyaning aniqlanish sohasini toping.
A) $[1;2]$ B) $(1;2)$ C) $[1;2)$
D) $(1;2]$ E) $(1;1,5]$

43. (03-4-41) $f(x)=log_2(x^2-2x+5)$ funksiyaning qiymatlar sohasini toping.
A) $(5;\infty)$ B) $[log_25;\infty)$ C) $(2;\infty)$
D) $(log_26;\infty)$ E) $[2;\infty)$

44. (03-5-63) $a=2log_25$, $b=3log_{\frac{1}{8}}\frac{1}{23}$, $c=4log_{\frac{1}{4}}\frac{5}{26}$ sonlarni o'sish tartibida joylashtiring.
A) $b<a<c$ B) $a<b<c$ C) $b<c<a$
D) $c<b<a$ E) $c<a<b$

45. (03-6-43)

$$y=\sqrt{\frac{8}{|x|}-1}+lg(x^2-1)$$

funksiyaning aniqlanish sohasini toping.
A) $-8<x<-1$ B) $1<x<8$ C) $-1<x<1$
D) $-8<x<-1$, $1<x<8$ E) $1<x<8$

46. (03-10-38) $y=\frac{ln(7-x^2)}{x+1}$ funksiyaning aniqlanish sohasiga tegishli butun sonlarning yig'indisini toping.
A) 0 B) 1 C) -1 D) 2 E) -2

1.14.2 Logarifmik ifodalarni shakl almashtirish.

(98-5-29) Agar $log_35=a$, $log_32=b$ bo'lsa, log_645 ni a va b orqali toping.
A) $\frac{b+2}{a+2}$ B) $\frac{2+a}{1+b}$ C) $\frac{a}{1+b}$ D) $\frac{b}{1+a}$ E) $\frac{1+a}{2+b}$

Yechish: $\log_3 5=a$, $log_32=b$ berilgan. Boshqa asosga o'tish formulasi

$$log_ab=\frac{log_cb}{log_ca},\quad (a,b,c>0,a,c\neq 1)$$

yordamida

$$log_645=\frac{log_345}{log_36}=\frac{log_3(9\cdot 5)}{log_3(2\cdot 3)}=\frac{log_39+log_35}{log_32+log_33}=\frac{2+a}{b+1}$$

ekanini hosil qilamiz. **Javob:** $\frac{2+a}{b+1}$ (B).

1. (96-3-89) Hisoblang. $\left[2^{\frac{1}{log_316}}\right]^4$
A) $\sqrt{3}$ B) 4 C) 2 D) $\sqrt[4]{3}$ E) 3

2. (96-6-53) Sonlardan qaysi biri 2 dan kichik?
$M=log_5100-log_54$, $N=4log_23-log_29$
$P=log_672-log_62$, $Q=log_416+log_4\frac{1}{8}$
A) N B) P C) M D) Q E) hech qaysisi

3. (96-9-31) Hisoblang.

$$\left(\sqrt[3]{7}\right)^{\frac{1}{log_97}}$$

A) 10 B) 9 C) 3 D) 7 E) 11

4. (96-12-89) Hisoblang.

$$\left(\sqrt{3}\right)^{\frac{2}{log_43}}$$

A) 2 B) 3 C) 4 D) 6 E) 7

5. (96-13-30) Hisoblang.

$$\left(\sqrt[3]{5}\right)^{\frac{3}{log_45}}$$

A) 8 B) 7 C) 5 D) 4 E) 9

6. (97-2-53) Ushbu $m=2log_28-log_24$, $n=log_2400-2log_25$ $p=log_5125+log_55$, $q=ln12e-ln12$ sonlardan qaysi biri qolgan uchtasida teng emas?
A) m B) n C) p D) q E) hech qaysisi

7. (97-5-37) Hisoblang.

$$log_2lg100$$

A) 1 B) 4 C) 3 D) 2 E) 10

8. (97-8-53) Quyidagi sonlardan qaysi biri 2 dan kichik?
A) log_42+log_48 B) $log_236-log_23$
C) $2log_25-log_225$ D) $log_26+\frac{1}{2}log_29$
E) $log_345-log_35$

9. (97-9-37) Hisoblang.

$$log_5 lne^5$$

A) 5 B) 5e C) 50 D) 10 E) 1

10. (97-12-52) Quyidagi sonlardan qaysi biri 1 ga teng emas?
A) $log_3 12 - log_3 4$ B) $\frac{1}{2}log_4 36 + log_4 \frac{2}{3}$
C) $log_5 125 - \frac{1}{2}log_5 625$ D) $2log_2 5 - log_2 30$
E) $ln4e - 2ln2$

11. (98-4-15) Hisoblang.

$$\frac{5^{lg20}}{20^{lg5+1}}$$

A) 0,25 B) 0,1 C) 0,2 D) 0,05 E) 0,01

12. (98-9-33) Hisoblang.

$$\frac{log_2 729}{log_2 9}$$

A) 2,5 B) 3 C) 3,5 D) 2 E) 1,5

13. (98-11-46) Hisoblang.

$$log_{2\sqrt{2}} 128$$

A) $4\frac{2}{3}$ B) $3\frac{2}{3}$ C) $2\frac{2}{3}$ D) $3\frac{3}{4}$ E) $4\frac{3}{4}$

14. (98-12-74) Hisoblang.

$$\frac{log_3 12}{log_{36} 3} - \frac{log_3 4}{log_{108} 3}$$

A) 3 B) 2 C) 1 D) 6 E) $\frac{1}{3}$

15. (99-2-31) Hisoblang.

$$100^{\frac{1}{2}lg27 - lg3} \cdot 10$$

A) 20 B) 40 C) 30 D) 10 E) 50

16. (99-3-15) Hisoblang.

$$\frac{5^{-log_{\sqrt{5}}(\sqrt[4]{3})}}{9^{1+log_{0,5}2}}$$

A) $\frac{\sqrt{3}}{9}$ B) $\frac{\sqrt{3}}{3}$ C) $\frac{\sqrt[4]{27}}{9}$ D) $\frac{\sqrt[4]{3}}{3}$ E) $\frac{1}{3}$

17. (99-6-13) Hisoblang.

$$log_9 17 \cdot log_{17} 7 \cdot log_7 3$$

A) $\frac{7}{14}$ B) $\frac{1}{7}$ C) 1 D) 2 E) $\frac{1}{14}$

18. $(99-8-30)^*$ Yig'indini hisoblang.Bunda $[a]$ yozuv a sonining butun qismini bildiradi.

$$[lg28] + [lg0,026]$$

A) 0 B) 1 C) -1 D) -2 E) 2

19. (00-1-35) Hisoblang.

$$100^{2lg5 - lg15}$$

A) $2\frac{7}{9}$ B) 2,4 C) $2\frac{8}{9}$ D) $2\frac{7}{9}$ E) $3\frac{1}{9}$

20. (00-1-39) Quyidagi keltirilgan sonlardan kattasini belgilang.
A) $log_2 18 - log_2 9$ B) $3^{log_3 6}$ C) $lg25 + lg4$
D) $log_{13} 169^2$ E) $\frac{log_8 4}{log_8 64}$

21. (00-3-34) Hisoblang.

$$343^{log_{49} 4}$$

A) 8 B) 4 C) 7 D) 6 E) 2

22. (00-7-32) $n = log_{\frac{1}{2}} 4 + log_{\frac{1}{2}} 2$, $m = log_{\frac{1}{3}} 15 - log_{\frac{1}{3}} 5$ va $p = lne^{-2}$ sonlarni kamayish tartibida joylashtiring.
A) $p > m > n$ B) $m > n > p$ C) $n > p > m$
D) $p > n > m$ E) $m > p > n$

23. (00-10-42) Hisoblang.

$$log_{2\sqrt{2}} 512$$

A) 8 B)6 C) 4 D) 10 E) 12

24. (96-9-84) Hisoblang.

$$log_3 4 \cdot log_4 5 \cdot log_5 6 \cdot log_6 7 \cdot log_7 8 \cdot log_8 9$$

A) 1 B)3 C) 6 D) 2 E) 9

25. (00-5-66) Hisoblang.

$$log_3 2 \cdot log_4 3 \cdot log_5 4 \cdot log_6 5 \cdot log_7 6 \cdot log_8 7$$

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{1}{5}$ E) $\frac{1}{7}$

26. (00-7-31) Hisoblang.

$$2log_2 3 \cdot log_3 2 \cdot log_3 \frac{1}{81}$$

A) -6 B) -9 C) -4 D) -8 E) -5

27. (00-8-43) Hisoblang.

$$\sqrt{25^{\frac{1}{log_6 5}} + 49^{\frac{1}{log_8 7}}}$$

A) 10 B) $\sqrt{73}$ C) 1 D) 12 E) 14

28. (00-8-44) Soddalashtiring.

$$36^{log_6 5} + 10^{1-lg2} - 3^{log_6 36}$$

A) 21 B) 43 C) 13 D) 1 E) 0

29. (98-1-33) Soddalashtiring.

$$\frac{log_2^2 14 + log_2 14 log_2 7 - 2log_2^2 7}{log_2 14 + 2log_2 7}$$

A) 2 B) $log_2 7$ C) $-log_2 7$ D) 1 E) $-2,5$

30. (98-2-36) Ifodani hisoblang.

$$(log_3 27 - log_3 9) \cdot \left(log_3 48 + log_3 \frac{1}{16}\right) + log_3 81$$

A) 8 B) 7 C) 4 D) 5 E) 6

31. (98-8-33) Soddalashtiring.

$$\frac{2log_3^2 2 - log_3^2 18 - log_3 2 \cdot log_3 18}{2log_3 2 + log_3 18}$$

A) 1 B) $\frac{1}{2}$ C) -2 D) $-\frac{1}{2}$ E) 2

32. (99-1-28)* Soddalashtiring.

$$\Big(\frac{1}{\sqrt{2}-1}\Big)^{\frac{log_6 log_6(\sqrt{2}+1)}{log_6(\sqrt{2}+1)}}$$

A) $log_6(\sqrt{2}+1)$ B) $log_6(\sqrt{2}-1)$ C) $\frac{1}{\sqrt{2}-1}$ D) $\sqrt{2}+1$ E) 1

33. (99-4-55) Ifodaning qiymatini toping.

$$\frac{log_5^2 15 - log_5^2 3 + 2log_5 15 + 2log_5 3}{log_5 15 + log_5 3}$$

A) 1 B) 2 C) 3 D) 5 E) 4

34. (01-3-14) Hisoblang.

$$4^{log_2(\sqrt[3]{2\sqrt{2}})^2}$$

A) 16 B) 2 C) 4 D) 64 E) $4\sqrt[3]{4}$

35. (01-5-16) Ifodaning qiymatini toping.

$$49^{1-log_7 2} + 5^{-log_5 4}$$

A) 12,5 B) 13 C) 14 D) 23 E) 25

36. (01-6-36) Hisoblang.

$$2log_2 12 + log_2 20 - log_2 15 - log_2 3$$

A) 4 B) 5 C) 7 D) 3 E) 6

37. (01-6-37) Soddalashtiring.

$$lg8 \log_2 10 + log_5 9 \; log_3 5$$

A) 4 B) 3 C) 6 D) 5 E) 7

38. (01-7-23) Soddalashtiring.

$$0,8 \cdot (1 + 9^{log_3 8})^{log_{65} 5}$$

A) 2 B) 3 C) 4 D) 5 E) 8

39. (01-9-10) Soddalashtiring.

$$\frac{lg(7-4\sqrt{3})}{lg(2-\sqrt{3})}$$

A) 2 B) 1 C) $\sqrt{3}$ D) -1 E) 3

40. (01-9-17) Soddalashtiring.

$$\frac{lg^2(x^3)}{lg^3(x^2)} \cdot lg\sqrt{x}$$

A) $\frac{9}{16}$ B) $\frac{3}{4}$ C) $1\frac{7}{8}$ D) $\frac{3}{8}$ E) $1\frac{1}{8}$

41. (01-9-26) Hisoblang.

$$0,2^{log_5(4+1+\frac{1}{4}+...)}$$

A) $\frac{3}{16}$ B) $\frac{1}{8}$ C) $\frac{1}{4}$ D) $\frac{5}{16}$ E) 0,2

42. (01-10-16) Hisoblang.

$$(0,125)^{log_{2\sqrt{2}}(\frac{1}{4}-\frac{1}{8}+\frac{1}{16}-\frac{1}{32}+...)}$$

A) 16 B) 25 C) 36 D) 32 E) 24

43. (01-10-33) Hisoblang.

$$\frac{log_3 256 \cdot log_2 \frac{1}{81}}{log_5 \frac{1}{16} \cdot log_4 125}$$

A) $4\frac{2}{3}$ B) $5\frac{2}{3}$ C) $5\frac{1}{3}$ D) $4\frac{1}{3}$ E) $6\frac{2}{3}$

44. (01-11-25) Hisoblang.

$$log_5 2 \cdot log_4 243 \cdot log_2 5 \cdot log_3 4$$

A) 4 B) 3 C) 5 D) 6 E) 2

45. (01-11-26) Ushbu

$$\frac{3lg2 + 3lg5}{lg1300 - lg13}$$

ifodaning qiymatini hisoblang.
A) 1,8 B) 1,6 C) 2,3 D) 2 E) 1,5

46. (02-2-53)

$$\frac{log_5 30}{log_{30} 5} - \frac{log_5 150}{log_6 5}$$

ni hisoblang.
A) 1 B) -1 C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) -2

47. (02-3-32) Agar $a > 0$ va $a \neq 1$ bo'lsa, $log_{\sqrt{a}} \sqrt[3]{a}$ ifodaning qiymatini toping.
A) $\frac{2}{3}$ B) $\frac{3}{2}$ C) 3 D) 6 E) $\frac{1}{3}$

48. (02-3-33)

$$\frac{1}{log_2 4} + \frac{1}{log_4 4} + \frac{1}{log_8 4} + \frac{1}{log_{16} 4} +$$

$$+ \frac{1}{log_{32} 4} + \frac{1}{log_{64} 4} + \frac{1}{log_{128} 4}$$

ni hisoblang.
A) 14 B) 16 C) 7 D) 32 E) 8

49. (02-4-38)

$$log_{\frac{1}{6}} 2 + log_{\frac{1}{6}} 3$$

ni hisoblang.
A) -3 B) -1 C) 0 D) 1 E) 3

50. (02-5-24)

$$log_3^{-1} \sqrt[3]{\sqrt[3]{\sqrt[3]{3}}}$$

ning qiymatini toping.
A) 27 B) -27 C) $\frac{1}{27}$ D) 3 E) 9

51. (02-6-20)

$$log_{128}\Big((0,25)^{log_{16}(\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+...)}\Big)$$

ni hisoblang.
A) $\frac{2}{7}$ B) $\frac{3}{8}$ C) $\frac{1}{14}$ D) $\frac{2}{5}$ E) $\frac{1}{12}$

52. (02-6-36)

$$\frac{log_2 729 \cdot log_3 \frac{1}{256}}{log_7 216 \cdot log_6 343}$$

ni hisoblang.
A) $-3\frac{1}{3}$ B) $\frac{2}{3}$ C) $4\frac{2}{3}$ D) $-5\frac{1}{3}$ E) $-5\frac{2}{3}$

53. (02-8-15)

$$\sqrt[3]{2^{log_8 125} + log_3 5 \cdot log_5 27}$$

ni hisoblang.
A) 2 B) 1 C) 3 D) 4 E) 5

54. (02-9-34)

$$\frac{1}{6}(1 + 9^{log_3 7})^{log_{50} 3}$$

ni hisoblang.
A) 1 B) 0,5 C) 3 D) 9 E) 0,75

55. (02-10-73)

$$\left(\frac{log_6 27 + 2log_6 2}{log_6 \sqrt[3]{0,25} + log_6 \frac{1}{3}}\right)^3$$

ni hisoblang.
A) -27 B) 27 C) -8 D) $8log_6 27$ E) 16

56. (02-11-31)

$$16^{log_2(5-\sqrt{10})+log_{\frac{1}{2}}(\sqrt{5}-\sqrt{2})}$$

ni hisoblang.
A) $\sqrt{5}$ B) 5 C) 25 D) 4 E) $5\sqrt{5}$

57. (02-12-48)

$$\frac{3lg2 + 3lg5}{lg1300 - lg0,13}$$

ni soddalasntiring.
A) 0,8 B) 0,6 C) 0,7 D) 0,65 E) 0,75

58. (03-1-20) Agar $x = log_5 2 + log_{11} 3$ bo'lsa, quyidagi sonlarning qaysi biri eng katta bo'ladi?
A) x B) x^2 C) x^3 D) $\sqrt{x}$ E) $\sqrt[3]{x}$

59. (03-2-20)

$$\frac{1 + 2log_3 2}{(1 + log_3 2)^2} + log_6^2 2$$

ni hisoblang.
A) 2 B) 0,5 C) 1 D) $\frac{1}{4}$ E) $log_3 2$

60. (03-2-25) Agar $p = \frac{1}{lg\pi} + \frac{1}{log_5 \pi} + \frac{1}{log_2 \pi}$ bo'lsa, quyidagi munosabatlarning qaysi biri to'g'ri?
A) $p < 3$ B) $p = 3$ C) $p < 4$
D) $p = 4$ E) $p > 4$

61. (03-3-33)

$$log_8 5^{2log_{25} 32}$$

ni hisoblang.
A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{5}{3}$ D) 2 E) $\frac{7}{3}$

62. (03-4-32) $ln(3^{log_3 0,64} + 8^{log_8 0,36})$ ning qiymati -11 dan qancha ko'p?
A) 10 B) 9 C) 11 D) 12 E) 13

63. (03-4-33)

$$2log_4 8 - 3log_8 4 + log_2 32 + 18$$

ni hisoblang.
A) 22 B) 24 C) 26 D) 20 E) 28

64. (03-5-39)

$$y = log_5 log_5 \sqrt[5]{\sqrt[5]{\sqrt[5]{\sqrt[5]{5}}}}$$

ni hisoblang.
A) -4 B) $\frac{1}{5}$ C) $-\frac{1}{4}$ D) 4 E) -2

65. (03-6-59) $lg5 = 0,7$ bo'lsa, $log_5(10)$ ni toping.
A) 0,3 B) $1\frac{3}{4}$ C) 1,4 D) $1\frac{3}{7}$ E) 1,7

66. (03-9-19)

$$log_{\frac{1}{3}} \frac{\sqrt{3}}{7 + 2\sqrt{10}} + log_{\sqrt{3}} \frac{1}{\sqrt{5} + \sqrt{2}}$$

ni hisoblang.
A) -1 B) -2 C) 2 D) $-\frac{1}{2}$ E) $\frac{1}{2}$

67. (03-11-82)

$$3^{\sqrt{log_3 2}} - 2^{\sqrt{log_2 3}} - 1$$

ni hisoblang.
A) 0 B) 1 C) 2 D) -1 E) -2

68. (96-1-33) Agar $2^n = 5$ bo'lsa, $lg2$ ni n orqali ifodalang.
A) $\frac{1}{n}$ B) $n + 1$ C) n D) $\frac{n+1}{2}$ E) $\frac{1}{n+1}$

69. (96-10-36) Agar $log_4 125 = a$ bo'lsa, $lg64$ ni a orqali ifodalang.
A) $\frac{3}{2}a + 4$ B) $\frac{2}{3}a + 6$ C) $\frac{18}{2a+3}$
D) $\frac{6}{3a+2}$ E) $3a + 2$

70. (96-9-28) $a = log_{50} 40$ bo'lsa, $log_5 2$ ni a orqali ifodalang.
A) $\frac{3a-1}{2-a}$ B) $\frac{a-3}{1-2a}$ C) $\frac{a-3}{2a-1}$ D) $\frac{2a-1}{a-3}$ E) $\frac{1-2a}{a-3}$

71. (96-3-86) $a = log_{98} 56$ bo'lsa, $log_7 2$ ni a orqali ifodalang.
A) $\frac{3-a}{2a-1}$ B) $\frac{2a-1}{3-a}$ C) $\frac{a-3}{2a-1}$ D) $\frac{1-2a}{3-a}$ E) $\frac{a-2}{3-a}$

72. (96-12-86) $a = log_{147} 63$ bo'lsa, $log_7 3$ ni a orqali ifodalang.
A) $\frac{1-2a}{a-2}$ B) $\frac{2a-1}{a-2}$ C) $\frac{a-2}{1-2a}$ D) $\frac{a-2}{2a-1}$ E) $\frac{a-2}{2a+1}$

73. (96-13-27) $a = log_{75} 45$ bo'lsa, $log_5 3$ ni a orqali ifodalang.
A) $\frac{1-2a}{a-2}$ B) $\frac{2a-1}{a-2}$ C) $\frac{a-2}{1-2a}$ D) $\frac{a-2}{2a-1}$ E) $\frac{a+2}{2a-1}$

74. (98-2-33) $a = log_a 256 = 2,4$ bo'lsa, $log_a 4 - log_a 2$ ni hisoblang.
A) $0,2$ B) $0,4$ C) $0,15$ D) $0,28$ E) $0,3$

75. (98-3-30) $a = log_{36}108$ bo'lsa, $log_2 3$ ni a orqali ifodalang.
A) $\frac{2+2a}{2a+3}$ B) $\frac{2(1+a)}{2a-3}$ C) $\frac{2(1-a)}{2a-3}$ D) $\frac{2(1-a)}{2a+3}$ E) $\frac{1+2a}{2a+3}$

76. (98-10-77) $a = log_6 108$ bo'lsa, $log_2 3$ ni a orqali ifodalang.
A) $\frac{a+2}{3+a}$ B) $\frac{a-2}{3+a}$ C) $\frac{2-a}{3+a}$ D) $\frac{a-2}{3-a}$ E) $\frac{3+a}{a+2}$

77. (00-1-38) $a = log_{12}2$ bo'lsa, $log_6 16$ ning qiymatini toping.
A) $\frac{4a}{1+a}$ B) $\frac{2a}{1-a}$ C) $\frac{4a}{1-a}$ D) $\frac{3a}{1+a}$ E) $\frac{3a}{1-a}$

78. (00-1-41) $log_2(log_2 a^8)$ son $log_2 log_2 a$ dan qanchaga ko'p?
A) 2,5 B) 3,2 C) 3 D) 4 E) 2

79. (00-6-32) Agar $log_{0,5}27 = a$ bo'lsa, $log_{\sqrt{3}}\sqrt[6]{1,5}$ ning qiymatini toping.
A) $\frac{1}{3} + a^{-1}$ B) $a^2 - 1$ C) $3 + a^{-1}$
D) $1 + a^{-3}$ E) $\sqrt[3]{a} - \frac{1}{3}$

80. (00-10-34) $a = log_2 3$ bo'lsa, $log_8 0,75$ ni a orqali ifodalang.
A) $\frac{1}{3}(a-1)$ B) $\frac{1}{3}(a+1)$ C) $\frac{1}{3}(a-2)$
D) $\frac{1}{3}(a+2)$ E) $\frac{1}{3}(2-a)$

81. (00-10-66) Agar $log_a 27 = b$ bo'lsa, $log_{\sqrt{3}}\sqrt[6]{a}$ ni toping.
A) $\frac{1}{b}$ B) $\frac{2}{b}$ C) $-\frac{b}{2}$ D) $2b$ E) $2b^2$

82. (97-4-33) Agar $lg2 = a$, va $lg7 = b$ bo'lsa, $log_{35}5$ ni a va b orqali toping.
A) $\frac{1+a}{1+b}$ B) $\frac{1-a}{1+b}$ C) $\frac{a+b}{b-1}$ D) $\frac{a-1}{a+b}$ E) $\frac{1-a}{1-a+b}$

83. (97-9-93) $log_3 20 = a$ va $log_3 5 = b$ bo'lsa, $log_4 500$ ni a va b orqali toping.
A) $\frac{a+b}{a-b}$ B) $\frac{a+2b}{a+b}$ C) $\frac{a+2b}{a-b}$ D) $\frac{a-b}{a+2b}$ E) $\frac{a-b}{a+b}$

84. (98-11-44) Agar $log_7 2 = a$ $log_2 10 = b$ bo'lsa, $log_4 39,2$ ni a va b orqali toping.
A) $\frac{1}{a} + \frac{2}{3} - \frac{b}{2}$ B) $\frac{1}{a} + \frac{3}{2} - \frac{b}{2}$ C) $\frac{1}{a} - \frac{3}{2} + \frac{b}{2}$
D) $\frac{1}{a} - \frac{2}{3} + \frac{b}{2}$ E) $\frac{1}{a} - \frac{2}{3} + \frac{b}{3}$

85. (99-7-30) $log_2 3 = a$, va $log_2 5 = b$ bo'lsa, $log_{45}135$ ni a va b orqali ifodalang.
A) $\frac{b+3a}{b+2a}$ B) $\frac{b+2a}{b+3a}$ C) $\frac{b+a}{b+2a}$ D) $\frac{b+2a}{b+5a}$ E) $\frac{b+3a}{b+a}$

86. (99-10-35) Agar $log_2 a = 2$ va $log_3 b = 2$ bo'lsa, $log_6 ab$ ning qiymatini toping.
A) -2 B) 3 C) -3 D) 4 E) 2

87. (00-3-33) Agar $log_a x = 2$, $log_b x = 3$ va $log_c x = 6$ bo'lsa, $log_{abc} x$ ni toping.
A) $\frac{2}{3}$ B) $\frac{5}{6}$ C) 1 D) $\frac{4}{3}$ E) $\frac{3}{2}$

88. (00-3-35) $log_{14}7 = a$ va $log_{14}5 = b$ bo'lsa, $log_{35}28$ ni a va b orqali ifodalang.
A) $\frac{2-a}{a+b}$ B) $\frac{a-2}{a+b}$ C) $\frac{a+2}{a+b}$ D) $\frac{a+b}{a-2}$ E) $\frac{a+b}{2-a}$

89. (00-8-38) Agar $lg5 = a$ va $lg3 = b$ bo'lsa, $log_{30}8$ ni a va b orqali ifodalang.
A) $\frac{3-3a}{1+b}$ B) $\frac{3(1-b)}{1+a}$ C) $\frac{3(a-b)}{a+b}$ D) $\frac{b-1}{a+1}$ E) $\frac{a+1}{1+b}$

90. (00-10-39) Agar $log_7 2 = a$ $log_2 10 = b$ bo'lsa, $log_4 78,4$ ni a va b orqali ifodalang.
A) $2 - \frac{1}{a} - \frac{b}{2}$ B) $2 + \frac{1}{a} + \frac{b}{2}$ C) $2 - \frac{1}{a} + \frac{b}{2}$
D) $2 + \frac{1}{a} - \frac{b}{2}$ E) $-2 + \frac{1}{a} + \frac{b}{2}$

91. (01-2-29)* Ifodani soddalashtiring.$(b > a > 1)$

$$\left((log_b^4 a + log_b^4 b + 2)^{\frac{1}{2}} - 2\right)^{\frac{1}{2}}$$

A) $log_a b - log_b a$ B) $log_a b + log_b a$ C) $log_b a - log_a b$ D) $\sqrt{log_a b - log_b a}$ E) $\sqrt{log_b a - log_a b}$

92. (01-3-28)* Agar $a^2 + b^2 = 7ab$ bo'lsa,

$$\frac{2 \cdot lg((a+b)/3)}{lga + lgb}$$

$a > 0$, $b > 0$ni hisoblang.
A) 1 B) -1 C) 2 D) -2 E) $\frac{1}{2}$

93. (01-7-24) Agar $lg2 = a$ va $lg7 = b$ bo'lsa, $log_5 9,8$ ni a va b orqali ifodalang.
A) $\frac{a+b}{1-a}$ B) $\frac{a+2b-1}{1-a}$ C) $\frac{a-2b+1}{1-a}$
D) $\frac{a+2b}{a-1}$ E) $\frac{2-b}{a-1}$

94. (01-8-31) Agar $log_{0,2}27 = a$ bo'lsa, $log_{\sqrt{3}}\sqrt[6]{1,8}$ a orqali ifodalang.
A) $a^2 - \frac{2}{3}$ B) $a^{-1} + 1,5$ C) $a^{-3} + 2$
D) $\sqrt[3]{a} - 2$ E) $a^{-1} + \frac{2}{3}$

95. (01-11-27) Agar $log_3 4 = a$, va $log_5 4 = b$ bo'lsa, $log_4 45$ ni a va b orqali ifodalang.
A) $\frac{a+3b}{ab}$ B) $\frac{2a+b}{a+b}$ C) $\frac{a-2b}{ab}$ D) $\frac{a+2b}{a+b}$ E) $\frac{a+2b}{ab}$

96. (01-11-55)* Agar

$$log_3\left(\sqrt[3]{\sqrt{83}+\sqrt{2}} \cdot \sqrt[3]{\sqrt{245}+\sqrt{2}}\right) = t$$

bo'lsa,

$$log_3\left(\sqrt[3]{\sqrt{83}-\sqrt{2}} \cdot \sqrt[3]{\sqrt{245}-\sqrt{2}}\right)$$

ning qiymatini hisoblang.
A) $3 + t$ B) $2 + t$ C) $2 - t$ D) $3 - t$ E) $3t$

97. (02-2-21) Agar $lg5 = c$ bo'lsa, lg250 nimaga teng.
A) $2c + 1$ B) $2c - 1$ C) $\frac{3c+1}{2}$
D) $3c + 1$ E) $\frac{4c-5}{2}$

98. (02-5-23) Agar $log_4 a = log_8 b$ bo'lsa, $log_a b$ ning qiymatini toping.
A) $\frac{3}{2}$ B) $\frac{2}{3}$ C) 2 D) $-\frac{3}{2}$ E) $-\frac{2}{3}$

99. (02-8-12) Agar $7^{log_5 b} = 4$ bo'lsa, $b^{log_5\sqrt{7}}$ ni hisoblang.
A) 2 B) 3 C) 1 D) 4 E) 5

100. (02-8-13) Agar $lg2 = a$ va $lg3 = b$ bo'lsa, $log_9 20$ ni a va b orqali ifodalang.
A) $\frac{1+a}{2b}$ B) $\frac{1-a}{2b}$ C) $\frac{b}{1+2a}$ D) $\frac{b}{1-2a}$ E) $\frac{a+b}{a-b}$

101. (02-9-38) Agar $log_{\frac{b}{a}}(\frac{a^2}{b}) = -\frac{1}{2}$ bo'lsa, $log_{a^2 b}(ab)$ ni hisoblang.
A) $-\frac{1}{4}$ B) -1 C) 1 D) 0,6 E) 0,8

102. (02-10-27) $lg2 = a$ va $log_2 7 = b$ bo'lsa, lg56 ni a va b orqali ifodalang.
A) $3a + ab$ B) $2a + 3b$ C) $3a + 2b$
D) $\frac{2a+5b}{3}$ E) $\frac{3a^2+ab}{b}$

103. (02-11-32) Agar $log_2(\sqrt{3}-1) + log_2(\sqrt{6}-2) = a$ bo'lsa, $log_2(\sqrt{3}+1) + log_2(\sqrt{6}+2)$ yigindini toping.
A) $\sqrt{6} - a$ B) $\sqrt{3} - a$ C) $\sqrt{2} - a$
D) $3 - a$ E) $2 - a$

104. (03-4-37) Agar $log_a 8 = 3$ va $log_b 243 = 5$ bo'lsa, ab ning qiymatini toping.
A) 4 B) 5 C) 6 D) 8 E) 7

105. (03-7-67) Agar $lg5 = a$ va $lg3 = b$ bo'lsa, $log_{30}8$ ni a va b orqali ifodalang.
A) $\frac{a}{2a+3b}$ B) $\frac{b-3}{1-2a}$ C) $\frac{3a-3}{b+2}$ D) $\frac{3(1-a)}{1+b}$ E) $\frac{a-1}{3a+b}$

106. (03-8-43) Agar $a = log_5 4$ va $b = log_5 3$ bo'lsa, $log_{25}12$ ni a va b orqali ifodalang.
A) $\frac{a+b}{2}$ B) $\frac{a-b}{4}$ C) $\frac{ab}{2}$ D) $\frac{a^2+b}{4}$ E) $\frac{a^2-b^2}{5}$

107. (03-11-11) a,b,c lar musbat sonlar va $a^4 b^{\frac{1}{8}} = 16c^2$ bo'lsa, $4log_2 a - log_{\sqrt{2}} c + log_4 \sqrt[4]{b}$ ning qiymatini toping.
A) 4 B) 2 C) 8 D) 6 E) 1

108. (03-11-12) Agar $log_3 7 = a$, $log_7 5 = b$ va $log_5 4 = c$ bo'lsa, $log_3 12$ ni toping.
A) $abc + 1$ B) $\frac{ab}{c} + 1$ C) $a + b + c$
D) $\frac{ac}{b} + 2$ E) $abc + 2$

109. (03-12-58)

$$5^{\sqrt{log_5 a}} - a^{\sqrt{log_a 5}} \quad (a > 1)$$

ni soddalashtiring.
A) a B) a^2 C) $5a$ D) 1 E) 0

1.14.3 Logarifmik tenglamalar.

1. $log_a f(x) = b \quad \Leftrightarrow \quad f(x) = a^b$;
2. $log_a f(x) = log_a g(x) \quad \Leftrightarrow \begin{cases} f(x) = g(x), \\ f(x) > 0, \\ g(x) > 0; \end{cases}$
3. $log_{f(x)} g(x) = b \Leftrightarrow \begin{cases} [f(x)]^b = g(x), \\ f(x) > 0, \quad f(x) \neq 1 \end{cases}$

(00-7-33) a ning qanday qiymatida

$$lgx + lg(x-6) = lg(-a)$$

tenglama bitta ildizga ega bo'ladi?
A) 9 B) $a \in (-\infty; 0)$ C) 7 D) 6 E) $\emptyset$
Yechish: Berilgan tenglamaning aniqlanish sohasi $x > 6$ to'plamdan iborat.$log_a b + log_a c = log_a bc$ formula yordamida tenglamaning chap qismini almashtiramiz. $lgx(x-6) = lg(-a)$. Uni potensiallaymiz. $x(x-6) = -a$ $(a < 0)$. Hosil bo'lgan tenglamani yechamiz.

$$x^2 - 6x + a = 0 \quad D = 36 - 4a = 4(9-a)$$

Bu tenglama $a \leq 9$ da yechimga ega va uning ildizlari quyidagilar

$$x_{1,2} = \frac{6 \pm 2\sqrt{9-a}}{2} = 3 \pm \sqrt{9-a}$$

$x_1 = 3 - \sqrt{9-a} \leq 3$ bo'lgani uchun u berilgan tenglamaning aniqlanish sohasiga kirmaydi. Shuning uchun u ildiz emas.$x_2 = 3 + \sqrt{9-a}$ berilgan tenglamaning ildizi bo'lishi uchun uning aniqlanish sohasiga tegishli bo'lishi, ya'ni $x_2 > 6$ bo'lishi kerak. Bu tengsizlikdan a ni topamiz.

$$\sqrt{9-a} > 3, \quad 9 - a > 9, \quad a < 0.$$

Shunday qilib, $a \in (-\infty; 0)$ da berilgan tenglama bitta ildizga ega. **Javob:** $a \in (-\infty; 0)$ (B).

A. $log_a f(x) = b \quad va \quad log_a f(x) = log_a g(x)$**tenglamalar.**

1. (98-9-34) Tenglamani yeching.

$$lg(x^2 + 2x - 3) = lg(x - 3)$$

A) 0 B) -1 C) $0; -1$ D) $\emptyset$ E) 1

2. (99-6-26) Tenglamani yeching.

$$log_{18} log_2 log_2\Big(-\frac{1}{x}\Big) = 0$$

A) $-\frac{1}{16}$ B) $-\frac{1}{8}$ C) $\frac{1}{8}$ D) $-\frac{1}{4}$ E) $\frac{1}{16}$

3. (99-6-50) Tenglamani yeching.

$$log_{\frac{1}{5}} log_5 \sqrt{5x} = 0$$

A) -5 B) 1 C) 0 D) 4 E) 5

4. (00-1-37) Tenglamani yeching.

$$log_8 log_4 log_2 x = 0$$

A) 12 B) 13 C) 16 D) 15 E) 18

5. (00-3-36) Tenglamani yeching.

$$log_2 log_3 log_4 \sqrt{x^3} = 0$$

A) 4 B) 16 C) 2 D) 8 E) 1

6. (00-3-42) Tenglamani yeching.

$$log_3(3^x - 8) = 2 - x$$

A) 2 va 3 B) 3 C) 2 D) 2 va -1 E) 4

7. (98-12-105)* Tenglama ildizlarining yig'indisini toping.

$$|x - 13| \cdot log_2(x - 3) = 3(13 - x)$$

A) 39 B) 130 C) 169 D) 24 E) 78

8. (00-2-22) Agar

$$\begin{cases} 3^x \cdot 2^y = 972, \\ log_{\sqrt{3}}(x - y) = 2 \end{cases}$$

bo'lsa, xy ning qiymatini toping.
A) 14 B) 12 C) 10 D) 8 E) -8

9. (00-4-43) Tenglama nechta ildizga ega.

$$\frac{(7^{x^2-5x+7}-7)\cdot\sqrt{x^2+x-12}\cdot lg(2x-7)}{ln(3x-5)\cdot(\sqrt{2x-1}-\sqrt{8-x})}=0$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

10. (01-2-66) Tenglamani yeching.

$$log_4(2+\sqrt{x+3})=2cos(\frac{5\pi}{3})$$

A) 1 B) 2 C) 3 D) -3 E) -2

11. (01-3-26) Ushbu

$$lg\left(3^{\sqrt{\frac{x^2-4x}{x-3}}}+1\right)=1$$

tenglamaning ildizlari yig'indisini toping.
A) 10 B) 2 C) 8 D) 25 E) -3

12. (01-7-25) Tenglamani yeching.

$$lg(3+2lg(1+x))=0$$

A) 0 B) 1 C) -15 D) $-0,9$ E) $-0,5$

13. (01-7-26) Tenglamani yeching.

$$log_2|x-1|=1$$

A) 3 B) 2 C) -1 D) $2;-1$ E) $3;-1$

14. (01-9-41) Ushbu

$$lg(5x-2)=lg(2-5x)$$

tenglamaning aniqlanish sohasini toping.
A) $(0,4;\infty)$ B) $\emptyset$ C) $(-\infty;0,4)$
D) {2,5} E) $\{0,4\}$

15. (01-11-29) Ushbu

$$log_x(3x^2-2)=4$$

tenglamaning haqiqiy ildizlari nechta?
A) 4 B) 3 C) 2 D) 1 E) ildizi yo'q

16. (01-11-33) Tenglamani yeching.

$$log_3(3^{2x}-26\cdot 3^x)=x$$

A) 9 B) 6 C) 4 D) 3 E) 2

17. (02-1-60)

$$0,2log_x\frac{1}{32}=-0,5$$

tenglamani yeching.
A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) 2 D) 4 E) $\frac{1}{8}$

18. (02-2-24)

$$3xlog_3x+2=log_{27}x^3+6x$$

tenglamaning katta ildizi kichik ildizidan necha marta katta?
A) 27 B) 9 C) 3 D) 81 E) 2

19. (02-3-35)

$$log_3(4\cdot 3^x-1)=2x+1$$

tenglama ildizlari ayirmasining moduli nechaga teng?
A) 1 B) 2 C) 3 D) 0 E) 4

20. (02-3-37)

$$\frac{1}{2x}lg3=lg(3^{\frac{1}{x}}-6)$$

tenglamani yeching.
A) 0,5 B) 1 C) 1,5 D) 2 E) $\frac{3}{4}$

21. (02-5-27) Agar

$$\begin{cases} log_9\frac{x^2}{\sqrt{y}}=\frac{1}{2}, \\ log_3xy=3 \end{cases}$$

bo'lsa, $x+y$ ning qiymatini toping.
A) 6 B) 10 C) 12 D) 15 E) 1

22. (02-10-69)

$$log_2(2^{2x}+16^x)=2log_412$$

tenglama yeching.
A) log_43 B) log_23 C) 2 D) log_46 E) 0

23. (02-10-71) Agar

$$\begin{cases} log_2(x-y)=1 \\ 2^x\cdot 3^{y+1}=72 \end{cases}$$

bo'lsa, x va y ning o'rta proporsional qiymatini toping.
A) $\sqrt{3}$ B) 2 C) $\sqrt{2}$ D) $2\sqrt{2}$ E) 1,5

24. (02-12-49)

$$log_3(3^{2x}-26\cdot 3^x)=x$$

tenglamani yeching.
A) 9 B) 6 C) 4 D) 3 E) 2

25. (03-1-11)

$$log_x(5x-4)=2$$

tenglamaning ildizlari yig'indisini toping.
A) 5 B) 4 C) 3 D) 2 E) 4,5

26. (03-9-20) Agar m ushbu $log_{5+2x}(5x^2+19x+19)=2$ tenglama ildizlarining soni, x_0 esa shu tenglamaning musbat ildizi bo'lsa, $\frac{2m+4}{x_0}$ ning qiymatini toping.
A) 1 B) 2 C) $\frac{4}{3}$ D) $\frac{6}{5}$ E) $\frac{8}{3}$

27. (03-11-78)* k ning qanday qiymatlarida

$$(2x-k)\cdot log_2x=0$$

tenglama bitta ildizga ega?
A) $0<k\le 1$ B) $k>2$ C) $k=1$
D) $1\le k<2$ E) $k\le 0; k=2$

B. $a^{log_a f(x)}=g(x)$ tenglamalar.

1. (96-6-55) Tenglamaning ildizini toping.

$$3^{2log_3 x} = 16$$

A) 3 B) -4 C) 4 D) ± 4 E) ± 3

2. (97-2-55) Tenglamaning ildizi 20 dan qancha katta?

$$4^{log_4(x-5)} = 19$$

A) 6 B) 2 C) 4 D) 3 E) 5

3. (98-2-35) Tenglama yeching.

$$2^{log_2(x^3+4x+1)} = 8x + 1$$

A) $0; -2$ B) $0; -2; 2$ C) $0; 2$
D) $-2; 2$ E) $0; 1; 2$

4. (00-10-82) Tenglama yeching.

$$\Big(2x\Big)^{log_{2x}(x+4,5)^2} = 25$$

A) yechimi yo'q B) 0,5 C) $-9,5$
D) 0,8 E) 2,4

5. (01-5-12) Tenglamani yeching.

$$x^{log_x(x^2-1)} = 3$$

A) 2 B) 1 C) 3
D) 4 E) 5

C. $log_a b + log_a c = log_a bc$
va $log_a b - log_a c = log_a \frac{b}{c}$
formulalarga oid tenglamalar.

1. (00-3-38) Tenglama yeching.

$$lg\Big(\frac{1}{2} + x\Big) = lg\frac{1}{2} - lgx$$

A) 2 B) $\frac{1}{2}$ C) 1 D) -1 E) -1 va $\frac{1}{2}$

2. (99-3-20) Tenglamani yeching.

$$lg\sqrt{x-5} + lg\sqrt{2x-3} + 1 = lg30$$

A) $\frac{1}{2}$ B) 6 C) $\frac{1}{2}; 6$ D) $\frac{1}{2}; 8$ E) 8

3. (97-12-54) Tenglamaning ildizi 8 dan qanchaga kam?

$$log_2(x+2) + log_2(x+3) = 1$$

A) 7 B) 9 C) 10 D) 6 E) 11

4. (02-5-25)

$$lg(x+11) - \frac{1}{2}lg(2x+7) = 2 - lg25$$

tenglamaning ildizlari yig'indisini toping.
A) 7 B) 8 C) 9 D) 10 E) 11

5. (02-8-16)

$$log_2(3-x) - log_{\frac{1}{2}}(1-x) = 3$$

tenglamaning ildiziga nechani qo'shsak, u 5 ga teng bo'ladi?
A) 6 B) 5 C) 7 D) 3 E) 4

6. (02-12-50) Agar $lg(x^2+y^2) = 2$, $lg2 + lgxy = lg96$ va $x > 0$ bo'lsa, $x+y$ yig'indining qiymatini toping.
A) 12 B) 14 C) 16 D) 18 E) 8

7. (03-5-28) O'suvchi geometrik progressiyani tashkil etuvchi uchta musbat sonning yig'indisi 42, bu sonlarning 2 asosga ko'ra logarifmlarining yig'indisi 9 ga teng. Progressiyaning maxrajini toping.
A) 4 B) 2 C) 3 D) 7 E) 2,4

8. (03-7-21)

$$log_{\sqrt{5}}(4^x - 6) - log_{\sqrt{5}}(2^x - 2) = 2$$

tenglamani yeching.
A) $\frac{3}{2}$ B) $\frac{5}{4}$ C) 2 D) 2,5 E)3

D. $log_{a^x} b^y = \frac{y}{x} log_a b$**formulalarga oid tenglamalar.**

1. (97-8-40) Tenglamani yeching.

$$4^{2log_4 x} = 25$$

A) 5 B) ± 5 C) -5 D) 10 E) ± 10

2. (99-2-32) Tenglamaning ildizi 16 dan necha marta kam?

$$\frac{1}{2^{log_4 x}} = 4$$

A) 164 B) 172 C) 312 D) 180 E) 256

3. (99-6-28) Tenglamani yeching.

$$log_2(54 - x^3) = 3log_2 x$$

A) -3 B) 2 C) 1 D) 3 E) $\frac{1}{3}$

4. (00-2-24) $log_5 x = 2log_5 3 + 4log_{25} 7$ bo'lsa, x ni aniqlang.
A) 441 B) 125 C) 256 D) 400 E) 421

5. (00-3-28) Tenglamani yeching.

$$\Big(\frac{4}{9}\Big)^x \cdot \Big(\frac{27}{8}\Big)^{x-1} = \frac{lg4}{lg8}$$

A) 3 B) 4 C) 2 D) 1 E) 0

6. (00-8-15) Tenglamani yeching.

$$log_2(9^{x-1} + 7) = 2log_2(3^{x-1} + 1)$$

A) 2 B) 1 C) 3 D) 4 E) 0

7. (00-8-39) Tenglamani yeching.

$$log_{\sqrt{5}} x + log_{\sqrt[4]{5}} x + log_{\sqrt[6]{5}} x + ... + log_{\sqrt[16]{5}} x = 36$$

A) $\sqrt{5}$ B) 5 C) 2 D) 10 E) $\sqrt{3}$

8. (01-1-22) Tenglamani yeching.

$$\frac{lg(2x-5)}{lg(3x^2-39)} = \frac{1}{2}$$

A) 4 B) 5 C) 16 D) 4;16 E) 6

9. (01-5-11) Tenglamani yeching.

$$log_a x - log_{a^2} x + log_{a^4} x = \frac{3}{4}$$

A) a B) a^2 C) a^4 D) 2 E) 1

10. (01-9-22) Tenglamani yeching.

$$lg(169 + x^3) - 3lg(x+1) = 0$$

A) 7 B) 6 C) 8 D) 4 E) 9

11. (01-9-36) x ning qanday qiymatida $log_3(x-1)$, $log_3(x+1)$ va $log_3(2x-1)$ ifodalar ko'rsatilgan tartibda arifmetik progressyaning dastlabki uchta hadidan iborat bo'ladi?
A) 3 B) 6 C) 4 D) 2 E) 5

12. (02-11-34) Agar

$$log_3 x + log_{\sqrt{x}} x - log_{\frac{1}{3}} x = 6$$

bo'lsa, $\frac{x^2-x}{4}$ ning qiymatini toping.
A) 12 B) 15 C) 16 D) 18 E) 20

13. (03-2-4) lga, lgb va 3 sonlar ko'rsatilgan tartibda arifmetik progressiyani tashkil etadi. Agar $a^4 = b^2$ bo'lsa, $a+b$ ning qiymatini toping.
A) 1000 B) 300 C) 101 D) 110 E) 10,1

14. (03-4-34) Agar

$$log_4 \frac{(2-x)^2}{(3-x)^3} = -3log_4|3-x|$$

bo'lsa, $x-27$ ni hisoblang.
A) -25 B) -29 C) -26 D) -24 E) -28

15. (03-8-47)

$$lg(2^x + x + 4) = x - xlg5$$

tenglamani yeching.
A) -4 B) -3 C) -2 D) 1 E) 2

16. (03-11-13)

$$7^{\frac{2x^2-5x-9}{2}} = (\sqrt{2})^{3log_2 7}$$

tenglamani yeching.
A) $-1,5;1$ B) $1,5$ C) $-2,5;4$
D) $2,5$ E) $-1,5;4$

E. $log_a b = \frac{log_c a}{log_c b}$, **xususan** $log_a b = \frac{1}{log_b a}$ **formulalarga oid tenglamalar.**

1. (99-6-55) Tenglamani yeching.

$$log_{\sqrt{2}} x + \frac{2}{log_x 2} = 4$$

A) 2 B) 1 C) 3 D) 4 E) 6

2. (98-11-45) Tenglamaning yechimlari ko'paytmasini aniqlang.

$$log_x 2 log_{2x} 2 = log_{4x} 2$$

A) 1 B) $\frac{1}{\sqrt{2}}$ C) $-\frac{1}{\sqrt{2}}$ D) $\frac{1}{2}$ E) 2

3. (99-3-21) Tenglamani yeching.

$$log_4(x+12) \cdot log_x 2 = 1$$

A) 4 B) -3 C) 2 D) 4;2 E) $-3;4$

4. (00-10-40) Tenglamaning yechimlari ko'paytmasini toping.

$$log_x 3 \cdot log_{3x} 3 = log_{9x} 3$$

A) $\frac{1}{\sqrt{3}}$ B) $-\frac{1}{3}$ C) 1 D) 3 E) $\frac{1}{\sqrt{2}}$

5. (01-1-23) Tenglamani yeching.

$$log_{\sqrt{x}} x - \frac{1}{log_x 3} = 1$$

A) 2 B) 3 C) 4 D) 8 E) 9

6. (02-3-36)

$$log_x 2 + log_{4x} 4 = 1$$

tenglamaning ildizlari ko'paytmasini toping.
A) 2 B) 4 C) 1 D) 8 E) 6

7. (03-7-38)

$$\sqrt{1 + log_3 \sqrt{x}} \cdot log_x 9 + \sqrt{2} = 0$$

tenglamani yeching.
A) $\frac{1}{3}$ B) 9 C) 3 D) $\frac{1}{3};9$ E) $\frac{1}{3};3$

F. $a^{log_b c} = c^{log_b a}$,
Formulaga oid yoki logarifmlash yordamida yechiladigan tenglamalar.

1. (98-6-30)* Ushbu $2^{x^2} \cdot 3^x = 6$ tenglamaning bitta ildizi 1 ga teng bo'lsa, ikkinchi ildizini toping.
A) $-log_2 6$ B) $log_2 3$ C) $log_3 6$ D) $\sqrt{2}$ E) $\sqrt{3}$

2. (99-8-31) Tenglamani yeching.

$$\left(\sqrt{3}\right)^{log_{\sqrt{5}} x - 4} = \frac{1}{3}$$

A) 125 B) 25 C) 1 D) 5 E) 3

3. (00-3-39) Tenglama ildizlarining ko'paytmasini toping.

$$x^{lgx-1} = 100$$

A) 10 B) 20 C) 100 D)1 E) 2

4. (00-8-6) Tenglamani yeching.

$$x^{log_3 x^2 + log_3^2 x - 10} = \frac{1}{x^2}$$

A) $1;9;\frac{1}{81}$ B) 1;9 C) $1;\frac{1}{81}$ D) $9;\frac{1}{81}$ E) $4;1;\frac{1}{81}$

5. (00-8-40) Tenglamani yeching.

$$3^{log_3 x + log_3 x^2 + log_3 x^3 + ... + log_3 x^8} = 27x^{30}$$

A) $\sqrt{3}$ B) $\sqrt{2}$ C) 3 D) 1 E) 2

6. (97-1-59) Tenglamani yeching.

$$x^{lg25} + 25^{lgx} = 10$$

A) 10 B) 1 C) $\sqrt{10}$ D) 5 E) 100

7. (97-6-59) Tenglamani yeching.

$$x^{lg9} + 9^{lgx} = 6$$

A) 1 B) 10 C) $\sqrt{10}$ D) 2
E) to'g'ri javob keltirilmagan

8. (01-2-73) Ushbu

$$x^{\frac{lgx+5}{3}} = 10^{5+lgx}$$

tenglama ildizlarining ko'paytmasini toping
A) 100 B) 10 C) 1 D) 0,1 E) 0,01

9. (01-8-33) Agar $x^{lg0,2} = 0,2^{lgx}$ tenglamaning 5 ga karrali bo'lgan eng kichik ildizi x_1 bo'lsa, $6^{lg(6+x_1)\cdot lg^{-1}6}$ ning qiymatini hisoblang.
A) $\frac{1}{12}$ B) 12 C) 11 D) $lg11$ E) $lg12$

10. (01-9-9) Ushbu

$$x^{3-log_3 x} = 9$$

tenglama ildizlarining o'rta proportsional qiymatini toping.
A) $3\sqrt{3}$ B) $\sqrt{2}$ C) $2\sqrt{3}$ D) $\sqrt{3}$ E) 3

11. (01-10-29) Tenglamani yeching.

$$x^{\frac{lgx}{2}} = \left(\frac{x}{10}\right)^2$$

A) 10 B) 100 C) 0,1 D) 0,01 E) 1000

12. (02-6-34)

$$x^{2lgx} = 10x^2$$

tenglamaning ildizlari ko'paytmasini toping
A) 1 B) 10 C) 100 D) 0,1 E) 1000

13. (02-7-9)

$$2 \cdot 3^{log_7 x} + 3x^{log_7 3} = 45$$

tenglamani yeching.
A) 49 B) 4 C) 7 D) 8 E) 3

14. (03-4-36) Agar

$$\begin{cases} x^{lgy} = 1000, \\ log_y x = 3 \end{cases}$$

bo'lsa, y ning qiymatini toping.
A)10 B) 0,01 C) 10 yoki $0,1$ D)30
E) qiymati yo'q

15. (03-12-76)

$$3^{log_3^2 x} + x^{log_3 x} = 162$$

tenglamaning ildizlari ko'paytmasini toping
A) 9 B) 3 C) 1 D) $\frac{1}{3}$ E) $\frac{2}{9}$

G. Kvadrat tenglamaga keltiiriladigan tenglamalar.

1. (96-10-38) Tenglamaning ildizlari ko'paytmasini toping.

$$log_2^2 x - 5 \cdot log_2 x + 6 = 0$$

A) 5 B) 6 C) 32 D) $\frac{3}{2}$ E) $\frac{1}{2}$

2. (96-1-35) Tenglamaning ildizlari ko'paytmasini toping.

$$lg^2 x - lgx - 2 = 0$$

A) 1 B) -2 C) 10 D) 100 E) 0,1

3. (96-9-86) Ushbu

$$log_3^2 x - 4log_3 x + 3 = 0$$

tenglamaning ildizlari ko'paytmasini toping.
A) 4 B) 81 C) 24 D) $9\frac{1}{3}$ E) 30

4. (98-3-33) Tenglamaning ildizlari yig'indisini toping.

$$log_3^2 x - 3log_3 x + 2 = 0$$

A) 6 B) 3 C) 12 D) 15 E) 18

5. (98-6-24) Tenglamaning ildizlari ko'paytmasini toping.

$$log_2^2 x - 4log_2 x - 1 = 0$$

A) 8 B) 4 C) 16 D) $\frac{1}{8}$ E) $\frac{1}{16}$

6. (98-10-80) Tenglamaning ildizlari yig'indisini toping.

$$log_2^2 x - 4log_2 x + 3 = 0$$

A) 8 B) 10 C) 12 D) 6 E) 14

7. (99-8-32) Tenglamaning eng kichik ildizini toping.

$$lg(10x^2)lgx = 1$$

A) 0,01 B) 0,1 C) $\sqrt{10}$ D) $\frac{1}{\sqrt{10}}$ E) 1

8. (00-1-47) Tenglamaning ildizlari yig'indisini toping.

$$log_2^2 x - 2log_2 x^2 + 3 = 0$$

A) 4 B) -4 C) -10 D)10 E) 8

9. (00-4-40)

$$lg^2 x - lg^2(10x) = 6 - lg^2(100x)$$

tenglamaning ildizlari ko'paytmasini toping.
A) 1 B) 10 C) 0,1 D) 0,01 E) 0,001

10. (01-9-1) Ushbu

$$log_x(9x^2) \cdot log_3^2 x = 4$$

tenglamaning ildizlari yig'indisini toping.
A) $3\frac{1}{3}$ B) $-3\frac{1}{3}$ C) 3 D) 2 E) $\frac{1}{3}$

11. (02-11-33)

$$log_2^2\frac{x}{2} - log_2 4x = 3$$

tenglamaning ildizlari ko'paytmasini toping.
A) 2 B) 4 C) 6 D) 8 E) 12

12. (03-3-34)

$$log_{0,2}^2\frac{x}{25} + log_{0,2}^2\frac{x}{5} = 1$$

tenglamaning ildizlari ko'paytmasini toping.
A) $\frac{1}{125}$ B) 125 C) 25 D) $\frac{1}{25}$ E) 5

13. (03-9-21)

$$log_4 x\frac{4}{x} + \frac{1}{log_x^2 4} = 1$$

tenglama ildizlarining yig'indisini toping.
A) $\frac{65}{16}$ B) $\frac{3}{8}$ C) $\frac{81}{16}$ D) $\frac{5}{8}$ E) $\frac{35}{16}$

H. Grafik usul.

1. (97-7-35) Tenglama nechta ildizga ega?

$$lg(x+1) = x - 1$$

A) 1 B) 2 C) 3 D) ildizi yo'q
E) aniqlab bo'lmaydi

2. (97-10-35) Tenglamaning nechta ildizi bor?

$$ln(x-1) = x - 3$$

A) 1 B) 2 C) 3 D) ildizi yo'q
E) aniqlab bo'lmaydi

3. (01-5-10)* Ushbu

$$1 + log_x\frac{4-x}{10} = (lglg2 - 1)log_x 10$$

tenglama nechta ildizga ega?
A) 2 B) 1 C) 3 D) 4 E) 5

4. (01-10-32) Ushbu

$$2^{x^2} + log_3 x^3 = 515$$

tenglama nechta ildizga ega?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

5. (02-6-35)

$$3^{x^2} + log_2 x^3 = 84$$

tenglama nechta ildizga ega?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

6. (98-11-24) Tenglamaning ildizi nechta?

$$|log_2 x| = -x + 4$$

A) 1 B) $\emptyset$ C) cheksiz ko'p D) 2 E) 3

7. (99-5-22) Tenglamaning ildizi nechta?

$$2^x + log_3 x = 9$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

8. (00-3-37) Tenglama nechta ildizga ega?

$$log_2(2+x) = \frac{x^2}{2}$$

A) 2 B) 1 C) 3 D) 0 E) 4

9. (00-10-20) Tenglamaning nechta ildizi bor?

$$|log_5 x| = -x + 5$$

A) 1 B) $\emptyset$ C) 5 D) 2 E) 3

10. (01-9-43) Ushbu

$$x^2 + 8 = log_2(x+1) + 6x$$

tenglamaning nechta ildizi bor?
A) 2 B) 3 C) 1 D) $\emptyset$
E) ildizlarini topib bo'lmaydi

1.14.4 Logarifmik tengsizliklar.

1. Agar $0 < a < 1$ bo'lsa,
$log_a f(x) > log_a g(x) \Leftrightarrow \begin{cases} f(x) < g(x) \\ f(x) > 0 \end{cases}$

2. Agar $a > 1$ bo'lsa,
$log_a f(x) > log_a g(x) \Leftrightarrow \begin{cases} f(x) > g(x) \\ g(x) > 0 \end{cases}$

(99-5-14) Tengsizlikni yeching.

$$log_{0,5}(x+5)^4 > log_{0,5}(3x-1)^4$$

A) $(3;\infty)$ B) $(-\infty;1)$ C) $(-\infty;1)\cup(3;\infty)$
D) $(-\infty;-5)\cup(-5;-1)\cup(3;\infty)$ E) $(-\infty;-2)\cup(3;\infty)$

Yechish: Logarifmlarning asoslari 1 dan kichik bo'lgani uchun potensiallaganda tengsizlik belgisi qarama-qarshisiga o'zgaradi.
$0 < (x+5)^4 < (3x-1)^4$ Bu yerdan $0 < (x+5)^2 < (3x-1)^2$ ekanini hosil qilamiz. Qo'sh tengsizlikni yechamiz.

$$(x+5)^2 - (3x-1)^2 < 0, \quad x \neq -5,$$

Tengsizlikning chap qismini $a^2 - b^2 = (a-b)(a+b)$ formuladan foydalanib ko'paytuvchilarga ajratib

$$(x+5-3x+1)(x+5+3x-1) < 0, \quad x \neq -5$$

ekanini, yani

$$(6-2x)(4x+4) < 0, \quad x \neq -5$$

ni hosil qilamiz. Bu yerdan ushbu $(-\infty;-5)\cup(-5;-1)\cup(3;\infty)$ yechimni hosil qilamiz.
Javob: $(-\infty;-5)\cup(-5;-1)\cup(3;\infty)$ (D).

1. (96-3-87) Ushbu $y = log_2 log_3 \sqrt{4x - x^2 - 2}$ funksiyaning aniqlanish sohasini toping.
A) $\emptyset$ B) $(1;3)$ C) $\{2\}$
D) $(-\infty;1) \cup (3;\infty)$ E) $(1,5;2,5)$

2. (96-7-33) Tengsizlikni yeching.
$$log_{\frac{1}{\sqrt{2}}} \frac{4x-1}{4x+8} < 0$$
A) $(\frac{1}{4};\infty)$ B) $(2;\infty)$ C) $(-2;\infty)$
D) $(-2;\frac{1}{4})$ E) $(-\infty;-2)$

3. (97-1-24) Tengsizlikni yeching.
$$log_{\frac{1}{\sqrt{3}}}(x-5) + 2log_{\sqrt{3}}(x-5) < 4$$
A) $(6;15)$ B) $(5;14)$ C) $(5;81)$
D) $(10;20)$ E) $(6,5;10)$

4. (97-1-56) Tengsizlikni yeching.
$$log_5(5-2x) \le 1$$
A) $(-\infty;2,5)$ B) $(0;2,5)$ C) $(-\infty;2,5]$
D) $[0;2,5)$ E) $[0;2,5]$

5. (97-3-33) Tengsizlikni yeching.
$$log_{\sqrt{3}}\Big(\frac{3x}{3x-1,5}\Big) > 0$$
A) $(0,5;\infty)$ B) $(0;0,5)$ C) $(-\infty;0)$
D) $(0;\infty)$ E) $(2;\infty)$

6. (97-4-16) x ning qanday qiymatlarida $y = 2 - lgx$ funksiya manfiy qiymatlar qabul qiladi?
A) $x > 100$ B) $x > 10$ C) $x \le 100$
D) $x < 10$ E) $x \ge 100$

7. (97-6-24) Tengsizlikni yeching.
$$log_2(3-2x) - log_{\frac{1}{8}}(3-2x) > \frac{4}{3}$$
A) $(-\infty;0,5)$ B) $(-\infty;1,5)$ C) $(-4;-1)$
D) $(0;1)$ E) $(-\infty;0)$

8. (97-7-33) Tengsizlikni yeching.
$$log_{\frac{2}{\sqrt{5}}} \frac{5x}{5x-1} < 0$$
A) $(\frac{1}{5};0)$ B) $(0,2;\infty)$ C) $(-\infty;0)$
D) $(-\infty;\frac{1}{5})$ E) $(0;\frac{1}{5})$

9. (97-10-33) Tengsizlikni yeching.
$$log_{\frac{\sqrt{5}}{2}} \frac{2x-1}{2x+9} > 0$$
A) $(\frac{1}{2};\infty)$ B) $(-9;\frac{1}{2})$ C) $(-\infty;-4,5)$
D) $(-4,5;0,5)$ E) $\emptyset$

10. (97-11-24) Tengsizlikni yeching.
$$log_{\frac{1}{3}}(x+2) - log_9(x+2) > -\frac{3}{2}$$
A) $(0;1)$ B) $(1;\infty)$ C) $(2;3)$
D) $(-2;1)$ E) $(-2;5)$

11. (97-12-53) Tengsizlikning eng kichik butun musbat yechimini toping.
$$\Big(\frac{1}{2}\Big)^{log_{0,5}x(x-4)} > 0$$
A) 4 B) 6 C) 5 D) 5,5 E) 4,5

12. (98-2-37) Tengsizlikning barcha manfiy yechimlari to'plamini ko'rsating.
$$log_{0,2}(x^4 + 2x^2 + 1) > log_{0,2}(6x^2 + 1)$$
A) $(-2;2)$ B) $(-2;0)$ C) $(-\infty;-2) \cup (0;2)$
D) $(-\infty;-2)$ E) $(0;2)$

13. (98-3-32) Tengsizlikni qanoatlantiradigan butun sonlar nechta?
$$log_5(3-x) - log_5 12 < 0$$
A) cheksiz ko'p B) 5 C) 10 D) 11 E) 13

14. (98-4-30) Tengsizlikning yechimlari orasida nechta butun son bor?
$$log_3\Big(\frac{4x-9}{2x+5} + 1,5\Big) < 1$$
A) 16 B) 15 C) 14 D) 10 E) 8

15. (98-9-35) Tengsizlikning yechimi bo'lgan kesma o'rtasining koordinatasini toping.
$$log_{0,3}(2x^2 + 4) \ge log_{0,3}(x^2 + 20)$$
A) -2 B) -1 C) 2 D) 1 E) 0

16. (98-10-79) Tengsizlikni qanoatlantiradigan butun sonlar nechta?
$$log_2(4-x) - log_2 7 < 0$$
A) 6 B) 5 C) 8 D) 7 E) 4

17. (99-2-33) Tengsizlikning butun yechimini toping.
$$log_{3x^2+5}(9x^4 + 27x^2 + 28) > 2$$
A) 1 B) 2 C) -1 D) 0 E) 3

18. (99-3-17) Tengsizlikni yeching.
$$log_2 log_{\frac{1}{3}} log_5 x > 0$$
A) $(0;\infty)$ B) $(-\infty;\sqrt[3]{5})$ C) $(-\infty;0) \cup (\sqrt[3]{5};\infty)$
D) $(0;\sqrt[3]{5})$ E) $(1;\sqrt[3]{5})$

19. (99-6-9) Tengsizlikning eng katta butun yechimini toping.
$$log_2(2x-1) < 3$$
A) 2 B) 5 C) 1 D) 4 E) 3

20. (00-3-40) Tengsizlikni yeching.
$$log_4(x+1) \le log_4(5-x)$$
A) $(-1;5)$ B) $[2;\infty)$ C) $(-1;2) \cup (2;5)$
D) $(-\infty;2]$ E) $(-1;2]$

21. (00-4-41) Tengsizlikni yeching.

$$log_{x^2}(x+2) \le 1$$

A) $(-\infty;-1]\cup[2;\infty)$ B) $(-\infty;-1)\cup[2;\infty)$
C) $(-2;-1)\cup(-1;0)\cup(0;1)\cup[2;\infty)$ D) $(-1;2]$
E) $(-\infty;-1)\cup(-1;\infty)$

22. (00-4-42) x=2,25 soni

$$log_c(3-x^2+2x) < log_c(x^2-x-2)$$

tengsizlikni qanoatlantirishi ma'lum. Shu tengsizlikni yeching.
A) $(1,5;3)$ B) $(2;3)$ C) $(2;2,5)$
D) $(1,5;3,5)$ E) $(1;3)\cup(3;5)$

23. (00-7-34) Tengsizlikning eng kichik yechimi 15 dan qancha kam?

$$2^{log_2(x-3)} + (x-3)^2 < 6$$

A) 10 B) 9 C) 11 D) 8 E) 14

24. (00-9-22) Tengsizlikni yeching.

$$log_{\frac{1}{5}}(x+17)^8 \le log_{\frac{1}{5}}(x+13)^8$$

A) $(-15;-13)\cup(-13;\infty)$
B) $[-15;-13)\cup(-13;\infty)$
C) $(-13;\infty)$
D) $(-\infty;-17)\cup(-17;-13)\cup(-13;\infty)$
E) $(-17;\infty)$

25. (96-9-29) Ushbu $y = log_2 log_{\frac{1}{2}}\sqrt{4x-x^2-2}$ funksiyaning aniqlanish sohasini toping.
A) $(2-\sqrt{2};1)\cup(3;2+\sqrt{2})$ B) $(2-\sqrt{2};2+\sqrt{2})$
C) $(1;3)$ D) $(-\infty;1)\cup(3;\infty)$
E) $(-\infty;2-\sqrt{2})\cup(2+\sqrt{2};\infty)$

26. (96-12-87) Funksiyaning aniqlanish sohasini toping.

$$y = log_2 log_{\frac{1}{2}}\sqrt{4x-4x^2}$$

A) $\{\frac{1}{2}\}$ B) $(0;\frac{1}{2})$ C) $(\frac{1}{2};1)$
D) $(-\infty;0)\cup(1;\infty)$ E) $(0;\frac{1}{2})\cup(\frac{1}{2};1)$

27. (96-13-28) Ushbu $y = log_2(log_3\sqrt{4x-4x^2})$ funksiyaning aniqlanish sohasini toping.
A) $\{\frac{1}{2}\}$ B) $\emptyset$ C) $(0;\frac{1}{2})\cup(\frac{1}{2};1)$
D) $(-\infty;0)\cup(1;\infty)$ E) $(0;\frac{1}{2})$

28. (98-2-34) Ushbu $log_p 15 < log_p 10$; va $log_{5p}8 > log_{5p}6$ tengsizliklar o'rinli bo'ladigan p ning barcha qiymatlarini toping.
A) $0<p<1$ B) $p>\frac{1}{5}$ C) $p>1$
D) $\frac{1}{5}<p<1$ E) $p<1$

29. (98-6-25) $log_{0,2}log_4(x^2-5) < 0$ tengsizlikning yechimini ko'rsating.
A) $(-3;3)$ B) $(-\infty;-3)\cup(3;\infty)$ C) $(3;\infty)$
D) $(-3;-\sqrt{6})\cup(\sqrt{6};3)$ E) $(-\infty;-\sqrt{5})\cup(\sqrt{5};\infty)$

30. (98-11-39) Tengsizlikni yeching.

$$log_x 6 > log_x 12$$

A) $(0;\frac{1}{2})$ B) $(\frac{1}{2};1)$ C) $(0;1)$ D) $(0;2)$ E) $(1;2)$

31. (99-10-38) Tengsizlikning barcha butun yechimlari yig'indisini toping.

$$4^{log_2 x} + x^2 < 32$$

A) 10 B) 8 C) 9 D) 7 E) 6

32. (96-3-88) Tengsizlik x ning qanday qiymatlarida o'rinli?

$$(x+2)^{log_2(x^2+1)} < (x+2)^{log_2(2x+9)}$$

A) $(-4,5;\infty)$ B) $(-2;4)$ C) $(4;\infty)$
D) $(-1;4)$ E) $(-2;-1)$

33. (96-9-30) Tengsizlik x ning qanday qiymatlarida o'rinli?

$$x^{log_{0,3}(x^2-5x+4)} < x^{log_{0,3}(x-1)}$$

A) $\emptyset$ B) $(4;\infty)$ C) $(5;\infty)$
D) $(-\infty;1)$ E) $(3;\infty)$

34. (96-12-88) x ning qaysi qiymatlarida tengsizlik o'rinli?

$$(x-2)^{log_{\frac{1}{2}}(x^2-5x+5)} < (x-2)^{log_{\frac{1}{2}}(x-3)}$$

A) $(-\infty;2)\cup(4;\infty)$ B) $(2;4)$ C) $(\frac{5+\sqrt{5}}{2};4)$
D) $(4;\infty)$ E) $(-\infty;\frac{5-\sqrt{5}}{2})\cup(\frac{5+\sqrt{5}}{2};\infty)$

35. (96-13-29) Tengsizlik x ning qanday qiymatlarida o'rinli?

$$(x-2)^{log_2(x^2-5x+5)} < (x-2)^{log_2(x-3)}$$

A) $(3;\infty)$ B) $(2;4)$ C) $(\frac{5+\sqrt{5}}{2};4)$
D) $(-\infty;2)\cup(4;\infty)$ E) $(-\infty;\frac{5-\sqrt{5}}{2})\cup(\frac{5+\sqrt{5}}{2};\infty)$

36. (98-11-49) Tengsizlikni yeching.

$$x^{log_2 x+4} < 32$$

A) $(2^{-1};2)$ B) $(2^{-2};2)$ C) $(2^{-3};2)$
D) $(2^{-4};2)$ E) $(2^{-5};2)$

37. (98-4-39) x ning nechta natural qiymatida

$$\frac{\sqrt{6-x}}{log_{\frac{1}{3}}(x-3)} \ge 0$$

tengsizlik o'rinli bo'ladi?
A) bunday qiymatlar yo'q
B) 1 C) 2 D) 3 E) 4

38. (98-4-27) Tengsizlikni qanoatlantiruvchi musbat sonlar nechta?

$$(3x^2+7x+13)\Big(x-\frac{1}{\pi}\Big)^2 log_{1-x^2}\Big(x^2+\frac{1}{x^2}\Big) \ge 0$$

A) 4 B) 2 C) 3 D) 1
E) bunday sonlar yo'q

39. (01-1-24) Tengsizlikni yeching.

$$log_2 x \le \frac{2}{log_2 x - 1}$$

A) $(0;1)$ B) $(0;4]$ C) $(0;2)$
D) $(0;1)\cup(2;4]$ E) $(0;\frac{1}{2}]\cup(2;4]$

40. (01-1-25) Tengsizlikni yeching.

$$|log_3 x| - log_3 x - 3 < 0$$

A) $(0;1)$ B) $[1;\infty)$ C) $(1;\infty)$
D) $[\frac{1}{3\sqrt{3}};\infty)$ E) $(\frac{1}{3\sqrt{3}};\infty)$

41. (01-2-28) Ushbu $log_{x^2}(3-2x) > 1$ tengsizlikning butun yechimlari nechta?
A) 4 B) 3 C) 2 D) 1 E) 0

42. (01-2-75) Ushbu

$$\begin{cases} log_x 3 > log_x 7, \\ log_{\frac{1}{2}}(x - \frac{1}{3}) \le 1 \end{cases}$$

tengsizliklar sistemasini yeching.
A) $(0;1)$ B) $[\frac{1}{6};1)$ C) $(1;\frac{5}{3}]$ D) $[\frac{5}{6};1)$ E) $(1;2]$

43. (01-2-80) Ushbu

$$y = \sqrt{lg^2|2x-9| \cdot (5x-6-x^2)}$$

funksiyaning aniqlanish sohasiga tegishli butun sonlarning yig'indisini toping.
A) 10 B) 5 C) 15 D) 13 E) 14

44. (01-3-24) x ning

$$log_6\Big(\frac{x}{3}+7\Big) > 0$$

tengsizlikni qanoatlantiruvchi eng kichik butun qiymatini aniqlang.
A) -16 B) -18 C) -15 D) -17 E) -14

45. (01-4-28) Tengsizlikni yeching.

$$log_{1/3}(5-2x) > -2$$

A) $(-2;-1)$ B) $(-2;2,5)$ C) $(0;2,5)$
D) $(0;2)$ E) $(0;1)$

46. (01-6-38) Ushbu

$$log_{\frac{1}{2}}(2^x - 128) \ge -7$$

tengsizlikning butun sonlardan iborat yechimini toping.
A) 5 B) 6 C) 9 D) 8 E) 7

47. (01-6-39) Nechta butun son

$$\begin{cases} log_2 x^2 \ge 2 \\ log_5 x^2 \le 2 \end{cases}$$

tengsizliklar sistemasini qanoatlantiradi?
A) 6 B) 7 C) 9 D) 8 E) 5

48. (01-7-27) Ushbu

$$|\ log_2 x\ | \le 3$$

tengsizlikning yechimlaridan iborat bo'lgan tub sonlarning yig'indisini toping.
A) 26 B) 27 C) 17 D) 18 E) 15

49. (01-7-28) Tengsizlikni yeching.

$$log_{\frac{1}{3}}(x-1) - 2log_{\frac{1}{9}}(2x-3) < 0$$

A) $(\frac{3}{2};2)$ B) $(-\infty;2)$ C) $(2;\infty)$ D) $(\frac{3}{2};\infty)$
E) $(0;\frac{3}{2}) \cup (2;\infty)$

50. (01-7-35) Ushbu

$$0,5^{log_3(x^2+6x-7)} \ge \frac{1}{4}$$

tengsizlikning eng katta butun yechimini toping.
A) 1 B) 2 C) 4 D) 1,5 E) 2,5

51. (01-9-3) Tengsizlikni yeching.

$$\frac{2log_2(3-2x)}{log_2 0,1} < 0$$

A) $(-\infty;1)$ B) $(-\infty;1]$ C) $(1;\infty)$
D) $(-1;2)$ E) $[1;2]$

52. (01-9-45) Tengsizlikni yeching.

$$\sqrt{4x^2-5x-9} < ln\frac{1}{2}$$

A) $(-5;4)$ B) $(2;3)$ C) $(-5;2)$
D) $(-1;3)$ E) $\emptyset$

53. (01-10-30) Tengsizlikni yeching.

$$(x^2-6x+5)\sqrt{log_3(x-2)} \le 0$$

A) $[1;5]$ B) $[1;3]$ C) $[1;4]$ D) $[2;5]$ E) $[3;5]$

54. (01-10-31) Tengsizlikni yeching.

$$\frac{log_3(1-2x)}{log_{0,2}(x^2+2x+2)} < 0$$

A) $(\frac{1}{2};1)$ B) $(-\infty;\frac{1}{2})$ C) $(-\infty;0)$
D) $(-\infty;-1) \cup (-1;0)$ E) $(-\infty;-1) \cup (-1;\frac{1}{2})$

55. (01-11-28) Ushbu

$$12^{log_{12}(x+3)} > 2x-5$$

tengsizlikning eng kichik butun yechimini toping.
A) -1 B) -2 C) -3 D) 2 E) $-2,5$

56. (01-11-32) Ushbu

$$\frac{x-5}{log_x^2 3} < 0$$

tengsizlikning butun yechimlari yig'indisini toping.
A) 7 B) 8 C) 9 D) 10 E) 6

57. (02-1-59) Tengsizlikni yeching.

$$log_2^3 x - 3log_2^2 x \ge 0$$

A) $[16;\infty)$ B) $\{1\} \cup [16;\infty)$ C) $[8;\infty)$
D) $\{1\} \cup [9;\infty)$ E) $\{1\} \cup [8;\infty)$

58. (02-2-26) Tengsizlikni yeching.

$$log_{0,5}(2x+1) < log_2(2-3x)$$

A) $(-\frac{1}{3};\frac{1}{2})$ B) $(-1;-\frac{1}{3})$ C) $(-\infty;-\frac{1}{3})$
D) $(\frac{1}{2};1)$ E) $(\frac{1}{2};\infty)$

59. (02-3-40)

$$log_{\frac{\pi}{6}}\frac{2x+3}{3x-2} > log_{\frac{\pi}{6}}2$$

tengsizlikning eng kichik butun musbat yechimini aniqlang.
A) 2 B) 1 C) 3 D) 4 E) 6

60. (02-4-42)

$$-lgx < 1$$

tengsizlikni qanoatlantiruvchi eng kichik butun sonni toping.
A) -2 B) -1 C) 10 D) 1 E) 2

61. (02-4-43)

$$log_{16}(3x+1) > \frac{1}{2}$$

tengsizlikning eng kichik butun yechimini toping.
A) -2 B) -1 C) 0 D) 1 E) 2

62. (02-5-26)

$$2log_8(x-2) - log_8(x-3) > \frac{2}{3}$$

tengsizlikni yeching.
A) $(-\infty;4)$ B) $\{2\}\cup(4;\infty)$ C) $(-\infty;4)\cup(4;\infty)$
D) $(3;\infty)$ E) $(3;4)\cup(4;\infty)$

63. (02-6-37) Nechta butun son

$$\frac{log_5(5-x^2)}{log_2(x^4+x^2+1)} > 0$$

tengsizlikni qanoatlantiradi?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

64. (02-6-38)

$$(x^2-8x+7)\cdot\sqrt{log_5(x^2-3)} \le 0$$

tengsizlikni yeching.
A) $[-2;1]\cup[2;7]$ B) $[2;7]\cup\{-2\}$ C) $[1;7]$
D) $[3;7]$ E) $[-1;5]$

65. (02-9-35)

$$lg(x-2) < 2 - lg(27-x)$$

tengsizlikning yechimlaridan nechtasi butun sondan iborat?
A) 9 B) 8 C) 7 D) 6 E) 4

66. (02-10-72)

$$(2-log_2x)\cdot\sqrt{x^2-1} \ge 0$$

tengsizlikni yeching.
A) $[1;4]$ B) $(0;4]$ C) $(-\infty;-1]\cup[1;\infty)$
D) $[1;\infty)$ E) $(0;\infty)$

67. (02-11-35)

$$\frac{2log_3x}{2+log_3x} \le 1$$

tengsizlikning yechimlaridan iborat tub sonlarning yig'indisini toping.
A) 5 B) 6 C) 16 D) 12 E) 17

68. (02-11-36)

$$\sqrt{5-x}\cdot\left(log_{\frac{1}{3}}(2x-4)+\frac{1}{log_x3}\right) \ge 0$$

tengsizlikning butun sonlardan iborat nechta yechimi bor?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

69. (03-1-12) Nechta butun son

$$3^{\sqrt{5-x}} \le (x-4)ln(x-4)$$

tengsizlikni qanoatlantiradi?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

70. (03-1-29)

$$log_x3 < 2$$

tengsizlikni yeching.
A) $(\sqrt{3};\infty)$ B) $(3;\infty)$ C) $(0;1)\cup(\sqrt{3};\infty)$
D) $(0;1)$ E) $(0;1)\cup(3;\infty)$

71. (03-2-22)

$$log_4(2-\sqrt{x+3}) < 2cos\frac{5\pi}{3}$$

tengsizlikning butun sonlardan iborat nechta yechimi bor?
A) 6 B) 4 C) 5 D) 3 E) 1

72. (03-3-35)

$$(\frac{1}{2})^{log_{0,2}log_2\frac{9x+6}{9x^2+2}} > 1$$

tengsizlikni yeching.
A) $(0;\frac{2}{3})$ B) $(0;\frac{1}{6})\cup(\frac{2}{3};\infty)$
C) $(0;\frac{1}{6})\cup(\frac{2}{3};\infty)$ D) $(-\frac{1}{6};\frac{2}{3})$ E) $(\frac{2}{3};\infty)$

73. (03-4-35)

$$10^{lg(x-2)-2} < 4$$

tengsizlikning eng katta butun yechimini toping.
A) 400 B) 401 C) 398 D) 402 E) 404

74. (03-6-60)

$$log_{\frac{1}{3}}(2x-3) > 1$$

tengsizlikni yeching.
A) $1\frac{1}{2} < x < 1\frac{2}{3}$ B) $x > 1\frac{1}{2}$ C) $x > 1\frac{2}{3}$
D) $x < 1\frac{1}{2}$ E) $x < 2\frac{2}{3}$

75. (03-7-71)

$$log_2\sqrt[3]{x+1} < log_816$$

tengsizlikni yeching.
A) $(-\infty;15)$ B) $(-1;\infty)$ C) $(3;\infty)$
D) $(-1;3)$ E) $(-1;15)$

76. (03-8-51) Agar $log_x(4x-3) \geq 2$ bo'lsa, x ning natural sonlar to'plamiga tegishli ildizlari yig'indisini toping.
A) 5 B) 6 C) 7 D) 4 E) 3

77. (03-9-22)
$$\frac{log_2 x - 2}{log_2 x - 4} \leq 0$$
tengsizlikning yechimlaridan nechtasi tub sonlardan iborat?
A) 2 B) 3 C) 4 D) 5 E) cheksiz ko'p

78. (03-9-23)
$$|x-8|\Big(log_5(x^2-3x-4) + \frac{2}{log_3 0,2}\Big) \leq 0$$
tengsizlikning yechimlaridan nechtasi butun sonlardan iborat?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 5

79. (03-9-40) Nechta butun son
$$f(x) = \sqrt{log_{0,5}(x-2)+2}$$
funksiyaning aniqlanish sohasiga tegishli?
A) $\emptyset$ B) 1 C) 3 D) 4 E) 5

80. (03-12-24)
$$log_3(x-2)^2 \leq 4$$
tengsizlik nechta butun sonda o'rinli bo'ladi?
A) 9 B) 10 C) 19 D) 18 E) cheksiz ko'p

81. (03-12-57)
$$e^{ln(3x^2-27)} \leq 21$$
tengsizlik nechta butun sonda o'rinli bo'ladi?
A) 8 B) 9 C) 6 D) 4 E) 2

2 -Bob.

2.1 Trigonometriya.

2.1.1 Boshlang'ich tushunchalar.

1. α radiandan gradusga o'tish: $\frac{180^0}{\pi} \cdot \alpha$.
2. n^0 gradusdan radianga o'tish: $\frac{\pi}{180} \cdot n$.
3. $\sin(-x) = -\sin x, \quad \cos(-x) = \cos x$.
4. $tg(-x) = -tgx, \quad ctg(-x) = -ctgx$.

α	0^0	30^0	45^0	60^0	90^0	180^0	270^0
$\sin\alpha$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1
$\cos\alpha$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0
$tg\alpha$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	–	0	–
$ctg\alpha$	–	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	–	0

Trigonometrik funksiyalarning ishoralari.

Funksiya	I-chorak	II-chorak	III-chorak	IV-chorak
$\sin\alpha$	+	+	–	–
$\cos\alpha$	+	–	–	+
$tg\alpha$	+	–	+	–
$ctg\alpha$	+	–	+	–

(00-2-32) Quyidagilardan qaysi biri musbat?
A) $\cos 3$ B) $\sin 4$ C) $\sin 2$ D) $tg2$ E) $\cos 9$

Yechish: $\frac{\pi}{2} < 2 < \pi$ bo'lgani uchun 2 soni II-chorakda yotadi. Shuning uchun $\sin 2$ musbat bo'ladi. *J:* $\sin 2$ (C).

1. (96-6-31) 240^0 ning radian o'lchovini toping.
A) $\frac{5\pi}{4}$ B) $\frac{2\pi}{3}$ C) $\frac{4\pi}{3}$ D) $\frac{6\pi}{3}$ E) $\frac{3\pi}{4}$

2. (97-2-31) $\frac{5\pi}{4}$ radian necha gradus bo'ladi?
A) 220 B) 230 C) 225 D) 240 E) 235

3. (97-8-30) 216^0 ning radian o'lchovini toping.
A) $\frac{4\pi}{3}$ B) $\frac{5\pi}{4}$ C) $\frac{3\pi}{2}$ D) $\frac{7\pi}{6}$ E) $\frac{6\pi}{5}$

4. (97-12-30) $\frac{4\pi}{3}$ radian necha gradusga teng?
A) 230^0 B) 220^0 C) 250^0 D) 240^0 E) 210^0

5. (97-12-32) Quyidagi sonlardan qaysi biri manfiy?
A) $sin122^0 \cdot cos322^0$ B) $cos148^0 \cdot cos289^0$
C) $tg196^0 \cdot ctg189^0$ D) $tg220^0 \cdot sin100^0$
E) $ctg320^0 \cdot cos186^0$

6. (00-8-58) 72^0 ning radian o'lchovini toping.
A) 72 B) 1 C) 0,3 D) $\frac{2\pi}{5}$ E) $\frac{\pi}{5}$

7. (96-3-56) Hisoblang.
$$5sin90^0 + 2cos0^0 - 2sin270^0 + 10cos180^0$$
A) -3 B) -6 C) -1 D) 9 E) 19

8. (96-11-58) Ifodaning qiymatini hisoblang.
$$sin180^0 + sin270^0 - ctg90^0 + tg180^0 - cos90^0$$
A) -1 B) 0 C) 1 D) -2 E) 2

9. (96-12-11) Hisoblang.
$$3tg0^0 + 2cos90^0 + 3sin270^0 - 3cos180^0$$
A) 6 B) 0 C) -6 D) 9 E) -9

10. (96-3-54) Agar $sin\alpha \cdot cos\alpha > 0$ bo'lsa, α burchak qaysi chorakka tegishli?
A)I yoki II B) I yoki III C) I yoki IV
D) II yoki III E) III yoki IV

11. (96-11-56) Agar $tg\alpha \cdot cos\alpha > 0$ bo'lsa, α burchak qaysi chorakka tegishli?
A)II yoki III B) III yoki IV C) I yoki II
D) I yoki III E) I yoki IV

12. (96-12-58) Agar $sin\alpha \cdot cos\alpha < 0$ bo'lsa, α burchak qaysi chorakka tegishli?
A)1 yoki 2 B) 1 yoki 3 C) 1 yoki 4
D) 2 yoki 4 E) 3 yoki 4

13. (96-6-33) Quyidagi sonli ifodalarning qaysi biri musbat?

$$M=\frac{cos320^0}{sin217^0},\quad N=\frac{ctg187^0}{tg340^0}$$

$$P=\frac{tg185^0}{sin140^0}\quad Q=\frac{sin135^0}{ctg140^0}$$

A) M B) N C) P D) Q E) hech qaysisi

14. (97-2-33) Quyidagi sonlardan qaysi biri manfiy?
A) $tg247^0\cdot sin125^0$ B) $ctg215^0\cdot cos300^0$
C) $tg135^0\cdot ctg340^0$ D) $sin247^0\cdot cos276^0$
E) $sin260^0\cdot cos155^0$

15. (97-8-32) Quyidagi sonlardan qaysi biri musbat?
A) $\frac{ctg187^0}{sin316^0}$ B) $\frac{cos340^0}{sin185^0}$ C) $\frac{sin148^0}{cos317^0}$
D) $\frac{ctg105^0}{tg185^0}$ E) $\frac{tg215^0}{cos125^0}$

16. (98-2-24) Quyidagi sonlardan qaysi biri manfiy?
A) $\frac{sin80^0}{sin149^0}$ B) $\frac{cos98^0}{cos265^0}$ C) $\frac{cos300^0}{sin316^0}$
D) $tg40^0\cdot tg189^0$ E) $\frac{ctg110^0}{ctg324^0}$

17. (99-10-27) $a=sin540^0$ va $b=cos640^0$, $c=tg545^0$, $d=ctg405^0$ sonlardan qaysi biri manfiy?
A) a B) b C) c D) d
E) Hech biri manfiy emas

18. (96-3-42) $P(3;0)$ nuqtani koordinata boshi atrofida 90^0 ga burganda u qaysi nuqtaga o'tadi?
A) $(-3;0)$ B) $(0;-3)$ C) $(3;3)$
D) $(0;3)$ E) $(3;-3)$

19. (96-11-43) $P(-3;0)$ nuqtani koordinata boshi atrofida 90^0 ga burganda hosil bo'ladigan nuqtaning koordinatalarini toping.
A) $(3;0)$ B) $(0;-3)$ C) $(3;3)$
D) $(0;3)$ E) $(3;-3)$

20. (96-12-45) $P(0;3)$ nuqtani koordinata boshi atrofida 90^0 ga burganda hosil bo'ladigan nuqtaning koordinatalarini toping.
A) $(3;0)$ B) $(0;-3)$ C) $(-3;0)$
D) $(3;3)$ E) $(3;-3)$

21. (98-11-101) Agar $sinx-\frac{1}{sinx}=-3$ bo'lsa,

$$sin^2x+\frac{1}{sin^2x}$$

ning qiymati qanchaga teng bo'ladi?
A) 7 B) 8 C) 9 D) 11 E) 6

22. (00-10-78)* To'g'ri tengsizlikni aniqlang.
A) $cos(sin\alpha)>0$ B) $cos2>0$ C) $-\frac{\pi}{2}+2\le 0$
D) $|cos\alpha|+|sin\alpha|<1$ E) $sin5-tg4>0$

23. (01-2-58) Hisoblang.

$$cos\Big(\frac{12\pi}{5}(log_20,25+log_{0,25}2)\Big)$$

A) 0 B) 1 C) -1 D) $\frac{1}{2}$ E) $-\frac{1}{2}$

24. (01-7-3) Ushbu $a=2,7(2)$, $b=\sqrt{2+\sqrt[3]{8}}$, $c=\pi-3,14$, $d=sin\frac{\pi}{3}$ sonlardan qaysilari irratsional sonlar?
A) a; c; d B) b; c; d C) c; d
D) a; c E) Hammasi

25. (01-9-29) Qaysi ko'paytma musbat?

$$1)sin4,11\cdot tg3,52;\quad 2)cos2,53\cdot log_{\frac{1}{2}}\frac{\pi}{3};$$

$$3)ctg5,73\cdot cos1,19$$

A) 1 B) 1; 2 C) 2 D) 1; 3 E) 2; 3

26. (01-9-33) Ushbu $k=2^{\frac{\pi}{4}}$, $p=log_2\frac{\pi}{5}$ va $q=sin\frac{5\pi}{6}$ sonlarini o'sish tartibida yozing.
A) $p<q<k$ B) $q<p<k$ C) $k<p<q$
D) $k<q<p$ E) $p<k<q$

27. (01-12-32) Qaysi ko'paytma manfiy?

$$1)cos3,78\cdot log_21,37;\quad 2)tg2,91\cdot ctg4,82;$$

$$3)ln1,98\cdot tg4,45$$

A) 1; 2 B) 1 C) 2; 3 D) 1; 3 E) 2

28. (02-2-48) Agar $\frac{1}{2}x=(sin30^0+tg60^0\cdot cos30^0)^2$ bo'lsa, $x=$?
A) 8 B) 4 C) 2 D) 16 E) 1

2.1.2 Trigonometriyaning asosiy ayniyatlari.

1. $tgx=\frac{sinx}{cosx}$;
2. $ctgx=\frac{cosx}{sinx}$;
3. $tgx\cdot ctgx=1$;
4. $sin^2x+cos^2x=1$;
5. $1+tg^2x=\frac{1}{cos^2x}$;
6. $1+ctg^2x=\frac{1}{sin^2x}$:

1. (98-5-48) Agar $sin\alpha=\frac{3}{5}$ va $\frac{\pi}{2}<\alpha<\pi$ bo'lsa, $tg\alpha$ ni toping.
A) $-\frac{4}{5}$ B) $-\frac{3}{4}$ C) $\frac{3}{4}$ D) $-\frac{3}{5}$ E) $\frac{3}{5}$

2. (99-7-47) Agar $\alpha\in(\frac{\pi}{2};\pi)$ va $sin\alpha=\frac{1}{4}$ bo'lsa, $ctg\alpha$ ni hisoblang.
A) -4 B) $-\sqrt{17}$ C) $-\frac{1}{\sqrt{15}}$
D) $-\sqrt{13}$ E) $-\sqrt{15}$

3. (00-8-61) Agar $0<\alpha<\frac{\pi}{2}$ va $tg\alpha=2$ bo'lsa, $cos\alpha$ ni toping.
A) $\frac{5}{\sqrt{5}}$ B) $\frac{2}{\sqrt{5}}$ C) $\frac{\sqrt{5}}{5}$ D) $\sqrt{5}$ E) $-\frac{1}{\sqrt{5}}$

4. (98-4-17) Agar $tg\alpha=3$ bo'lsa,

$$\frac{3sin\alpha}{5sin^3\alpha+10cos^3\alpha}$$

ning qiymati qanchaga teng bo'ladi?
A) $\frac{16}{26}$ B) $\frac{4}{5}$ C) $\frac{8}{15}$ D) $\frac{15}{23}$ E) $\frac{18}{23}$

5. (98-5-52) Ifodani soddalashtiring.

$$sin^2\alpha + cos^2\alpha + ctg^2\alpha$$

A) $cos^2\frac{\alpha}{2}$ B) $\frac{cos2\alpha}{2}$ C) $tg\frac{\alpha}{2}$ D) $\frac{1}{sin^2\alpha}$ E) $\frac{1}{cos^2\alpha}$

6. (98-6-52) Agar $\sqrt{1-cos^2x} - \sqrt{1+sin^2x} = k$ bo'lsa, $\sqrt{1-cos^2x} + \sqrt{1+sin^2x}$ ni toping.
A)$1,5k$ B) $2k$ C) $\frac{2}{k}$ D) $-k$ E) $-\frac{1}{k}$

7. (98-8-62) Agar $tg\alpha + ctg\alpha = p$ bo'lsa, $tg^3\alpha + ctg^3\alpha$ ni p orqali ifodalang.
A)$-p^3 - 3p$ B) $p^3 - 3p$ C) $p^3 + 3p$
D) $3p - p^3$ E) $3p^3 - p$

8. (98-11-97) Agar $tg\alpha + ctg\alpha = a \quad (a > 0)$ bo'lsa, $\sqrt{tg\alpha} + \sqrt{ctg\alpha}$ qiymati qanchaga teng bo'ladi?
A)$\sqrt{a+2}$ B) $a-2$ C) $\sqrt{2} + \sqrt{a}$
D) $a+2$ E) $\sqrt{a} - \sqrt{2}$

9. (98-12-54) Agar $sin\alpha + cos\alpha = a$ bo'lsa, $|sin\alpha - cos\alpha|$ ni a orqali ifodalang .
A)$\sqrt{2-a^2}$ B) $-\sqrt{2-a^2}$ C) $\sqrt{a^2-2}$
D) $\sqrt{2-a}$ E) $2 - a^2$

10. (98-12-55) Agar $tg\alpha + ctg\alpha = p$ bo'lsa, $tg^2\alpha + ctg^2\alpha$ ni p orqali ifodalang.
A)$p^2 - 2$ B) $-p^2 + 2$ C) $p^2 + 2$
D) $p^2 - 1$ E) $p^2 + 1$

11. (99-6-21) Soddalashtiring.

$$sin^2\alpha + sin^2\beta - sin^2\alpha \cdot sin^2\beta + cos^2\alpha \cdot cos^2\beta$$

A) 1 B) 0 C) -1 D) -2 E) 2

12. (99-6-33) tgx ni hisoblang.

$$\frac{2sinx - cosx}{2cosx + sinx} = 3$$

A) 7 B) -3 C) 3 D) -7 E) 2

13. (99-6-51) Soddalashtiring.

$$sin^6\alpha + cos^6\alpha + 3sin^2\alpha \cdot cos^2\alpha$$

A) -1 B) 0 C) 1 D) 2 E) 4

14. (99-8-80) Soddalashtiring.

$$sin^2x + cos^2x + tg^2x$$

A) $-\frac{1}{cos^2x}$ B) $-\frac{1}{sin^2x}$ C) $\frac{1}{sin^2x}$
D) $\frac{1}{cosx}$ E) $\frac{1}{cos^2x}$

15. (00-10-16) Agar $tg\alpha = \frac{4}{5}$ bo'lsa,

$$\frac{sin\alpha + cos\alpha}{sin\alpha - cos\alpha}$$

nimaga teng.
A) -3 B) 3 C) -9 D) 9 E) $\frac{1}{3}$

16. (00-10-64) Agar $ctg\alpha = \sqrt{3}$ bo'lsa,

$$\frac{9}{sin^4\alpha + cos^4\alpha}$$

ni hisoblang .
A) 5 B) 4,5 C) 81 D) 4 E) 14,4

17. (97-1-47) Soddalashtiring.

$$(ctg\alpha - cos\alpha) \cdot \Big(\frac{sin^2\alpha}{cos\alpha} + tg\alpha\Big)$$

A) $cos^2\alpha$ B) $tg\alpha$ C) $\frac{1}{cos\alpha}$
D) $ctg^2\alpha$ E) $sin^2\alpha$

18. (97-6-46) Soddalashtiring.

$$\frac{1 - sin^4\alpha - cos^4\alpha}{cos^4\alpha}$$

A) $2tg^2\alpha$ B) $\frac{1}{cos^2\alpha}$ C) 2
D) $sin^2\alpha$ E) $ctg^2\alpha$

19. (97-11-46) Soddalashtiring.

$$\frac{sin^2\alpha - cos^2\alpha + cos^4\alpha}{cos^2\alpha - sin^2\alpha + sin^4\alpha}$$

A) $tg^4\alpha$ B) $tg^2\alpha$ C) $ctg^4\alpha$
D) $\frac{tg^2\alpha}{2}$ E) $2ctg^2\alpha$

20. (98-1-55) Soddalashtiring.

$$\frac{3sin^2\alpha + cos^4\alpha}{1 + sin^2\alpha + sin^4\alpha}$$

A) $2sin\alpha$ B) 2 C) $ctg^2\alpha$ D) 1 E) 3

21. (98-8-55) Soddalashtiring.

$$\frac{1 + cos^2\alpha + cos^4\alpha}{3cos^2\alpha + sin^4\alpha}$$

A) 3 B) 2 C) $1\frac{1}{2}$ D) $\frac{1}{3}$ E) 1

22. (99-1-8) Agar $sin\alpha = \sqrt{3}/2$ va $\frac{\pi}{2} < \alpha < \pi$ bo'lsa,

$$\frac{|-1 + cos\alpha| + 2cos\alpha}{|\frac{tg\alpha}{\sqrt{3}} - 0,5|}$$

ni hisoblang .
A) $\frac{1}{3}$ B) 1 C) 3 D) -1 E) -3

23. (00-2-45) Agar $ctg\alpha = \frac{13}{4}$ bo'lsa,

$$\frac{2cos\alpha + sin\alpha}{cos\alpha - 2sin\alpha}$$

kasrning qiymatini toping .
A) 6 B) 5 C) 6,2 D) 4,8 E) 6,4

24. (97-4-36) Hisoblang.

$$\Big[\frac{log_\pi 2\pi}{tg^2\frac{\pi}{12} + 1}\Big]^{sin^2\frac{\pi}{5} + cos^2\frac{\pi}{5} - 1}$$

A) 0 B) 2 C) 3 D) 1 E) 1,5

25. (01-1-46) Ifodani soddalashtiring.

$$\frac{cos^2\alpha - ctg^2\alpha}{tg^2\alpha - sin^2\alpha}$$

A) $-ctg^6\alpha$ B) $ctg^4\alpha$ C) $tg^4\alpha$
D) $ctg^42\alpha$ E) $ctg^6\alpha$

26. (01-1-69) Agar $sinx + cosx = 0,5$ bo'lsa, $16(sin^3x + cos^3x)$ ni toping.
A) 8 B) 14 C) 11 D) 16 E) 12

27. (01-7-37) Agar $tg\alpha = -\frac{3}{4}$ va $\frac{\pi}{2} < \alpha < \pi$ bo'lsa, $sin\alpha - cos\alpha$ ning qiymatini toping .
A) $-\frac{1}{5}$ B) $\frac{1}{5}$ C) $\frac{7}{5}$ D) $-\frac{7}{5}$ E) $-\frac{3}{5}$

28. (01-9-23) Agar $cos\alpha = \frac{\sqrt{3}}{2}$ bo'lsa,

$$\frac{1 - sin^2\alpha + cos^2\alpha \cdot sin\alpha}{1 + sin\alpha}$$

ifodaning qiymatini toping .
A) $\frac{3}{4}$ B) $1,5$ C) $1\frac{1}{3}$ D) 1 E) $\frac{3}{5}$

29. (02-4-30)

$$(tgx + ctgx)^2 - (tgx - ctgx)^2$$

ni soddalashtiring.
A) 0 B) -4 C) -2 D) 2 E) 4

30. (02-5-32) Agar

$$\frac{2sin\alpha + 3cos\alpha}{5sin\alpha - cos\alpha}$$

bo'lsa, $ctg\alpha = -2$ ning qiymatini hisoblang .
A) $\frac{7}{4}$ B) $-\frac{7}{4}$ C) $\frac{1}{2}$ D) $\frac{4}{7}$ E) $-\frac{4}{7}$

31. (02-6-31)

$$\frac{5sin^2\alpha + 4cos^2\alpha}{4cos^2\beta + 5sin^2\beta}$$

ifodaning eng katta qiymatini toping .
A) 1,25 B) 1,5 C) 2,25 D) 2,5 E) 2,75

32. (02-7-39)

$$(sin\alpha + cos\alpha)^2 + (sin\alpha - cos\alpha)^2 - 2$$

ni soddalashtiring.
A) 0 B) 4 C) $2sin2\alpha$ D) 1 E) $1 + 2sin2\alpha$

33. (02-8-41) Agar $ctg\alpha = 2$ bo'lsa,

$$\frac{sin^2\alpha - 2cos^2\alpha}{3sin\alpha \cdot cos\alpha + cos^2\alpha}$$

ifodaning qiymatini hisoblang .
A) $-0,7$ B) $-0,5$ C) $\frac{\sqrt{3}}{2}$ D) $-\frac{\sqrt{3}}{2}$ E) $-\frac{2}{3}$

34. (03-1-32) Agar $tgx = 0,5$ bo'lsa, $cos^8x - sin^8x$ ning qiymatini hisoblang .
A) 0,52 B) 0,408 C) 0,392
D) 0,416 E) 0,625

35. (03-8-54) $cos\alpha - sin\alpha = 0,2$ bo'lsa, $cos^3\alpha - sin^3\alpha$ ni hisoblang .
A) 0,296 B) 0,3 C) 0,04 D) 0,324
E) 0,008

36. (03-8-55) Agar $cosx = \frac{1}{\sqrt{10}}$ bo'lsa,

$$(1 + tg^2x)(1 - sin^2x) - sin^2x$$

ifodaning qiymatini toping .
A) 0,1 B) 0,2 C) 0,3 D) $\frac{2}{\sqrt{10}}$ E) $\frac{\sqrt{10}}{10}$

37. (03-12-25)

$$1 + \frac{sin^4\alpha + sin^2\alpha \cdot cos^2\alpha}{cos^2\alpha}$$

ni soddalashtiring.
A) $tg^2\alpha$ B) $1 + tg^2\alpha$ C) $ctg^2\alpha$
D) $1 + ctg^2\alpha$ E) $tg^2\alpha + ctg^2\alpha$

2.1.3 Keltirish formulalari

x	sinx	cosx	tgx	ctgx
$\frac{\pi}{2} - \alpha$	$cos\alpha$	$sin\alpha$	$ctg\alpha$	$tg\alpha$
$\frac{\pi}{2} + \alpha$	$cos\alpha$	$-sin\alpha$	$-ctg\alpha$	$-tg\alpha$
$\pi - \alpha$	$sin\alpha$	$-cos\alpha$	$-tg\alpha$	$-ctg\alpha$
$\pi + \alpha$	$-sin\alpha$	$-cos\alpha$	$tg\alpha$	$ctg\alpha$
$\frac{3\pi}{2} - \alpha$	$-cos\alpha$	$-sin\alpha$	$ctg\alpha$	$tg\alpha$
$\frac{3\pi}{2} + \alpha$	$-cos\alpha$	$sin\alpha$	$-ctg\alpha$	$-tg\alpha$
$2\pi - \alpha$	$-sin\alpha$	$cos\alpha$	$-tg\alpha$	$-ctg\alpha$

1. (96-1-54) Ushbu $2tg(-765^0)$ ifodaning qiymatini aniqlang.
A) $-\sqrt{2}$ B) $\frac{2}{\sqrt{3}}$ C) -2 D) 4 E) $-2\sqrt{3}$

2. (00-5-31) $sin2010^0$ ni hisoblang.
A) $-\frac{1}{2}$ B) $-\frac{\sqrt{3}}{2}$ C) $\frac{\sqrt{3}}{2}$ D) 1 E) $-\frac{1}{4}$

3. (97-1-44) Hisoblang.

$$sin(1050^0) - cos(-90^0) + ctg(660^0)$$

A) $\sqrt{3} - 1$ B) $-\frac{3\sqrt{3}}{2}$ C) $-\frac{3+2\sqrt{3}}{6}$
D) $0,5 + \sqrt{3}$ E) $2\sqrt{3}$

4. (97-6-43) Hisoblang.

$$sin(-45^0) + cos(405^0) + tg(-945^0)$$

A) 1 B) -1 C) $-2\sqrt{2}$ D) $\sqrt{2}-1$ E) $\sqrt{2}+1$

5. (97-11-43) Hisoblang.

$$cos(-45^0) + sin(315^0) + tg(-855^0)$$

A) 0 B) $\sqrt{2} - 1$ C) $1 + \sqrt{3}$ D) -1 E) 1

6. (98-10-36) Hisoblang.

$$tg\frac{\pi}{6} \cdot sin\frac{\pi}{3} \cdot ctg\frac{5\pi}{4}$$

A) 1,5 B) 0,5 C) $-\frac{1}{2}$ D) $\frac{\sqrt{3}}{4}$ E) $\frac{3}{4}$

7. (00-1-25) Keltirilgan sonlardan eng kattasini toping.
A) $sin1$ B) $cos(\frac{\pi}{2} - \frac{1}{2})$ C) $sin4$
D) $cos(\frac{3\pi}{2} + \frac{1}{4})$ E) $tg\frac{\pi}{4}$

8. (96-6-34) Soddalashtiring.

$$\frac{sin(2\pi - \alpha)}{ctg(\frac{3\pi}{2} - \beta)}$$

A) $\frac{sin\alpha}{tg\beta}$ B) $-\frac{sin\alpha}{ctg\beta}$ C) $-\frac{sin\alpha}{tg\beta}$
D) $-\frac{cos\alpha}{sin\beta}$ E) $-\frac{cos\alpha}{ctg\beta}$

9. (97-8-33) Soddalashtiring.

$$sin\Big(\frac{3\pi}{2}+\alpha\Big)ctg(\pi+\beta)$$

A) $cos\alpha\cdot ctg\beta$ B) $-cos\alpha\cdot ctg\beta$ C) $-cos\alpha\cdot tg\beta$
D) $sin\alpha\cdot tg\beta$ E) $-sin\alpha\cdot ctg\beta$

10. (97-12-33) Soddalashtiring.

$$cos\Big(\frac{3\pi}{2}-\alpha\Big)tg(\pi-\beta)$$

A) $-sin\alpha\cdot tg\beta$ B) $cos\alpha\cdot tg\beta$ C) $sin\alpha\cdot tg\beta$
D) $-cos\alpha\cdot tg\beta$ E) $sin\alpha\cdot ctg\beta$

11. (98-11-105) Ifodani soddalashtiring.

$$cos^2(\pi+x)+cos^2(\frac{\pi}{2}+x)$$

A) π B) $cosx$ C) sin^2x D) 2 E) 1

12. (97-2-34) Soddalashtiring.

$$\frac{tg(\frac{\pi}{2}+\alpha)}{cos(2\pi-\beta)}$$

A) $\frac{ctg\alpha}{cos\beta}$ B) $-\frac{ctg\alpha}{cos\beta}$ C) $-\frac{tg\alpha}{sin\beta}$
D) $\frac{tg\alpha}{sin\beta}$ E) $-\frac{tg\alpha}{cos\beta}$

13. (99-6-31) Noto'g'ri tenglikni ko'rsating.
A) $cos(-x)=-cosx$ B) $cos(\pi+x)=-cosx$
C) $ctg(\frac{3\pi}{2}-x)=tgx$ D) $tg(2\pi-x)=-tgx$
E) $tg(\pi+x)=tgx$

14. (98-5-49) $tg1^0\cdot tg2^0\cdot ...\cdot tg88^0\cdot tg89^0$ ni hisoblang.
A) 0 B) $\frac{1}{2}$ C) 1 D)hisoblab bo'lmaydi E) $\sqrt{3}$

15. (99-1-41) Soddalashtiring.

$$tg\alpha\cdot ctg(\pi+\alpha)+ctg^2\alpha$$

A) $\frac{1}{sin^2\alpha}$ B) $\frac{1}{cos^2\alpha}$ C) $tg\alpha$ D) $tg^2\alpha$ E) 1

16. (00-1-26) Soddalashtiring.

$$\frac{sin(\frac{\pi}{2}-\alpha)\cdot cos(\pi+\alpha)}{ctg(\pi+\alpha)\cdot tg(\frac{3\pi}{2}-\alpha)}$$

A) $-sin^2\alpha$ B) $-cos^2\alpha$ C) $-sin^2\alpha\cdot tg^2\alpha$
D) $cos^2\alpha\cdot ctg^2\alpha$ E) $sin^2\alpha\cdot tg^2\alpha$

17. (00-8-60) Soddalashtiring.

$$\frac{tg(\pi-\alpha)}{cos(\pi+\alpha)}\cdot\frac{sin(\frac{3\pi}{2}+\alpha)}{tg(\frac{3\pi}{2}+\alpha)}$$

A) $tg^2\alpha$ B) $ctg^2\alpha$ C) $-tg^2\alpha$ D) $\frac{1}{tg\alpha}$ E) $\frac{1}{ctg\alpha}$

18. (00-8-42) Hisoblang.

$$log_5tg36^0+log_5tg54^0$$

A) 0 B) 1 C) $\sqrt{3}$ D) $\sqrt{2}$ E) $\emptyset$

19. (00-9-56) Hisoblang.

$$\left(\left(3\cdot 128^{\frac{3}{7}}\cdot e^{-ln48}\right)^{-\frac{1}{2}}-\left(tg\frac{7\pi}{6}\right)^{-1}\right)^2+\frac{12}{\sqrt{6}}$$

A) 1 B) 2 C) 3 D) 4 E) 5

20. (01-2-17) Hisoblang.

$$cos870^0$$

A) $\frac{\sqrt{3}}{2}$ B) $-\frac{1}{2}$ C) $-\frac{\sqrt{3}}{2}$ D) $\frac{1}{2}$ E) $-\frac{\sqrt{2}}{2}$

21. (01-9-28) Qaysi ifoda ma'noga ega?

$$1)log_3sin\frac{6\pi}{5};\quad 2)log_2cos\frac{23\pi}{12};\quad 3)\sqrt{tg\frac{7\pi}{12}}$$

A) 1;2 B) 3 C) 2 D) 2;3 E) 3

22. (01-12-31) Qaysi ifoda ma'noga ega emas?

$$1)\sqrt{lg\frac{11\pi}{8}};\quad 2)\sqrt{sin\frac{19\pi}{12}};\quad 3)log_{\sqrt{\frac{\pi}{3}}}\sqrt[3]{\frac{3\pi}{8}}.$$

A) 1;3 B) 3 C) 2 D) 1;2 E) 1

23. (01-12-42) Tenglamani yeching.

$$\frac{3}{2}x-\frac{4}{5}=\sqrt{sin30^0+sin\frac{7\pi}{4}}$$

A) 2^{-1} B) $\emptyset$ C) 2 D) $\frac{3}{4}$ E) $\frac{5}{2}$

24. (99-10-37) Hisoblang.

$$lgtg22^0+lgtg68^0+lgsin90^0$$

A) 0,5 B) 1 C) 0 D) 0,6 E) -1

25. (02-3-76)

$$sin\frac{\pi}{9}-cos\frac{7\pi}{18}$$

ni hisoblang.
A) 0 B) $\frac{1}{2}$ C) $\frac{\sqrt{2}}{2}$ D) $\frac{\sqrt{3}}{2}$ E) $-\frac{1}{2}$

26. (02-4-29)

$$sin^2(3570^0)$$

ning qiymatini hisoblang.
A) 0,2 B) 0,3 C) 0,25 D) 0,35 E) 0,15

27. (03-2-41) $tg1395^0$ ni hisoblang.
A) $\sqrt{3}$ B) $-\frac{1}{\sqrt{3}}$ C) -1 D) 1 E) $\frac{\sqrt{3}}{3}$

28. (03-2-43)

$$ctg37^0ctg38^0ctg39^0...ctg52^0ctg53^0$$

ni hisoblang.
A) 0 B) 1 C) -1 D)$-\sqrt{3}$ E) 2

29. (03-3-41)

$$\frac{sin(\pi+\alpha)}{sin\left(\frac{3\pi}{2}+\alpha\right)}+\frac{cos(\pi-\alpha)}{cos\left(\frac{\pi}{2}+\alpha\right)-1}$$

ni soddalashtiring.
A) $\frac{1}{\quad}$ B) $\frac{1}{\quad}$ C) $sin\alpha$ D)$cos\alpha$ E) 1

30. (03-4-22) $tg240^0$, $sin120^0$, $cos150^0$ va $ctg225^0$ sonlardan eng kattasining eng kichigiga ko'paytmasini toping.
A) $-1,4$ B) $-1,5$ C) $-\frac{\sqrt{6}}{2}$ D)$1,5$ E) $\frac{\sqrt{6}}{2}$

31. (03-5-44)
$$y = cos(-7,9\pi)tg(-1,1\pi) - sin5,6\pi \cdot ctg4,4\pi$$
ni soddalashtiring.
A) 0 B) 1 C) -1 D)$\sqrt{2}$ E) $-\sqrt{2}$

32. (03-9-29) Agar $\alpha - \beta = \frac{\pi}{2}$ bo'lsa,
$$\frac{sin\alpha - sin\beta}{cos\alpha + cos\beta}$$
ning qiymatini toping.
A) $\frac{1}{2}$ B) $\sqrt{2}$ C) $\frac{\sqrt{2}}{2}$ D)1 E) 2

2.1.4 Qo'shish formulalari.

1. $sin(x+y) = sinxcosy + cosxsiny$;
2. $sin(x-y) = sinxcosy - cosxsiny$;
3. $cos(x+y) = cosxcosy - sinxsiny$;
4. $cos(x-y) = cosxcosy + sinxsiny$;
5. $tg(x+y) = \frac{tgx+tgy}{1-tgxtgy}$;
6. $tg(x-y) = \frac{tgx-tgy}{1+tgxtgy}$:

1. (96-3-111) Agar $tg(\frac{\pi}{4} - \alpha) = 2$ bo'lsa, $tg\alpha$ ni toping.
A) 3 B) -3 C) $\frac{1}{3}$ D) $-\frac{1}{3}$ E) $\frac{1}{2}$

2. (96-9-46) Agar $tg(\frac{\pi}{4} - \alpha) = 2$ bo'lsa, $ctg\alpha$ ni toping.
A) 3 B) $\frac{1}{3}$ C) $-\frac{1}{3}$ D) -4 E) -3

3. (96-12-84) Agar $tg(\frac{\pi}{4} + \alpha) = 2$ bo'lsa, $tg\alpha$ ni toping.
A) $-\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{1}{3}$ D) $-\frac{1}{2}$ E) $\frac{1}{4}$

4. (96-13-53) Agar $tg(\frac{\pi}{4} + \alpha) = 2$ bo'lsa, $ctg\alpha$ ni toping.
A) $\frac{1}{3}$ B) $-\frac{1}{3}$ C) -3 D) $\frac{1}{4}$ E) 3

5. (01-1-42) Agar $tg\alpha = \frac{1}{2}$, $tg\beta = \frac{1}{3}$ va $\pi < \alpha + \beta < 2\pi$ bo'lsa, $\alpha + \beta$ ning qiymatini toping.
A) $\frac{7\pi}{3}$ B) $\frac{5\pi}{3}$ C) $\frac{5\pi}{4}$ D) $\frac{7\pi}{4}$ E) $\frac{11\pi}{6}$

6. (97-1-60) Agar $\begin{cases} tg(x+y) = 3 \\ tg(x-y) = 2 \end{cases}$ bo'lsa, $tg2x$ ni hisoblang.
A) 5 B) 2,5 C) 1 D) -1 E) -5

7. (97-1-66) Agar
$$tg\alpha = \frac{5+\sqrt{x}}{2}, \quad tg\beta = \frac{5-\sqrt{x}}{2}$$
va $\alpha + \beta = 45^0$ bo'lsa, x ni toping.
A) 41 B) 40 C) 5 D) 42
E) to'g'ri javob berilmagan

8. (97-6-60) Agar $\begin{cases} tg(\alpha+\beta) = 5 \\ tg(\alpha-\beta) = 3 \end{cases}$ bo'lsa, $tg2\beta$ ni hisoblang.
A) 15 B) 8 C) $\frac{1}{8}$ D) 1 E) 2

9. (97-6-68) Agar $\begin{cases} tg\alpha = \frac{3+\sqrt{x}}{2}, \\ tg\beta = \frac{3-\sqrt{x}}{2} \\ \alpha + \beta = \frac{\pi}{4} \end{cases}$ bo'lsa, x ni toping.
A) $\frac{\pi}{3}$ B) -17 C) $-\frac{\pi}{6} + \pi k \in Z$ D) 17
E) to'g'ri javob keltirilmagan

10. (98-6-48) Agar $tg(x+y) = 5$ va $tgx = 3$ bo'lsa, tgy ni toping.
A) 2 B) $\frac{1}{8}$ C) 8 D) $\frac{1}{2}$ E) $-\frac{4}{7}$

11. (98-6-54) Hisoblang.
$$cos45^0 \cdot cos15^0 + sin45^0 \cdot sin15^0$$
A) $\frac{1}{2}$ B) $\frac{\sqrt{2}}{2}$ C) $\frac{\sqrt{3}}{2}$ D) 0 E) 1

12. (98-8-61) Agar $b = sin(40^0 + \alpha)$ va $0^0 < \alpha < 45^0$ bo'lsa, $cos(70 + \alpha)$ ni b orqali ifodalang.
A) $-\frac{1}{2} \cdot (\sqrt{3(1-b^2)} + b)$ B) $\frac{1}{2} \cdot \left(b - \sqrt{3(1-b^2)}\right)$
C) $\frac{1}{2} \cdot (\sqrt{3(1-b^2)} - b)$ D) $\frac{1}{2} \cdot (\sqrt{3(1-b^2)} + b)$
E) $\frac{1}{2} \cdot \sqrt{3(1-b^2)}$

13. (98-10-33) Agar $\alpha = 46^0$ va $\beta = 16^0$ bo'lsa, $sin(\alpha+\beta) - 2sin\beta \cdot cos\alpha$ son $21,5$ dan qancha kam bo'ladi?
A) 22 B) 20 C) 20,5 D) 19,5 E) 21

14. (98-11-73) Agar
$$5x^2 - 3x - 1 = 0$$
tenglamaning uldizlari $tg\alpha$ va $tg\beta$ bo'lsa, $tg(\alpha+\beta)$ qanchaga teng bo'ladi?
A) $\frac{3}{2}$ B) 1 C) 3 D) $\frac{1}{2}$ E) 5

15. (98-11-104) Agar $sin\alpha = \frac{3}{5}$, $sin\beta = \frac{5}{13}$, $\frac{\pi}{2} < \alpha < \pi$, $\frac{\pi}{2} < \beta < \pi$ bo'lsa, $sin(\alpha - \beta)$ ning qiymati qanchaga teng.
A) $-\frac{16}{65}$ B) $\frac{16}{65}$ C) $\frac{56}{65}$ D) $-\frac{56}{65}$ E) $-\frac{2}{13}$

16. (99-1-42) Quyidagi tengliklardan qaysi biri noto'g'ri?
A)$cos(\frac{\pi}{4} - \alpha) = \frac{\sqrt{2}}{2}(cos\alpha - sin\alpha)$
B) $sin(\frac{\pi}{2} + \alpha) = cos\alpha$
C)$cos(\alpha - 30^0) = \frac{\sqrt{3}}{2}cos\alpha + \frac{1}{2}sin\alpha$
D)$tg(\frac{\pi}{4} + \alpha) = \frac{1+tg\alpha}{1-tg\alpha}$
E) $cos75^0 = \frac{\sqrt{2}(\sqrt{3}-1)}{4}$

17. (99-5-25) Agar $\begin{cases} \alpha, \beta \in (0; \frac{\pi}{2}) \\ (tg\alpha + 1)(tg\beta + 1) = 2 \end{cases}$ bo'lsa,
$$3,2\left(\frac{\alpha+\beta}{\pi}\right)^2$$
ning qiymati nechaga teng?
A) 0,5 B) 0,2 C) 0,3 D) 0,4 E) 0,6

18. (99-10-30) Agar $tg(\alpha - \beta) = 5$ va $\alpha = 45^0$ bo'lsa, $tg\beta$ ning qiymatini toping.
A) $\frac{1}{2}$ B) $-\frac{3}{4}$ C) $\frac{2}{3}$ D) $-\frac{1}{3}$ E) $-\frac{2}{3}$

19. (00-1-29) Agar $\alpha = -45^0$ va $\beta = 15^0$ bo'lsa, $cos(\alpha+\beta) + 2sin\alpha \cdot sin\beta$ ning qiymatini toping.
A) $-\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $-\frac{\sqrt{3}}{2}$ D) $\frac{\sqrt{2}}{2}$ E) $\frac{1}{2}$

20. (00-1-32) Agar $tg\alpha + tg\beta = \frac{5}{6}$ va $tg\alpha \cdot tg\beta = \frac{1}{6}$ bo'lsa, $\alpha+\beta$ nimaga teng bo'ladi?
A) $\frac{\pi}{6} + \pi k, k \in Z$ B) $-\frac{\pi}{4} + \pi k, k \in Z$
C) $-\frac{\pi}{6} + \pi k, k \in Z$ D) $\frac{\pi}{4} + \pi k, k \in Z$
E) $\frac{\pi}{3} + \pi k, k \in Z$

21. (00-9-65) Agar $\alpha, \beta \in (0; \frac{\pi}{2})$ va $(tg\alpha + \sqrt{3}) \cdot (tg\beta + \sqrt{3}) = 4$ bo'lsa, $9 \cdot \left(\frac{\alpha+\beta}{\pi}\right)^2$ ning qiymatini toping.
A) 0,25 B) 0,5 C) 0,36 D) 0,64 E) 0,16

22. (98-2-25) Quyidagi sonlardan qaysi biri qolgan uchtasiga teng emas?
$p = \frac{1}{sin^2 x} - ctg^2 x$, $q = tgx \cdot tg(270^0 - x)$, $\left(x \neq \frac{\pi k}{2}, k \in Z\right)$, $r = cos^2(270^0 - x) + cos^2 x$, $l = sin42^0 \cdot cos48^0 + sin48^0 \cdot cos42^0$
A)p B) q C) r D) l E) hech qaysisi

23. (00-1-31) Soddalashtiring.

$$ctg2\alpha - ctg\alpha$$

A) $\frac{1}{sin2\alpha}$ B) $\frac{1}{cos2\alpha}$ C) $-\frac{1}{sin2\alpha}$
D) $-\frac{1}{cos2\alpha}$ E) $-\frac{1}{sin^2\alpha}$

24. (98-6-56) Agar

$$\begin{cases} sin^2 x = cosx \cdot cosy \\ cos^2 x = sinx \cdot siny \end{cases}$$

bo'lsa, $cos(x-y)$ ni toping?
A) $\frac{1}{2}$ B) 1 C) $\frac{\sqrt{3}}{2}$ D) $\frac{\sqrt{2}}{2}$ E) 0

25. (00-7-30) Agar $sin\alpha \cdot sin\beta = 1$ va $sin\beta \cdot cos\alpha = \frac{1}{2}$ bo'lsa, $\alpha - \beta$ ning qiymatlarini toping.
A) $(-1)^k \frac{\pi}{4} + \pi k, \quad k \in Z$
B) berilgan tengliklarni qanoatlantiruvchi α va β ning qiymatlari yo'q
C) $(-1)^k \frac{\pi}{3} + 2\pi k, \quad k \in Z$
D) $(-1)^k \frac{\pi}{3} + \pi k, \quad k \in Z$
E) $(-1)^k \frac{\pi}{6} + \pi k, \quad k \in Z$

26. (01-10-40) $cos(x-y) \quad ni \quad toping.$

$$\begin{cases} sinx \cdot siny = \frac{1}{4} \\ ctgx \cdot ctgy = 3 \end{cases}$$

A) 0 B) 0,5 C) 1 D) $-0,5$ E) -1

27. (02-6-46)

$$\begin{cases} cosx \cdot cosy = \frac{1}{6} \\ tgx \cdot tgy = 2 \end{cases}$$

$cos(x+y) =?$
A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $-\frac{1}{2}$ D) $-\frac{1}{3}$ E) $-\frac{1}{6}$

28. (97-3-54) Soddalashtiring.

$$\frac{sin56^0 \cdot sin124^0 - sin34^0 \cdot cos236^0}{cos28^0 \cdot cos88^0 + cos178^0 \cdot sin208^0}$$

A) $\frac{2}{\sqrt{3}}$ B) $tg28^0$ C) 2 D) $\frac{1}{sin26^0}$ E) -2

29. (96-1-57) Ifodani soddalashtiring.

$$\frac{cos(\alpha+\beta) + 2sin\alpha \cdot sin\beta}{sin(\alpha+\beta) - 2cos\beta \cdot sin\alpha}$$

A) $ctg(\beta-\alpha)$ B) $tg(\alpha-\beta)$ C) $2tg(\alpha+\beta)$
D) $2ctg(\alpha-\beta)$ E) $sin\alpha \cdot cos\beta$

30. (96-7-54) Soddalashtiring.

$$\frac{cos18^0 \cdot cos28^0 + cos108^0 \cdot sin208^0}{sin34^0 \cdot sin146^0 + sin236^0 \cdot sin304^0}$$

A) 1 B) $cos10^0$ C) $sin46^0$ D) $-sin10^0$ E) 2

31. (97-7-54) Soddalashtiring.

$$\frac{sin56^0 \cdot sin124^0 - sin34^0 \cdot cos236^0}{cos28^0 \cdot sin88^0 + sin178^0 \cdot cos242^0}$$

A) $\frac{1}{sin26^0}$ B) $tg28^0$ C) $-\frac{\sqrt{3}}{2}$ D) $\frac{2}{\sqrt{3}}$ E) 1

32. (97-10-54) Soddalashtiring.

$$\frac{cos18^0 \cdot cos28^0 + cos108^0 \cdot sin208^0}{sin18^0 \cdot sin78^0 + sin108^0 \cdot sin168^0}$$

A) $2cos10^0$ B) $\frac{1}{2}sin10^0$ C) 2 D) $\frac{\sqrt{3}}{2}$
E) $cos46^0$

33. (01-1-49) Agar $sin\alpha = -\frac{1}{3}$ va $cos\beta = -\frac{1}{2}$ bo'lsa, $sin(\alpha+\beta) \cdot sin(\alpha-\beta)$ ning qiymatini toping.
A) $-\frac{23}{36}$ B) $\frac{23}{36}$ C) $\frac{3}{4}$ D) $-\frac{3}{4}$ E) $\frac{1}{6}$

34. (01-6-27) Hisoblang.

$$cos15^0 + \sqrt{3}sin15^0$$

A) $\sqrt{3}$ B) $\sqrt{2}$ C) $\frac{\sqrt{2}}{2}$ D) $\frac{\sqrt{3}}{2}$ E) $\frac{\sqrt{2}}{4}$

35. (01-11-24) Soddalashtiring.

$$\frac{sin\alpha + cos\alpha}{\sqrt{2}cos(\frac{\pi}{4} - \alpha)}$$

A) 1,6 B) $ctg(\frac{\pi}{4} + \alpha)$ C) 1,5
D) 1 E) $tg(\frac{\pi}{4} + \alpha)$

36. (02-3-71) α, β, γ o'tkir burchaklar bo'lib, $tg\alpha = \frac{1}{2}$, $tg\beta = \frac{1}{5}$ va $tg\gamma = \frac{7}{9}$ bo'lsa, γ ni α va β lar orqali ifodalang.
A) $\gamma = \alpha + \beta$ B) $\gamma = 2\alpha - \beta$ C) $\gamma = \alpha + 2\beta$
D) $\gamma = \alpha - \beta$ E) $\gamma = 2(\alpha + \beta)$

37. (02-3-72)

$$\frac{2cos(\frac{\pi}{4} - \alpha) + \sqrt{2}sin(\frac{3\pi}{2} - \alpha)}{2sin(\frac{2\pi}{3} + \alpha) - \sqrt{3}cos(2\pi - \alpha)}$$

ni soddalashtiring.
A) $-\sqrt{2}$ B) $-\frac{\sqrt{2}}{2}$ C) $\sqrt{2}$ D) 1 E) $\frac{\sqrt{2}}{2}$

38. (02-5-35) Agar $tg\alpha = 3$, $tg\beta = -\frac{1}{2}$, $0 < \alpha < \pi$ va $-\frac{\pi}{2} < \beta < 0$ bo'lsa, $\alpha + \beta$ ni toping.
A) $arctg\frac{5}{2}$ B) $\frac{\pi}{3}$ C) $-arctg\frac{5}{2}$
D) $\frac{\pi}{4}$ E) $arctg\frac{3}{2}$

39. (02-10-22) Agar $sin\alpha = -\frac{1}{3}$ va $cos\beta = -\frac{1}{2}$ bo'lsa, $sin(\alpha+\beta)sin(\alpha-\beta)$ ning qiymatini hisoblang.
A) $-\frac{23}{36}$ B) $\frac{1}{6}$ C) $-\frac{5}{6}$ D) $\frac{17}{36}$ E) $-\frac{19}{24}$

40. (03-1-25)
$$\begin{cases} sinx \cdot cosy = -\frac{1}{3} \\ cosx \cdot siny = \frac{2}{3} \end{cases}$$
$ctg(x-y)-?$
A) 0 B) 1 C) $-\frac{1}{2}$ D) $\frac{1}{2}$ E) $-\frac{\sqrt{3}}{3}$

41. (03-4-23)
$$(tg60^0 cos15^0 - sin15^0) \cdot 7\sqrt{2}$$
ning qiymatini toping.
A) 16 B) 12 C) 18 D) 14 E) 10

42. (03-5-46)
$$4cos20^0 - \sqrt{3}ctg20^0$$
ni hisoblang.
A) -1 B) 1 C) $-\frac{1}{2}$ D) $\frac{1}{2}$ E) $2\sqrt{3}$

43. (03-12-77)
$$\left(\left(tg^2\frac{7\pi}{24} - tg^2\frac{\pi}{24}\right) : \left(1 - tg^2\frac{7\pi}{24}\cdot tg^2\frac{\pi}{24}\right)\right)^2$$
ni hisoblang.
A) $\frac{1}{9}$ B) 9 C) $\frac{1}{3}$ D) 1 E) 3

2.1.5 Ikkilangan burchak formulalari.

1. $sin2x = 2sinxcosx$;
2. $cos2x = cos^2x - sin^2x = 2cos^2x - 1 = 1 - 2sin^2x$;
3. $sin2x = \frac{2tgx}{1+tg^2x}$;
4. $cos2x = \frac{1-tg^2x}{1+tg^2x}$;
5. $tg2x = \frac{2tgx}{1-tg^2x}$:

(97-6-51) Hisoblang.
$$sin\frac{\pi}{8}\cdot cos^3\frac{\pi}{8} - sin^3\frac{\pi}{8}\cdot cos\frac{\pi}{8}$$
A) 0 B) 1 C) 2 D) $\frac{1}{2}$ E) $\frac{1}{4}$

Yechish: $sin\alpha\cdot cos\alpha = \frac{1}{2}sin2\alpha$ va $cos^2\alpha - sin^2\alpha = cos2\alpha$ ekanidan
$$sin\frac{\pi}{8}\cdot cos^3\frac{\pi}{8} - sin^3\frac{\pi}{8}\cdot cos\frac{\pi}{8} = sin\frac{\pi}{8}\cdot$$
$$\cdot cos\frac{\pi}{8}\left(cos^2\frac{\pi}{8} - sin^2\frac{\pi}{8}\right) = \frac{1}{2}sin\frac{\pi}{4}cos(2\frac{\pi}{8}) =$$
$$= \frac{1}{2}sin\frac{\pi}{4}\cdot cos\frac{\pi}{4} = \frac{1}{4}sin\frac{\pi}{2} = \frac{1}{4}$$
ni hosil qilamiz. **Javob:** $\frac{1}{4}$ (E).
(99-6-53) Hisoblang.
$$cos\frac{\pi}{7}\cdot cos\frac{4\pi}{7}\cdot cos\frac{5\pi}{7}$$
A) $-\frac{1}{8}$ B) $\frac{1}{4}$ C) $\frac{1}{2}$ D) 1 E) $\frac{1}{8}$

Yechish: Ushbu $cos\alpha = -cos(\pi-\alpha)$ formuladan foydalanib berilgan ifodani shakl almashtiramiz:
$$A = cos\frac{\pi}{7}\cdot cos\frac{4\pi}{7}\cdot cos\frac{5\pi}{7} = -cos\frac{\pi}{7}\cdot$$
$$\cdot cos\frac{4\pi}{7}\cdot cos(\pi - \frac{5\pi}{7}) = -cos\frac{\pi}{7}\cdot cos\frac{2\pi}{7}cos\frac{4\pi}{7}.$$
Tenglikni $8sin\frac{\pi}{7}$ ga ko'paytirib va $sin2\alpha = 2sin\alpha cos\alpha$ formulani bir necha marta qo'llab
$$8Asin\frac{\pi}{7} = -8cos\frac{4\pi}{7}cos\frac{2\pi}{7}cos\frac{\pi}{7}sin\frac{\pi}{7} =$$
$$= -4cos\frac{4\pi}{7}\cdot cos\frac{2\pi}{7}\cdot sin\frac{2\pi}{7} =$$
$$= -2cos\frac{4\pi}{7}sin\frac{4\pi}{7} = -sin\frac{8\pi}{7}$$
ni hosil qilamiz. Demak,
$$A = -\frac{sin\frac{8\pi}{7}}{8sin\frac{\pi}{7}} = -\frac{sin(\pi+\frac{\pi}{7})}{8sin\frac{\pi}{7}} = \frac{1}{8}$$
Javob: $\frac{1}{8}$ (E).

1. (96-3-112) Soddalashtiring.
$$\frac{sin3\alpha}{sin\alpha} - \frac{cos3\alpha}{cos\alpha}$$
A) $2cos\alpha$ B) 2 C) $2sin\alpha$ D) 1 E) 0,5

2. (97-1-52) Hisoblang.
$$sin\frac{\pi}{16}\cdot cos^3\frac{\pi}{16} - sin^3\frac{\pi}{16}\cdot cos\frac{\pi}{16}$$
A) $\frac{\sqrt{2}}{2}$ B) $\frac{\sqrt{2}}{3}$ C) $\frac{\sqrt{2}}{4}$ D) $\frac{\sqrt{2}}{8}$ E) $\frac{1}{2}$

3. (97-7-56) Soddalashtiring.
$$\frac{sin(\pi-2\alpha)}{1-sin(\frac{\pi}{2}-2\alpha)}$$
A) $-tg\alpha$ B) $2sin\alpha$ C) $ctg\alpha$
D) $tg\alpha$ E) $-cos\alpha$

4. (96-10-35) Agar $cos\alpha = \frac{1}{5}$ bo'lsa,
$$\frac{2sin\alpha + sin2\alpha}{2sin\alpha - sin2\alpha}$$
ni hisoblang.
A) 0,5 B) 1,5 C) 3 D) $\frac{2}{3}$ E) $-0,5$

5. (98-1-54) Agar $tg\alpha = -\frac{1}{4}$ bo'lsa,
$$\frac{2cos^2\alpha - sin2\alpha}{2sin^2\alpha - sin2\alpha}$$
ni hisoblang.
A) -4 B) 4 C) $\frac{1}{4}$ D) $-\frac{1}{2}$ E) 2

6. (98-3-53) Hisoblang.

$$\frac{sin36^0}{sin12^0} - \frac{cos36^0}{cos12^0} = ?$$

A) 2 B) 3 C) $\sqrt{\sqrt{3}-1}$
D) $\sqrt{\frac{\sqrt{3}-1}{2}}$ E) $\frac{\sqrt{2\sqrt{3}-2}}{2}$

7. (98-10-32) Hisoblang.

$$tg15^0 - ctg15^0$$

A) $2\sqrt{3}$ B) $-2\sqrt{3}$ C) $-\frac{2\sqrt{3}}{3}$
D) $\frac{2\sqrt{3}}{3}$ E) $-\sqrt{3}$

8. (98-10-37) Agar $\alpha = 15^0$ bo'lsa, $(1 + cos2\alpha)tg\alpha$ ning qiymatini $\frac{1}{8}$ bilan solishtiring.
A) u $\frac{1}{8}$ dan kichik B) u $\frac{1}{8}$ ga teng
C) u $\frac{1}{8}$ dan 2 marta katta
D) u $\frac{1}{8}$ dan 4 marta katta
E) u $\frac{1}{8}$ dan $\frac{1}{4}$ ga katta

9. (98-10-101) Agar $tg\alpha = \frac{1}{2}$ bo'lsa, $tg2\alpha$ ni toping.
A) $\frac{5}{3}$ B) $\frac{4}{3}$ C) $\frac{3}{4}$ D) $\frac{3}{5}$ E) 1

10. (98-11-17) Hisoblang.

$$tg22,5^0 + tg^{-1}22,5^0$$

A) $\sqrt{2}$ B) $\sqrt{2^{-1}}$ C) $4\sqrt{2}$
D) $4^{-1} \cdot \sqrt{2}$
E) $2\sqrt{2}$

11. (98-12-78) Agar $sin\frac{\alpha}{2} + cos\frac{\alpha}{2} = -\frac{1}{2}$ va $\frac{3\pi}{2} < \alpha < 2\pi$ bo'lsa, $sin2\alpha$ ning qiymati qanchaga teng bo'ladi.
A) $-\frac{3\sqrt{7}}{8}$ B) $-\frac{2\sqrt{3}}{5}$ C) $-\frac{3\sqrt{5}}{8}$ D) $-\frac{\sqrt{2}}{4}$
E) $-\frac{1}{3}$

12. (98-4-29) Hisoblang.

$$cos92^0 \cdot cos2^0 + 0,5 \cdot sin4^0 + 1$$

A) $\frac{1}{2}$ B) 1 C) 0 D) 2 E) $-\frac{\sqrt{3}}{2}$

13. (98-8-54) Agar $ctg\alpha = \frac{1}{8}$ bo'lsa,

$$\frac{sin2\alpha + 2sin^2\alpha}{sin2\alpha + 2cos^2\alpha}$$

ni hisoblang.
A) $\frac{1}{8}$ B) 8 C) $\frac{1}{4}$ D) 4 E) 2

14. (99-6-12) Hisoblang.

$$\frac{2tg(240^0)}{1 - tg^2(240^0)}$$

A) $-\sqrt{3}$ B) $\sqrt{3}$ C) $\frac{\sqrt{3}}{3}$ D) $\frac{2}{\sqrt{3}}$ E) $-\frac{\sqrt{3}}{3}$

15. (96-11-59) Hisoblang.

$$sin10^0 \cdot sin30^0 \cdot sin50^0 \cdot sin70^0$$

A) $\frac{1}{2}$ B) $\frac{1}{8}$ C) $\frac{1}{4}$ D) $\frac{1}{6}$ E) $\frac{1}{16}$

16. (96-12-12) Hisoblang.

$$cos20^0 \cdot cos40^0 \cdot cos80^0$$

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{8}$ D) $\frac{\sqrt{3}}{8}$ E) $\frac{\sqrt{3}}{5}$

17. (00-10-13) Hisoblang.

$$cos\frac{\pi}{5} \cdot cos\frac{2\pi}{5}$$

A) $\frac{1}{2}$ B) $\frac{1}{8}$ C) $\frac{1}{4}$ D) $\frac{1}{12}$ E) $\frac{3}{4}$

18. (96-9-47) Soddalashtiring.

$$\frac{1 + sin2\alpha}{sin\alpha + cos\alpha} - sin\alpha$$

A) $cos\alpha$ B) $sin\alpha$ C) $-cos\alpha$
D) $-2sin\alpha$ E) $cos\alpha - 2sin\alpha$

19. (96-12-85) Soddalashtiring.

$$\frac{2}{tg\alpha + ctg\alpha}$$

A) $cos2\alpha$ B) $\frac{1}{cos2\alpha}$ C) $\frac{1}{sin2\alpha}$ D) 2 E) $sin2\alpha$

20. (96-13-38) Soddalashtiring.

$$\frac{2}{ctg\alpha - tg\alpha}$$

A) $ctg2\alpha$ B) $sin2\alpha$ C) $tg2\alpha$
D) $cos2\alpha$ E) $\frac{2}{sin\alpha \cdot cos\alpha}$

21. (98-8-57) Hisoblang.

$$sin^4\Big(\frac{23\pi}{12}\Big) - cos^4\Big(\frac{13\pi}{12}\Big)$$

A) $\frac{\sqrt{3}}{2}$ B) $\frac{1}{2}$ C) $-\frac{\sqrt{3}}{2}$ D) $-\frac{\sqrt{2}}{2}$ E) $-\frac{1}{2}$

22. (98-9-22) Quyidagi keltirilgan ifodalardan qaysi birining qiymati 1 ga teng emas?
1) $2cos^2\alpha - cos2\alpha$; 2) $2sin^2\alpha + cos2\alpha$;
3) $tg(90^0 + \alpha)tg\alpha$; 4) $(\frac{1}{cos^2\alpha} - 1)(\frac{1}{sin^2\alpha} - 1)$
(3 va 4 ifodalar α ning qabul qilishi mumkin bo'lgan qiymatlarida qaraladi.)
A) 1 B) 2 C) 3 D) 4 E) bunday son yo'q

23. (98-12-90) Hisoblang.

$$\frac{\sqrt{3}}{sin100^0} + \frac{1}{cos260^0}$$

A) 2 B) -4 C) -3 D) -1 E) -2

24. (99-3-32) Soddalashtiring.

$$sin^6\alpha + cos^6\alpha + \frac{3}{4}sin^2 2\alpha$$

A) 1 B) -1 C) $sin^2\alpha$
D) $cos^2\alpha$ E) To'g'ri javob berilmagan

25. (99-6-15) Hisoblang.

$$14\sqrt{2}\Big(sin^4\Big(\frac{3\pi}{8}\Big) - cos^4\Big(\frac{3\pi}{8}\Big)\Big)$$

A) 14 B) 7 C) $-14\sqrt{2}$ D) -14 E) $7\sqrt{2}$

26. (99-9-30) $sin^4\alpha+cos^4\alpha$ ning eng kichik qiymatini toping.
A) 0 B) 1 C) $\frac{1}{2}$ D) $\frac{3}{4}$ E) $\frac{2}{3}$

27. (99-9-29) $sin150^0$ ning qiymati $cos20^0 \cdot cos40^0 \cdot cos80^0$ ning qiymatidan qanchaga katta?
A) $\frac{1}{8}$ B) $\frac{5}{8}$ C) $\frac{3}{8}$ D) $\frac{7}{8}$ E) $\frac{1}{4}$

28. (00-8-41) Hisoblang.

$log_2cos20^0+log_2cos40^0+log_2cos60^0+log_2cos80^0$

A) -4 B) -3 C) $\frac{1}{2}$ D) 1 E) 0

29. (99-9-31) Agar $tg\alpha + ctg\alpha = 4$ bo'lsa, $sin2\alpha$ ni hisoblang.
A)$\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) $\frac{3}{4}$

30. (99-10-29) Ifodaning qiymatini hisoblang.

$$\frac{1}{sin10^0} - \frac{\sqrt{3}}{cos10^0}$$

A)4 B) 6 C) 3 D) 5 E) 2

31. (00-1-27) Soddalashtiring.

$$\frac{1-cos2\alpha}{1+cos2\alpha}+1$$

A) $cos^{-2}\alpha$ B) $sin^{-2}\alpha$ C) $sin^2\alpha$
D) $cos^2\alpha$ E) $-cos^2\alpha$

32. (00-2-48) Soddalashtiring.

$$(cos3x + cosx)^2 + (sin3x + sinx)^2$$

A) $4cos^2x$ B) $2cos^2x$ C) $3sin^2x$
D) $4sin^2x$ E) $4cos^2x + 1$

33. (00-4-45) Agar $tg\alpha = 2$ bo'lsa,

$$\frac{2-5cos2\alpha}{6+10sin2\alpha} - \frac{13+3tg2\alpha}{10cos2\alpha-15sin2\alpha}$$

ning qiymatini hisoblang.
A) $\frac{3}{4}$ B) $\frac{4}{5}$ C) $\frac{6}{7}$ D) $\frac{7}{8}$ E) $\frac{8}{9}$

34. (00-7-29) Soddalashtiring.

$$\frac{1+cos2\alpha+cos^2\alpha}{sin^2\alpha}$$

A) $3ctg^2\alpha$ B) $3tg^2\alpha$ C) $1,5ctg^2\alpha$
D) $1,5tg^2\alpha$ E) $ctg^2\alpha$

35. (00-8-46) Hisoblang.

$$cos50^0 \cdot cos40^0 - 2cos20^0 \cdot sin50^0 \cdot sin20^0$$

A) 0 B) 1 C) -1 D) $cos20^0$ E) $sin40^0$

36. (96-7-56) Soddalashtiring.

$$\frac{sin2\alpha + cos(\pi-\alpha)\cdot sin\alpha}{sin(\frac{\pi}{2}-\alpha)}$$

A) $cos\alpha$ B) $sin\alpha$ C) $-2sin\alpha$
D) $-cos\alpha$ E) $3cos\alpha$

37. (97-3-56) Soddalashtiring.

$$\frac{cos2\alpha + cos(\frac{\pi}{2}-\alpha)\cdot sin\alpha}{sin(\frac{\pi}{2}+\alpha)}$$

A) $cos\alpha$ B) $2sin\alpha$ C) $-cos\alpha$
D) $tg\alpha$ E) $-sin\alpha$

38. (97-10-56) Soddalashtiring.

$$\frac{sin(2\alpha-\pi)}{1-sin(\frac{3\pi}{2}+2\alpha)}$$

A) $tg\alpha$ B) $-tg\alpha$ C) $-2ctg\alpha$
D) $-2cos\alpha$ E) $sin\alpha$

39. (99-6-23) Soddalashtiring.

$$1+\frac{tg^2(-\alpha)-1}{sin(0,5\pi+2\alpha)}$$

A) $-tg^2\alpha$ B) $tg^2\alpha$ C) $ctg^2\alpha$
D) $-ctg^2\alpha$ E) $sin^2\alpha$

40. (99-9-32) Soddalashtiring.

$$\frac{\sqrt{3}cos2\alpha + sin2\alpha}{cos\alpha + \sqrt{3}sin\alpha}$$

A) $2cos(\alpha+\frac{\pi}{3})$ B) $\frac{1}{2}cos(\alpha+\frac{\pi}{6})$ C) $2cos(\alpha-\frac{\pi}{3})$
D) $\frac{1}{2}sin(\alpha+\frac{\pi}{6})$ E) $2cos(\alpha+\frac{\pi}{6})$

41. (99-10-31) Soddalashtiring.

$$\frac{2cos^2\alpha}{ctg\frac{\alpha}{2}-tg\frac{\alpha}{2}}$$

A) $-sin2\alpha$ B) $cos2\alpha$ C) $sin2\alpha$
D) $\frac{1}{2}sin2\alpha$ E) $-\frac{1}{2}cos2\alpha$

42. (01-1-43) Agar $tg\alpha = -\frac{4}{3}$ bo'lsa, $sin2\alpha$ ning qiymatini toping.
A) 0,96 B) $-0,96$ C) 0,25 D) $-0,5$ E) $0,5$

43. (01-1-50) Ifodaning qiymatini hisoblang.

$$1-\sqrt{3}ctg40^0+\frac{1}{cos20^0}$$

A) $sin20^0$ B) $\frac{1}{2}$ C) 0 D) $\frac{\sqrt{3}}{2}$ E) $cos20^0$

44. (01-2-86) Agar $sin2x = \frac{2}{5}$ bo'lsa, $sin^8x + cos^8x$ ning qiymatini aniqlang.
A) $\frac{16}{25}$ B) $\frac{398}{625}$ C) $\frac{527}{625}$ D) $\frac{256}{625}$ E) $\frac{8}{25}$

45. (01-3-1) Ifodaning qiymatini hisoblang.

$$sin50^0 + sin40^0 \cdot tg20^0$$

A) sin^220^0 B) 0,5 C) 1 D) cos^220^0 E) 1,5

46. (01-3-15) Ushbu

$$sin\frac{x}{2}\cdot cos^3\frac{x}{2} - sin^3\frac{x}{2}\cdot cos\frac{x}{2}$$

ifodaning eng katta qiymatini aniqlang.
A) 1 B) $\frac{1}{2}$ C) 2 D) $\frac{1}{4}$ E) $\frac{1}{8}$

47. (01-6-28) Soddalashtiring.

$$cos^6x + sin^6x - sin^2x \cdot cos^2x$$

A)$sin^2 2x$ B) $sin4x$ C) $cos4x$
D) $cos^2 4x$ E) $cos^2 2x$

48. (01-7-38) Agar $tg\alpha = 2-\sqrt{3}$ bo'lsa, α o'tkir burchakning qiymatini toping.
A) $\frac{\pi}{8}$ B) $\frac{\pi}{12}$ C) $\frac{5}{12}\pi$ D) $\frac{3}{8}\pi$ E) $\frac{5}{24}\pi$

49. (01-8-54) Agar $tg\alpha = 0,2$ bo'lsa, $\frac{2}{3+4cos2\alpha}$ ning qiymatini toping.
A) $\frac{52}{199}$ B) $\frac{52}{87}$ C) $\frac{26}{87}$ D) $\frac{26}{199}$ E) $\frac{13}{174}$

50. (01-9-21) Soddalashtiring.

$$sin^2\alpha tg\alpha + cos^2\alpha ctg\alpha + sin2\alpha$$

A)$\frac{2}{sin2\alpha}$ B) $\frac{2}{sin\alpha cos\alpha}$ C) 1 D) $sin^2\alpha$ E) $\frac{2}{cos2\alpha}$

51. (01-11-18) Ushbu

$$\frac{1}{sin10^0} - \frac{\sqrt{3}}{cos10^0}$$

ifodaning qiymatini hisoblang.
A) 3,5 B) 2,5 C) 3 D) 4 E) 4,5

52. (02-2-51) Agar $2sin6x(cos^4 3x - sin^4 3x) = sinkx$ tenglik hamma vaqt o'rinli bo'lsa, k ni toping.
A) 12 B) 24 C) 6 D) 18 E) 4

53. (02-3-75)

$$\sqrt{sin^4\alpha + cos2\alpha} + \sqrt{cos^4\alpha - cos2\alpha}$$

ni soddalashtiring.
A) 1 B) $sin^2\alpha$ C) 2 D) $cos2\alpha$ E) $cos^2\alpha$

54. (02-7-11) $sin^4 105^0 \cdot cos^4 75^0$ ni hisoblang.
A) $\frac{1}{256}$ B) $\frac{\sqrt{2}}{2}$ C) $\frac{1}{128}$ D) $\frac{\sqrt{6}}{4}$ E) $\frac{\sqrt{3}}{4}$

55. (02-8-40) $cos(\pi+2\alpha) + sin(\pi+2\alpha)\cdot tg(\frac{\pi}{2}+\alpha)$ ni soddalashtiring.
A) 1 B) 2 C) $sin\alpha$ D) $cos\alpha$ E) $tg\alpha$

56. (02-10-59) $sin\alpha = \frac{1}{3}$ va $90^0 < \alpha < 180^0$ bo'lsa, $tg2\alpha$ ni hisoblang.
A) $-\frac{4\sqrt{2}}{7}$ B) $-\frac{4\sqrt{3}}{7}$ C) $\frac{2}{3}$ D) $-\frac{\sqrt{2}}{4}$ E) $\frac{2\sqrt{2}}{3}$

57. (02-11-41)

$$\frac{1+cos\frac{\alpha}{2}-sin\frac{\alpha}{2}}{1-cos\frac{\alpha}{2}-sin\frac{\alpha}{2}}$$

ni soddalashtiring.
A) $tg\frac{\alpha}{4}$ B) $cos\frac{\alpha}{2}$ C) $-ctg\frac{\alpha}{4}$ D) $sin\frac{\alpha}{4}$ E) $-tg\frac{\alpha}{4}$

58. (03-1-33)

$$1 - sin^6 22,5^0 + cos^6 22,5^0$$

ni hisoblang.
A) $\frac{\sqrt{3}-1}{2}$ B) $\frac{\sqrt{6}+5}{4}$ C) $\frac{10+3\sqrt{2}}{8}$
D) $\frac{16+7\sqrt{2}}{16}$ E) $\frac{10+2\sqrt{3}}{5}$

59. (03-1-37)

$$cos\alpha \cdot cos\frac{\alpha}{2} \cdot cos\frac{\alpha}{4} \cdot cos\frac{\alpha}{8} \cdot \ldots \cdot cos\frac{\alpha}{128}$$

ni soddalashtiring.
A) $\frac{1}{128}\frac{sin\alpha}{sin\frac{\alpha}{128}}$ B) $\frac{1}{256}\frac{sin2\alpha}{sin\frac{\alpha}{128}}$ C) $\frac{1}{128}\frac{sin2\alpha}{sin\frac{\alpha}{256}}$
D) $\frac{1}{256}\frac{sin\alpha}{sin\frac{\alpha}{128}}$ E) $\frac{1}{64}\frac{sin\alpha}{sin\frac{\alpha}{64}}$

60. (03-2-26) Agar $ctg\alpha = \sqrt{2}-1$ bo'lsa, $cos2\alpha$ ning qiymatini toping.
A) $\sqrt{2}$ B) $\frac{\sqrt{2}+1}{2}$ C) $-\frac{1}{\sqrt{2}}$ D) $-\frac{1}{2}$ E) $\frac{\sqrt{3}}{2}$

61. (03-3-39)

$$ctg35^0 - tg35^0 - 2tg20^0$$

ni hisoblang.
A) $\frac{1}{2}$ B) 0 C) 1 D) $\frac{\sqrt{3}}{2}$ E) $\sqrt{3}$

62. (03-3-42) Agar $sin\left(\alpha - \frac{\pi}{2}\right) = \frac{2\sqrt{6}}{5}$ va $\alpha \in (\frac{\pi}{2};\pi)$ bo'lsa, $tg2\alpha$ ning qiymatini toping.
A) $\frac{\sqrt{6}}{46}$ B) $\frac{\sqrt{6}}{23}$ C) $-\frac{4\sqrt{6}}{23}$ D) $\frac{2\sqrt{6}}{23}$ E) $\frac{4\sqrt{6}}{23}$

63. (03-4-24)

$$\frac{1-cos2\alpha}{1+tg^2\alpha}$$

ni soddalashtiring.
A) $sin^2 2\alpha$ B) $\frac{1}{2}sin^2 2\alpha$ C) $cos^2 2\alpha$
D) $\frac{1}{2}cos^2 2\alpha$ E) $\frac{1}{2}sin^2\alpha$

64. (03-6-26) Agar $sin37^0 = a$ bo'lsa, $sin16^0$ ni a orqali ifodalang.
A) a^2-1 B) $a-1$ C) $2a^2-1$ D) $1-2a^2$
E) aniqlab bo'lmaydi

65. (03-7-34) Agar $cos37^0 = a$ bo'lsa, $sin16^0$ ni a orqali ifodalang.
A) a^2-1 B) $a-1$ C) $2a^2-1$ D) $1-2a^2$
E) aniqlab bo'lmaydi

66. (03-8-53)

$$sin\frac{\pi}{8}cos\frac{\pi}{8}tg\frac{\pi}{8}ctg\frac{9\pi}{8}$$

ni hisoblang.
A) $\frac{1}{2\sqrt{2}}$ B) $\sqrt{2}$ C) $\frac{1}{2}$ D) $\frac{\sqrt{3}}{2}$ E) -1

67. (03-8-57) Agar $sin\alpha+cos\alpha = m$ bo'lsa, $\frac{1+cos2\alpha}{ctg\frac{\alpha}{2}-tg\frac{\alpha}{2}}$ ni m orqali toping.
A) $\frac{m^2-1}{2}$ B) m^2+1 C) m^2-1
D) $2m^2$ E) $\frac{2m^2+1}{2}$

68. (03-9-27)

$$\frac{sin106^0 - sin14^0}{1-2cos^2 22^0}$$

ni hisoblang.
A) 1 B) $\frac{1}{2}$ C) $\frac{\sqrt{2}}{2}$ D) $-\frac{1}{2}$ E) -1

69. (03-9-28)

$$\frac{1-sin^2\frac{\alpha}{8}-cos^2\alpha-sin^2\alpha}{4sin^4\frac{\alpha}{16}}$$

ni soddalashtiring.
A) $tg^2\frac{\alpha}{16}$ B) 1 C) -1 D) $ctg^2\frac{\alpha}{16}$ E) $-ctg^2\frac{\alpha}{16}$

70. (03-9-31) Agar $tg\frac{\alpha}{2} = -2$ bo'lsa, $sin\alpha + 2cos\alpha$ ning qiymatini hisoblang.
A) $\frac{1}{2}$ B) $-\frac{1}{2}$ C) -2 D) $\frac{4}{5}$ E) $-\frac{4}{5}$

71. (03-10-40)

$$tg\alpha = \frac{1}{2}, \quad sin\Big(2\alpha + \frac{\pi}{4}\Big) = ?$$

A) $\frac{\sqrt{2}}{5}$ B) $\frac{2\sqrt{2}}{3}$ C) $\frac{2\sqrt{2}}{5}$ D) $\frac{3\sqrt{2}}{5}$ E) $\frac{7\sqrt{2}}{10}$

72. (03-11-22) α o'tkir burchak va

$$sin^4\alpha \cdot cos^4\alpha = \frac{1}{64}$$

bo'lsa, α quyidagilarning qaysi biriga teng?
A) $\frac{\pi}{8}; \frac{3\pi}{8}$ B) $\frac{\pi}{8}; \frac{\pi}{4}$ C) $\frac{\pi}{16}$ D) $\frac{\pi}{6}; \frac{3\pi}{8}$ E) $\frac{\pi}{32}$

73. (03-11-25) Agar $cos29^0 = a$ bo'lsa, $sin32^0$ ni a orqali ifodalang.
A) $2a^2 - 1$ B) $2a + 1$ C) $a - 1$ D) $1 - a^2$
E) $1 - 2a^2$

74. (03-11-26) Agar $tg\alpha = -2$ bo'lsa,

$$1 + 5sin2\alpha - 3cos^{-1}2\alpha$$

ning qiymatini toping.
A) 2 B) 1 C) 4 D) -2 E) -1

75. (03-12-75) Agar $tg\alpha = 3$ bo'lsa, $sin2\alpha - cos2\alpha$ ning qiymatini toping.
A) $-0,2$ B) $0,8$ C) $1,2$ D) $1,4$ E) $1,6$

2.1.6 Yig'indi va ayirmalar uchun formulalar.

1. $sinx + siny = 2sin\frac{x+y}{2}cos\frac{x-y}{2}$;
2. $sinx - siny = 2cos\frac{x+y}{2}sin\frac{x-y}{2}$;
3. $cosx + cosy = 2cos\frac{x+y}{2}cos\frac{x-y}{2}$;
4. $cosx - cosy = -2sin\frac{x+y}{2}sin\frac{x-y}{2}$;

1. (00-8-59) Hisoblang.

$$sin10^0 + sin50^0 - cos20^0$$

A) 0 B) -1 C) 1 D) $cos20^0$ E) $sin20^0$

2. (96-6-35) Soddalashtiring.

$$\frac{cos\alpha - cos3\alpha}{sin\alpha}$$

A)$-2cos2\alpha$ B) $2cos2\alpha$ C) $sin2\alpha$
D) $-2sin2\alpha$ E) $2sin2\alpha$

3. (97-2-35) Quyidagilardan qaysi biriga teng?

$$\frac{sin\alpha}{cos\alpha - cos3\alpha}$$

A)$-\frac{1}{2sin2\alpha}$ B) $\frac{1}{2cos2\alpha}$ C) $\frac{1}{sin2\alpha}$
D) $-\frac{1}{sin2\alpha}$ E) $\frac{1}{2sin2\alpha}$

4. (97-8-34) Ushbu $\frac{cos4\alpha}{sin5\alpha - sin3\alpha}$ ifoda quyidagilardan qaysi biriga teng?
A) $\frac{1}{2}$ B) $\frac{1}{sin}$ C) $\frac{1}{}$ D) $\frac{cos4\alpha}{}$ E) $\frac{1}{2sin}$

5. (97-12-34) Ifoda quyidagilarning qaysi biriga teng?

$$\frac{cos6\alpha - cos4\alpha}{sin5\alpha}$$

A)$2sin\alpha$ B) $2cos\alpha$ C) $-2cos\alpha$
D) $-sin\alpha$ E) $-2sin\alpha$

6. (98-10-35) Soddalashtiring.

$$\frac{sin4\alpha - sin6\alpha}{cos5\alpha}$$

A)$sin2\alpha$ B) $2sin\alpha$ C) $-2cos\alpha$
D) $-2sin\alpha$ E) $2cos\alpha$

7. (98-11-103) Hisoblang.

$$sin75^0 - sin15^0$$

A) $\frac{\sqrt{2}}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $\sqrt{2}$ D) $-\sqrt{2}$ E) $-\frac{2}{\sqrt{2}}$

8. (00-1-28) Hisoblang.

$$\frac{sin35^0 + cos65^0}{2cos5^0}$$

A) 0,25 B) 0,75 C) 0,5 D) 0,6 E) 0,3

9. (00-9-58) Hisoblang.

$$\frac{2^{cos\frac{\pi}{7}+cos\frac{2\pi}{7}+cos\frac{5\pi}{7}+cos\frac{6\pi}{7}}}{3^{cos\frac{3\pi}{7}+cos\frac{4\pi}{7}}}$$

A) 1 B) 2 C) $\frac{2}{3}$ D) $\frac{4}{9}$ E) 3

10. (98-1-58) Ifodani soddalashtiring.

$$\frac{sin2\alpha + 2sin\alpha \cdot cos2\alpha}{1 + cos\alpha + cos2\alpha + cos3\alpha}$$

A)$2tg\alpha$ B) $2sin\alpha$ C) $4tg\alpha$
D) $ctg\alpha$ E) $tg\alpha$

11. (98-8-58) Soddalashtiring.

$$\frac{1 - sin\alpha + cos2\alpha + sin3\alpha}{sin2\alpha + 2cos\alpha \cdot cos2\alpha}$$

A)$2ctg\alpha$ B) $tg\alpha$ C) $2sin\alpha$
D) $ctg\alpha$ E) $-ctg\alpha$

12. (99-5-54) Hisoblang.

$$\sqrt[3]{8 + \Big(cos\frac{\pi}{5} + cos\frac{2\pi}{5} + cos\frac{3\pi}{5} + cos\frac{4\pi}{5}\Big)^3}$$

A) 1 B) 2 C) 3 D) 4 E) 2,5

13. (01-7-40) Soddalashtiring.

$$\frac{sin\alpha + sin2\alpha - sin(\pi + 3\alpha)}{2cos\alpha + 1}$$

A)$sin\alpha$ B)$cos\alpha$ C)$sin2\alpha$ D)$cos2\alpha$ E)$1 + sin\alpha$

14. (02-2-47)

$$\left(\frac{sin100^0 + sin20^0}{sin50^0}\right)^2$$

ni hisoblang.
A) 3 B) $\frac{3}{4}$ C) $\frac{3}{2}$ D) 1 E) $\frac{1}{4}$

15. (02-5-33)

$$\frac{sin\alpha + sin2\alpha - sin(\pi + 3\alpha)}{1 + 2cos\alpha}$$

ni soddalashtiring.
A) $sin\alpha$ B) $cos\alpha$ C) $1 + cos\alpha$
D) $1 + sin\alpha$ E) $sin2\alpha$

16. (03-7-55)

$$\sin 87^0 - sin59^0 - sin93^0 + sin61^0$$

ni soddalashtiring.
A) $\sqrt{3}sin1^0$ B) $sin1^0$ C) $-\sqrt{2}sin1^0$
D) 0 E) $sin2^0$

2.1.7 Ko'paytma uchun formulalar.

1. $sinx \cdot siny = \frac{1}{2}(cos(x-y) - cos(x+y))$;
2. $cosx \cdot cosy = \frac{1}{2}(cos(x-y) + cos(x+y))$;
3. $sinx \cdot cosy = \frac{1}{2}(sin(x-y) + sin(x+y))$;

(00-8-48) Hisoblang.

$$cos\frac{2\pi}{7} + cos\frac{4\pi}{7} + cos\frac{6\pi}{7}$$

A) $-\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{1}{3}$ D) $\frac{\sqrt{2}}{3}$ E) $-\frac{\sqrt{3}}{2}$

Yechish: Berilgan ifodani A bilan belgilaymiz.

$$A = cos\frac{2\pi}{7} + cos\frac{4\pi}{7} + cos\frac{6\pi}{7}$$

Bu tenglikni $2sin\frac{\pi}{7}$ ga ko'paytirib, har bir qo'shiluvchiga $2sin\alpha cos\beta = sin(\alpha-\beta)+sin(\alpha+\beta)$ formulani qo'llaymiz:

$$2Asin\frac{\pi}{7} = 2sin\frac{\pi}{7}cos\frac{2\pi}{7} + 2sin\frac{\pi}{7}cos\frac{4\pi}{7} +$$
$$+2sin\frac{\pi}{7}cos\frac{6\pi}{7} = -sin\frac{\pi}{7} + sin\frac{3\pi}{7} - sin\frac{3\pi}{7} +$$
$$+sin\frac{5\pi}{7} - sin\frac{5\pi}{7} + sin\frac{7\pi}{7} = -sin\frac{\pi}{7}.$$

U holda $A = -\frac{1}{2}$ **Javob:** $-\frac{1}{2}$ (A).

1. (96-3-57) Hisoblang.

$$sin20^0 \cdot sin40^0 \cdot sin80^0$$

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{\sqrt{3}}{8}$ E) $5\sqrt{3}$

2. (00-10-79) Hisoblang.

$$cos5^0 \cdot cos55^0 \cdot cos65^0$$

A) $\frac{\sqrt{6}+\sqrt{2}}{16}$ B) $\frac{\sqrt{6}-\sqrt{2}}{16}$ C) $\frac{\sqrt{2}+1}{8}$ D) $\frac{\sqrt{2}}{2}$ E) $\frac{\sqrt{3}}{2}$

3. (98-3-54) Hisoblang. $\frac{4 \cdot sin40^0 \cdot sin50^0}{cos10^0}$.
A) 4 B) 2 C) 1,5 D) 3 E) 2,5

4. (01-1-45) $5^0, 10^0, 15^0, ...$ burchaklarning qiymatlari arifmetik progressiya tashkil qiladi. Shu progressiyaning birinchi hadidan boshlab eng kamida nechtasini olganda, ularning kosinuslari yig'indisi nolga teng bo'ladi?
A) 18 B) 17 C) 19 D) 35 E) 36

5. (01-5-15) Hisoblang. $tg10^0 tg50^0 tg70^0$.
A) $\frac{1}{\sqrt{3}}$ B) $\sqrt{3}$ C) 0 D) 1 E) $\frac{1}{\sqrt{2}}$

6. (03-9-30) $cos55^0 \cdot cos65^0 \cdot cos175^0$.
A) $-\frac{1}{8}$ B) $-\frac{\sqrt{3}}{8}$ C) $\frac{\sqrt{3}}{8}$
D) $-\frac{1}{8}\sqrt{2-\sqrt{3}}$ E) $-\frac{1}{8}\sqrt{2+\sqrt{3}}$

2.1.8 Yarim burchak formulalari.

1. $sin^2x = \frac{1-cos2x}{2}$;
2. $cos^2x = \frac{1+cos2x}{2}$;
3. $sin^2\frac{x}{2} = \frac{1-cosx}{2}$;
4. $cos^2\frac{x}{2} = \frac{1+cosx}{2}$;
5. $tg\frac{x}{2} = \frac{sinx}{1+cosx} = \frac{1-cosx}{sinx}$;
6. $ctg\frac{x}{2} = \frac{sinx}{1-cosx} = \frac{1+cosx}{sinx}$;
7. $tg^2\frac{\alpha}{2} = \frac{1-cos\alpha}{1+cos\alpha}$;
8. $ctg^2\frac{\alpha}{2} = \frac{1+cos\alpha}{1-cos\alpha}$

1. (98-10-100) Hisoblang.

$$sin105^0 + sin75^0$$

A) $\frac{\sqrt{2+\sqrt{3}}}{2}$ B) $\frac{\sqrt{2-\sqrt{3}}}{2}$ C) $\sqrt{\sqrt{3}-\sqrt{2}}$
D) $\sqrt{2+\sqrt{3}}$ E) $\frac{\sqrt{\sqrt{2}+\sqrt{3}}}{2}$

2. (96-1-55) Agar $cos2\alpha = \frac{1}{2}$ bo'lsa, $cos^2\alpha$ ni hisoblang.
A) $\frac{1}{4}$ B) $\frac{\sqrt{3}}{2}$ C) $\frac{3}{4}$ D) $\frac{3}{8}$ E) $\frac{1}{8}$

3. (96-7-55) $sin\frac{\pi}{12}$ ni hisoblang.
A) $\sqrt{2-\sqrt{3}}$ B) $\frac{\sqrt{2+\sqrt{3}}}{2}$ C) $\frac{\sqrt{2-\sqrt{3}}}{2}$
D) $\frac{\sqrt{2-\sqrt{2}}}{2}$ E) $\frac{\sqrt{2+\sqrt{2}}}{2}$

4. (97-1-45) Agar $cos\alpha = -\frac{1}{2}$ va $\pi < \alpha < \frac{3\pi}{2}$ bo'lsa, $sin(\frac{\pi}{2} + \frac{\alpha}{2})$ ni toping.
A) $\frac{1}{2}$ B) $-\frac{\sqrt{3}}{2}$ C) $\frac{\sqrt{3}}{2}$ D) $-\frac{1}{2}$ E) $-\frac{1}{4}$

5. (99-3-34) Agar $0 < \alpha < \frac{\pi}{2}$ va $cos\alpha = \frac{1}{2}\sqrt{2+\sqrt{2}}$ bo'lsa, α ni toping.
A) $\frac{\pi}{12}$ B) $\frac{5\pi}{12}$ C) $\frac{3\pi}{8}$ D) $\frac{\pi}{8}$ E) $\frac{7\pi}{24}$

6. (99-8-69) Hisoblang. $sin(202^030')$.
A) $-\frac{\sqrt{2-\sqrt{2}}}{2}$ B) $-\frac{\sqrt{2+\sqrt{2}}}{2}$ C) $\frac{\sqrt{2-\sqrt{2}}}{2}$
D) $-\frac{\sqrt{2}}{4}$ E) $\sqrt{2}-1$

7. (00-3-50) Hisoblang. $sin112,5^0$.
A) $\frac{1}{2}\sqrt{2-\sqrt{2}}$ B) $\frac{1}{2}\sqrt{1+\sqrt{2}}$ C) $\frac{1}{2}\sqrt{2+\sqrt{2}}$
D) $\frac{1}{2}\sqrt{\sqrt{2}-1}$ E) $\frac{1}{2}\sqrt{2}$

8. (00-3-53) Qaysi α o'tkir burchak uchun

$$cos\alpha = \frac{1}{2}\sqrt{2+\sqrt{3}}$$

tenglik to'g'ri?
A) $7,5^0$ B) $22,5^0$ C) 75^0 D) $67,5^0$ E) 15^0

9. (97-3-55) Hisoblang. $cos\frac{\pi}{12}$.
A) $\frac{\sqrt{2+\sqrt{3}}}{3}$ B) $\sqrt{2-\sqrt{2}}$ C) $\frac{\sqrt{\sqrt{3}-1}}{2}$
D) $\frac{\sqrt{2-\sqrt{3}}}{2}$ E) $\frac{\sqrt{2+\sqrt{3}}}{2}$

10. (97-5-28) Hisoblang. $8cos30^0 + tg^2 15^0$.
A) 5 B) 6 C) 7 D) 8 E) 9

11. (97-6-44) Agar $cos\alpha = \frac{1}{2}$ va $\frac{3\pi}{2} < \alpha < 2\pi$ bo'lsa, $sin(\pi - \frac{\alpha}{2})$ ni toping.
A) $-\frac{1}{2}$ B) $-\frac{\sqrt{3}}{2}$ C) $\frac{1}{4}$ D) $\frac{1}{2}$ E) $\frac{\sqrt{3}}{2}$

12. (97-7-55) Hisoblang. $cos\frac{5\pi}{12}$.
A) $\frac{\sqrt{2+\sqrt{3}}}{3}$ B) $\frac{\sqrt{3}}{4}$ C) $\frac{\sqrt{2-\sqrt{2}}}{2}$
D) $\frac{\sqrt{2+\sqrt{3}}}{2}$ E) $\frac{\sqrt{2-\sqrt{3}}}{2}$

13. (97-9-28) Soddalashtiring. $4ctg30^0 + tg^2 15^0$.
A) 5 B) 7 C) 9 D) 8 E) 6

14. (97-10-55) Hisoblang. $sin\frac{5\pi}{12}$.
A) $\frac{\sqrt{2-\sqrt{2}}}{4}$ B) $\frac{2\sqrt{3}-1}{4}$ C) $\frac{\sqrt{1+\sqrt{3}}}{3}$
D) $\frac{\sqrt{2+\sqrt{3}}}{2}$ E) $\frac{\sqrt{2-\sqrt{3}}}{2}$

15. (97-11-44) Agar $cos\alpha = -\frac{1}{2}$ va $\pi < a < 1,5\pi$ bo'lsa,$cos(\frac{\pi}{2} + \frac{\alpha}{2})$ ni toping.
A) $-\frac{\sqrt{2}}{2}$ B) $\frac{1}{2}$ C) $-\frac{1}{2}$ D) $\frac{\sqrt{3}}{2}$ E) $-\frac{\sqrt{3}}{2}$

16. (98-11-20) Agar $cos\alpha = \frac{7}{18}$, $0 < \alpha < \frac{\pi}{2}$ bo'lsa, $6cos\frac{\alpha}{2}$ ni toping.
A) 3 B) 5 C) 6 D) 4 E) 2

17. (99-3-33) Agar $450^0 < \alpha < 540^0$ va $ctg\alpha = -\frac{7}{24}$, bo'lsa, $cos\frac{\alpha}{2}$ ni hisoblang.
A) 0,6 B) $\frac{4}{5}$ C) $-\frac{4}{5}$ D) $-0,6$ E) 0,96

18. (99-2-27) Soddalashtiring.

$$\frac{cos^2 x + cosx}{2cos^2\frac{x}{2}} + 1$$

A) $2sin^2\frac{x}{2}$ B) $-2sin^2\frac{x}{2}$ C) $2cos\frac{x}{2}$
D) $-2cos^2\frac{x}{2}$ E) $2cos^2\frac{x}{2}$

19. (99-9-28) Soddalashtiring.

$$\sqrt{\frac{1+sin(\frac{3\pi}{2}+\alpha)}{1+sin(\frac{\pi}{2}+\alpha)}}$$

A) $tg\frac{\alpha}{2}$ B) $ctg\frac{\alpha}{2}$ C) $-tg\frac{\alpha}{2}$ D) $-ctg\frac{\alpha}{2}$ E) $|tg\frac{\alpha}{2}|$

20. (99-6-25) Soddalashtiring.

$$\frac{sin^4\alpha + 2cos\alpha \cdot sin\alpha - cos^4\alpha}{2cos^2\alpha - 1}$$

A) $tg2\alpha - 1$ B) $tg\alpha - 1$ C) $tg\alpha + 1$
D) $1 - tg2\alpha$ E) $ctg2\alpha - 1$

21. (01-1-68) Agar $sin\alpha = -0,8$ va $\alpha \in (\pi; \frac{3\pi}{2})$ bo'lsa, $tg\frac{\alpha}{2}$ ni aniqlang.
A) 1 B) -1 C) 2 D) -2 E) 1,5

22. (01-3-3) Hisoblang.

$$sin^4 15^0 + cos^4 15^0$$

A) $\frac{5}{8}$ B) $\frac{2}{3}$ C) $\frac{7}{8}$ D) $\frac{5}{7}$ E) $\frac{2}{7}$

23. (01-7-36) Hisoblang.

$$cos^2 5 + cos^2 1 - cos6 \cdot cos4$$

A) 0 B) $\frac{1}{2}$ C) $\frac{\sqrt{3}}{2}$ D) 1,5 E) 1

24. (01-10-35) Ifodaning qiymatini hisoblang.

$$cos^8 22^0 30' - sin^8 22^0 30'$$

A) $\frac{\sqrt{2}}{4}$ B) $\frac{\sqrt{2}}{8}$ C) $\frac{3\sqrt{2}}{8}$ D) $\frac{5\sqrt{2}}{8}$ E) $\frac{3\sqrt{2}}{4}$

25. (02-1-24)

$$cos^2 73^0 + cos^2 47^0 + cos73^0 \cdot cos47^0$$

ni soddalashtiring.
A) $\frac{3}{4}$ B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $\frac{2}{3}$ E) $\frac{4}{5}$

26. (02-3-73)

$$8sin^2\frac{7\pi}{8} \cdot cos^2\frac{9\pi}{8}$$

ni hisoblang.
A) 0 B) $\frac{\sqrt{2}}{2}$ C) 1 D) $\frac{1}{2}$ E) $\frac{1}{4}$

27. (02-3-74) Agar $cos(\pi - 4\alpha) = -\frac{1}{3}$ bo'lsa, $cos^4(\frac{3\pi}{2} - 2\alpha)$ ni hisoblang.
A) $\frac{1}{9}$ B) $\frac{1}{3}$ C) $\frac{3}{4}$ D) $\frac{8}{9}$ E) $\frac{4}{9}$

28. (02-5-31) Agar $sin(\alpha + \beta) = \frac{4}{5}$, $sin(\alpha - \beta) = \frac{5}{13}$ va $0 < \beta < \alpha < \frac{\pi}{4}$ bo'lsa, $sin\alpha + sin\beta$ ning qiymatini hisoblang.
A) $\frac{27}{65}$ B) $\frac{10}{\sqrt{130}}$ C) 1 D) $\frac{1}{2}$ E) $\frac{5}{\sqrt{65}}$

29. (02-5-34)

$$\frac{cos^2 68^0 - cos^2 38^0}{sin106^0}$$

ni hisoblang.
A)$\frac{1}{2}$ B) $-\frac{1}{2}$ C) $\frac{\sqrt{3}}{2}$ D) $-\frac{\sqrt{3}}{2}$ E) -1

30. (02-6-40)

$$cos^8 165^0 - sin^8 165^0$$

ni hisoblang.
A)$\frac{3\sqrt{2}}{5}$ B) $\frac{5\sqrt{3}}{8}$ C) $\frac{7\sqrt{2}}{16}$ D) $\frac{7\sqrt{3}}{16}$ E) $\frac{3\sqrt{3}}{8}$

31. (02-7-16)

$$\frac{2cos^2(45^0 - \frac{\alpha}{2})}{cos\alpha}$$

ni soddalashtiring.
A)$ctg(45^0 - \frac{\alpha}{2})$ B) $sin\frac{\alpha}{2}$
C) $2sin(45^0 - \frac{\alpha}{2})$ D) $cos\frac{\alpha}{2}$ E) $tg\frac{\alpha}{2}$

32. (02-9-39)

$$\frac{2sin^2 70^0 - 1}{2ctg115^0 \cdot cos^2 155^0}$$

ni hisoblang.
A)-1 B) 1 C) $\frac{1}{2}$ D) $\frac{\sqrt{3}}{2}$ E) $-\frac{1}{4}$

33. (02-11-40)

$$2sin44^0 cos16^0 + 2sin^2 31^0 - 1$$

ni hisoblang.
A)$\frac{1}{2}$ B) $\frac{\sqrt{2}}{2}$ C) $\frac{\sqrt{3}}{2}$ D) 1 E) 0

34. (02-11-42) Agar $ctg\alpha = \frac{5}{12}$ va $\alpha \in (540^0; 630^0)$ bo'lsa, $sin\frac{\alpha}{2}$ ning qiymatini hisoblang.
A) $\frac{3}{4}$ B) $-\frac{3}{4}$ C) $-\frac{1}{2}$ D) $\frac{3}{\sqrt{13}}$ E) $-\frac{3}{\sqrt{13}}$

35. (02-12-37) Agar $tg105^0$ ning qiymatini hisoblang.
A) $\sqrt{3}-2$ B) $1-\sqrt{3}$ C) $\sqrt{3}-3$
D) $-2-\sqrt{3}$ E) $-3-\sqrt{3}$

36. (02-12-38)
$$\frac{tg\alpha + sin\alpha}{2cos^2\frac{\alpha}{2}}$$
ni soddalashtiring.
A)$ctg\alpha$ B) $tg\alpha$ C) $tg\frac{\alpha}{2}$ D) $ctg\frac{\alpha}{2}$ E) $tg2\alpha$

37. (01-2-85) Hisoblang.
$$cos2227^0 30'$$
A) $\frac{\sqrt{2+\sqrt{2}}}{2}$ B) $\frac{\sqrt{2-\sqrt{2}}}{4}$ C) $\frac{\sqrt{2-\sqrt{2}}}{2}$
D) $\frac{\sqrt{2+\sqrt{2}}}{4}$ E) $\frac{\sqrt{2-\sqrt{3}}}{2}$

38. (01-11-19) $sin195^0$ ning qiymatini hisoblang.
A) $\frac{\sqrt{2+\sqrt{3}}}{2}$ B) $\frac{\sqrt{3-\sqrt{2}}}{2}$ C) $-\frac{\sqrt{3+\sqrt{2}}}{2}$
D) $-\frac{\sqrt{3-\sqrt{3}}}{2}$ E) $-\frac{\sqrt{2-\sqrt{3}}}{2}$

39. (98-1-57) Ifodani hisoblang.
$$8sin^2\frac{15\pi}{16}\cdot cos^2\frac{17\pi}{16} - 1$$
A) $-\frac{\sqrt{2}}{2}$ B) $\frac{\sqrt{2}}{2}$ C) $-\frac{1}{2}$ D) $\frac{1}{2}$ E) $\sqrt{2}$

40. (99-8-76) Soddalashtiring.
$$\frac{sin^2 2,5\alpha - sin^2 1,5\alpha}{sin4\alpha\cdot sin\alpha + cos3\alpha\cdot cos2\alpha}$$
A)$2tg2\alpha$ B) $tg2\alpha\cdot tg\alpha$ C) $2sin2\alpha$
D) $4cos^2\alpha$ E) $4sin^2\alpha$

41. (00-6-53) Soddalashtiring.
$$\frac{4cos^2 2\alpha - 4cos^2\alpha + 3sin^2\alpha}{4cos^2(\frac{5\pi}{2}-\alpha) - sin^2 2(\alpha-\pi)}$$
A)$\frac{3cos\alpha}{4sin^2\alpha}$ B) $\frac{8cos2\alpha+1}{2cos2\alpha-2}$ C) $4cos2\alpha - 1$
D) $\frac{2cos2\alpha}{sin^2\alpha}$ E) $tg^2 2\alpha - 3$

42. (03-1-48) $tg555^0$ ni hisoblang.
A) $\frac{\sqrt{3}}{6}$ B) $\sqrt{3}-1$ C) $2-\sqrt{3}$
D) $2+\sqrt{3}$ E) $1-\frac{\sqrt{3}}{2}$

43. (03-2-27)
$$sin^4\frac{\pi}{8} + cos^4\frac{3\pi}{8} + sin^4\frac{5\pi}{8} + cos^4\frac{7\pi}{8}$$
ni hisoblang.
A) 2 B) $\frac{5}{2}$ C) 4 D) $\frac{3}{2}$ E) $\frac{5}{4}$

44. (03-2-40)
$$cos92^0 + cos73^0 - sin92^0 sin73^0$$
ni hisoblang.
A) $\frac{\sqrt{2+\sqrt{2}}}{2}$ B) $-\frac{\sqrt{2+\sqrt{2}}}{2}$ C) $-\frac{\sqrt{2+\sqrt{3}}}{2}$
D) $-\frac{\sqrt{2-\sqrt{3}}}{2}$ E) $\frac{\sqrt{2-\sqrt{2}}}{2}$

45. (03-3-40)
$$2sin32^0 cos2^0 + 2sin^2 28^0 + \frac{1}{2}$$
ni hisoblang.
A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$ D) 2 E) 3

46. (03-5-40) Agar $sin\alpha\left(1-2sin^2\frac{\alpha}{2}\right) = \frac{1}{3}$ bo'lsa, $cos(\frac{\pi}{4}-\alpha)\cdot sin(\frac{3\pi}{4}-\alpha)$ ni hisoblang.
A) $\frac{5}{6}$ B) $\frac{3}{4}$ C) $\frac{4}{5}$ D) $\frac{\sqrt{3}}{4}$ E) $\frac{\sqrt{3}}{2}$

47. (03-7-1)
$$cos15^0 - sin15^0 = \frac{a}{4cos15^0}. \quad a-?$$
A) $\sqrt{3}$ B) $\sqrt{3}+1$ C) $\sqrt{3}+2$
D) $\sqrt{3}+3$ E) $\sqrt{3}+4$

48. (03-7-35)
$$cos15^0 + sin15^0 = \frac{a}{4cos15^0}. \quad a-?$$
A) $\sqrt{3}$ B) $\sqrt{3}+1$ C) $\sqrt{3}+2$
D) $\sqrt{3}+3$ E) $\sqrt{3}+4$

49. (03-7-47)
$$sin\frac{\alpha}{2} = \frac{1}{2}\sqrt{2-\sqrt{3}}$$
bo'lsa, $cos\alpha$ ning qiymatini hisoblang.
A) $\frac{\sqrt{2}}{2}$ B) $2-\frac{\sqrt{3}}{2}$ C) $2+\frac{\sqrt{3}}{2}$ D) $-\frac{\sqrt{3}}{2}$ E) $\frac{\sqrt{3}}{2}$

50. (03-11-81) Agar $sin2\alpha = -\frac{1}{3}$ bo'lsa, $sin^2(\frac{\pi}{2}-\alpha)$ ning qiymatini hisoblang.
A) $\frac{1}{3}$ B) $-\frac{2}{3}$ C) $\frac{3}{3}$ D) $\frac{4}{3}$ E) $-\frac{1}{3}$

2.1.9 Arksinus, arkkosinus, arktangens va arkkotangens.

a	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$arcsina$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$arccosa$	$\frac{\pi}{2}$	$\frac{\pi}{3}$	$\frac{\pi}{4}$	$\frac{\pi}{6}$	0

b	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$
$arctgb$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$
$arcctgb$	$\frac{\pi}{2}$	$\frac{\pi}{3}$	$\frac{\pi}{4}$	$\frac{\pi}{6}$

1. $arcsina$ va $arccosa$ sonlar $-1 \le a \le 1$ da ma'noga ega.
2. $arcsin(-a) = -arcsina,\ arccos(-a) = \pi - arccosa.$
3. $arctg(-a) = -arctga,\ arcctg(-a) = \pi - arcctga.$
4. $arcsin(sina) = a,\ -\frac{\pi}{2} \le a \le \frac{\pi}{2}.$
5. $arccos(cosa) = a,\ 0 \le a \le \pi.$
6. $arctg(tgb) = b,\ -\frac{\pi}{2} < b < \frac{\pi}{2}.$
7. $arcctg(ctgb) = b,\ 0 < b < \pi.$

(98-3-57) Hisoblang.

$$arcsin\Big(sin\frac{5\pi}{8}\Big) + arccos\Big(cos\frac{8\pi}{7}\Big)$$

A) $\frac{99\pi}{56}$ B) $\frac{83\pi}{56}$ C) $\frac{85\pi}{56}$ D) $\frac{69\pi}{56}$ E) $\frac{13\pi}{15}$

Yechish: $sin\alpha = sin(\pi - \alpha)$ formuladan foydalanib

$$1)\quad sin\frac{5\pi}{8} = sin(\pi - \frac{5\pi}{8}) = sin\frac{3\pi}{8}$$

ni hosil qilamiz. $-\frac{\pi}{2} \le \alpha \le \frac{\pi}{2}$ oraliqda $arcsin(sin\alpha) = \alpha$ ekanidan foydalanamiz.

$$-\frac{\pi}{2} < \frac{3\pi}{8} < \frac{\pi}{2}$$

munosabatlarni tekshirish qiyin emas. Shuning uchun

$$arcsin(sin\frac{5\pi}{8}) = arcsin(sin\frac{3\pi}{8}) = \frac{3\pi}{8}.$$

$cos\alpha = cos(2\pi - \alpha)$ ekanidan

$$2)\quad cos\frac{8\pi}{7} = cos(2\pi - \frac{8\pi}{7}) = cos\frac{6\pi}{7}$$

bo'ladi. $0 \le \alpha \le \pi$ oraliqda $arccos(cos\alpha) = \alpha$ bo'lgani uchun

$$arccos(cos\frac{8\pi}{7}) = arccos(cos\frac{6\pi}{7}) = \frac{6\pi}{7}$$

bo'ladi, chunki

$$0 < \frac{6\pi}{7} < \pi.$$

Shuning uchun berilgan ifoda $\frac{3\pi}{8} + \frac{6\pi}{7} = \frac{69\pi}{56}$ ga teng.
Javob: $\frac{69\pi}{56}$ (D).
(00-4-46) Ifodaning qiymatini toping.

$$sin(2arctg3)$$

A) 0,6 B)0,8 C) 0,75 D) 0,36 E) 0,9

Yechish: $\alpha = arctg3$ bo'lsin. U holda $tg\alpha = 3$ va

$$sin2\alpha = \frac{2tg\alpha}{1 + tg^2\alpha} = \frac{2 \cdot 3}{1 + 9} = \frac{6}{10} = 0,6$$

Javob: $0,6$ (A).

1. (99-2-25) $m = arcsin\frac{\sqrt{3}}{2}$, $n = arccos(-\frac{1}{2})$ va $p = arctg1$ sonlarni kamayish tartibida joylashtiring.
   A) $m > p > n$ B) $m > n > p$ C) $n > m > p$
   D) $p > n > m$ E) $p > m > n$
2. (97-4-37) Ma'noga ega ifodalarni ko'rsating.
   1) $arcsin(log_2 5)$; 2) $arccos\frac{\pi}{\sqrt{17}}$
   3) $arccos\frac{a^2+b^2}{a^2+b^2+c^2}$ 4) $arcsin\frac{a^2+b^2+\sqrt{2}}{a^2+b^2+1}$
   A) 1);2) B) 1);2);3) C) 2);3)
   D) 1);2);3);4) E) 3);4)
3. (97-9-97) Ma'noga ega ifodalarni ko'rsating.
   1) $lg(arccos1)$; 2) $arcsin(lg\frac{1}{2})$
   3) $arccos\Big(\frac{a^4+1}{(a^2+1)^2}\Big)$ 4) $arcsin(\sqrt[10]{2})$
   A) 1);2) B) 2);4) C) 3);4)
   D) 1);3) E) 2);3)
4. (97-9-96) Agar

$$A = \frac{97,6^2 - 2 \cdot 97,6 \cdot 96,6 + 96,6^2 + 5}{sin^2 5 + cos^2 5 + 5}$$

   bolsa,$(arccosA)^{sin^2 5 + cos^2 6 + 2sin5cos6}$ni hisoblang.
   A) 1 B) 2 C) 0 D) 3 E) 5
5. (98-2-22) Hisoblang.

$$arccos\Big(-\frac{\sqrt{2}}{2}\Big) - arctg\frac{1}{\sqrt{3}}$$

   A) -75^0 B) 75^0 C) -105^0 D) 165^0 E) 105^0
6. (98-5-47) Hisoblang.

$$sin\left(arcsin\frac{\sqrt{2}}{2} - arccos\frac{\sqrt{2}}{2}\right)$$

   A) 0 B) 1 C) $\frac{\sqrt{2}}{2}$ D) $\frac{\sqrt{3}}{2}$ E) $\frac{1}{2}$
7. (98-9-20) Hisoblang.

$$arccos\Big(-\frac{1}{2}\Big) - arcsin\Big(-\frac{\sqrt{2}}{2}\Big)$$

   A) $\frac{11}{12}\pi$ B) $\frac{7}{4}\pi$ C) $\frac{\pi}{12}$ D) $\frac{5}{6}\pi$ E) $\frac{9}{7}\pi$
8. (98-9-23) Hisoblang.

$$arccos\Big(-\frac{\sqrt{2}}{2}\Big) - arcsin\Big(-\frac{\sqrt{3}}{2}\Big)$$

   A) $\frac{7\pi}{12}$ B) $\frac{\pi}{12}$ C) $\frac{13}{12}\pi$ D) $\frac{5\pi}{12}$ E) $-\frac{5\pi}{12}$
9. (99-7-46) Hisoblang.

$$tg\left(arcsin\frac{\sqrt{3}}{2} + arctg\sqrt{3}\right)$$

   A) $\sqrt{3}$ B) $-\frac{\sqrt{3}}{3}$ C) $-\frac{\sqrt{2}}{2}$ D) $-\sqrt{3}$ E) -1
10. (99-8-68) Hisoblang.

$$2arcsin\Big(-\frac{1}{2}\Big) + \frac{1}{2}arccos\frac{\sqrt{3}}{2}$$

    A) $-\frac{\pi}{4}$ B) $\frac{\pi}{6}$ C) 0 D) $\frac{\pi}{3}$ E) $-\frac{\pi}{3}$
11. (01-6-31) Hisoblang.

$$sin(2arccos\frac{\sqrt{3}}{2})$$

    A) $\frac{\sqrt{2}}{2}$ B) $\frac{1}{2}$ C) $\frac{\sqrt{3}}{2}$ D) $\frac{\sqrt{6}}{2}$ E) $\frac{\sqrt{3}}{4}$

12. (01-9-19) Hisoblang.

$$\frac{sin(\pi + arcsin\frac{\sqrt{3}}{2})}{cos(0,5\pi + arcsin\frac{1}{2})}$$

A) $\sqrt{3}$ B) $-\frac{\sqrt{3}}{2}$ C) $-\frac{1}{2}$ D) $\frac{\sqrt{3}}{2}$ E) 1

13. (00-7-27) Hisoblang

$$sin\Big(\frac{\pi}{2} - arccos\frac{3}{5}\Big)$$

A) 0,8 B) 0,4 C) 0,7 D) 0,5 E) 0,6

14. (97-9-30) Soddalashtiring.

$$arcctg(ctg(-3))$$

A)$\pi+3$ B)$2\pi-3$ C) $\frac{2\pi}{3}-3$ D)$\frac{3\pi}{2}-3$ E)$\pi-3$

15. (98-4-16) Hisoblang.

$$arccos\Big(sin\frac{\pi}{8}\Big)$$

A) $1-(\frac{\pi}{8})^2$ B)$\frac{5\pi}{8}$ C) $\frac{7\pi}{8}$ D) $\frac{\pi}{8}$ E) $\frac{3\pi}{8}$

16. (98-10-104) Hisoblang.

$$arctg(tg(-\frac{3\pi}{5})) + arcctg(ctg(-\frac{3\pi}{5}))$$

A) $-\frac{6\pi}{5}$ B)$-\frac{7\pi}{10}$ C) $\frac{4\pi}{5}$ D) $-\frac{4\pi}{5}$ E) $\frac{\pi}{5}$

17. (00-3-54)

$$arctg(tg(-37^0))$$

necha gradus bo'ladi?
A)-37^0 B)37^0 C) 127^0 D)143^0 E)53^0

18. (99-3-36) Hisoblang.

$$cos\Big(arcsin\frac{40}{41} - arcsin\frac{4}{5}\Big)$$

A) $\frac{151}{205}$ B) $-\frac{151}{205}$ C) $\frac{121}{205}$ D) $-\frac{150}{205}$ E) $\frac{187}{205}$

19. (99-3-39) Hisoblang.

$$arctg\frac{1}{2} + arctg\frac{1}{3}$$

A) $arctg\frac{5}{6}$ B) $\frac{\pi}{4}+\pi k, k\in Z$
C) $\pi - arctg\frac{5}{6}$ D) $arctg\frac{1}{6}$ E) $\frac{\pi}{4}$

20. (96-7-60) Hisoblang.

$$sin\Big(2arcsin\frac{1}{3}\Big)$$

A) $\frac{2}{3}$ B) $\frac{2\sqrt{2}}{3}$ C) $\frac{4\sqrt{2}}{9}$ D) $\frac{2\sqrt{2}}{9}$ E) $\frac{2}{9}$

21. (97-4-63) Hisoblang.

$$sin\Big(2arccos\frac{1}{3}\Big)$$

A) $\frac{2}{3}$ B) $\frac{2}{9}$ C) $\frac{4\sqrt{2}}{9}$ D) $\frac{4\sqrt{2}}{9}$ E) $\frac{4\sqrt{2}}{5}$

22. (97-7-60) Hisoblang.

$$cos\Big(2arcsin\frac{1}{3}\Big)$$

A) $-\frac{2}{3}$ B) $-\frac{4}{9}$ C) $\frac{7}{9}$ D) $\frac{2}{9}$ E) $\frac{1}{3}$

23. (97-12-66) Hisoblang.

$$cos\Big(2arccos\frac{1}{3}\Big)$$

A) -3 B) $\frac{2}{9}$ C) $-\frac{4}{9}$ D) $-\frac{7}{9}$ E) $-\frac{2}{9}$

24. (00-3-56) Hisoblang.

$$cos\Big(2arcsin\frac{1}{3}\Big)$$

A) $\frac{5}{9}$ B) $0,5$ C) $\frac{2}{3}$ D) $0,8$ E) $\frac{7}{9}$

25. (00-5-44) Hisoblang.

$$tg\Big(2arcsin\frac{3}{4}\Big)$$

A) $3\sqrt{7}$ B) $\sqrt{7}$ C) $-\sqrt{7}$ D) $2\sqrt{7}$ E) $-3\sqrt{7}$

26. (00-6-54) Ifodaning qiymatini toping.

$$cos\Big(2arcsin\frac{2}{5}\Big)$$

A) $\frac{9}{25}$ B) $\frac{1}{5}$ C) $\frac{4}{5}$ D) $\frac{17}{25}$ E) $\frac{8}{25}$

27. (00-10-37) Hisoblang.

$$sin\Big(2arctg0,75\Big)$$

A) $\frac{12}{15}$ B) $\frac{24}{25}$ C) $\frac{22}{25}$ D) $\frac{11}{15}$ E) $\frac{9}{25}$

28. (98-11-42) Hisoblang.

$$tg\Big(\frac{1}{2}arcsin\frac{5}{13}\Big)$$

A) $\frac{1}{25}$ B) $\frac{1}{15}$ C) $\frac{1}{10}$ D) $\frac{1}{5}$ E) 5

29. (98-12-76) Hisoblang.

$$sin\Big(\frac{1}{2}arccos\frac{1}{9}\Big)$$

A) $\frac{2}{3}$ B) $\frac{4}{9}$ C) $\frac{8}{9}$ D) $\frac{3}{4}$ E) $\frac{2}{9}$

30. (01-1-47) Ifodaning qiymatini toping.

$$arctg3 - arcsin\frac{\sqrt{5}}{5}$$

A) 0 B) $\frac{\pi}{6}$ C) $\frac{\pi}{3}$ D) $\frac{\pi}{2}$ E) $\frac{\pi}{4}$

31. (01-5-14) Hisoblang.

$$arctg\frac{1}{3} + arctg\frac{1}{9} + arctg\frac{7}{19}$$

A) $\frac{\pi}{4}$ B) $\frac{\pi}{6}$ C) $\frac{\pi}{3}$ D) 0 E) $\frac{\pi}{2}$

32. (01-7-41) Ifodaning qiymatini toping.

$$cos(arcctg(-\frac{1}{5}))$$

A)$-\frac{\sqrt{26}}{26}$ B)$-\frac{\sqrt{26}}{13}$ C)$-\frac{3\sqrt{26}}{26}$ D) $-\frac{\sqrt{6}}{12}$ E)$-\frac{\sqrt{6}}{9}$

33. (01-11-20) Hisoblang

$$sin\Big(2arcsin\frac{4}{5}\Big)$$

A) $0,92$ B) $0,88$ C) $0,96$ D) $0,85$ E) $0,94$

34. (01-12-34) Ushbu

$$q = log_2\sqrt{5}; \quad p = tg(arcctg\frac{1}{5}) \quad va \quad k = 2^{-\frac{4\pi}{3}}$$

sonlarni kamayish tartibida yozing.
A) $q > p > k$ B) $k > p > q$ C) $p > q > k$
D) $k > q > p$ E) $p > k > q$

35. (02-1-54)

$$cos(arctg\sqrt{3} + arccos\frac{\sqrt{3}}{2})$$

ni hisoblang.
A) 1 B) $\frac{\sqrt{3}}{2}$ C) $\frac{1}{2}$ D) $\frac{\sqrt{2}}{2}$ E) 0

36. (02-2-50)

$$\frac{\pi}{24}(8x+1) = arccos(-\frac{1}{2}) + arcsin\frac{1}{2} - \frac{1}{2}arctg1$$

tenglamani yeching.
A) 4 B) 6 C) 5 D) 3 E) 2

37. (02-4-31)

$$12arcsin(-\frac{1}{2})/\pi$$

ni hisoblang.
A) 0 B) -2 C) 2 D) 1 E) -1

38. (02-4-32)

$$tg(arctg3 + arctg7)$$

ni hisoblang.
A) 0 B) $0,5$ C) $-0,5$ D) 0,25 E) $-0,25$

39. (02-6-42)

$$cos(2arcsin\frac{3}{5})$$

ni hisoblang.
A)$0,35$ B)$0,36$ C)$0,28$ D) $0,24$ E)$0,42$

40. (02-7-17)

$$arcsin\frac{4}{5} + arccos\frac{1}{\sqrt{50}}$$

ni hisoblang.
A) $\frac{3\pi}{4}$ B) $\frac{\pi}{2}$ C) $\frac{\pi}{6}$ D) $\frac{\pi}{4}$ E) $\frac{\pi}{12}$

41. (02-7-19)

$$arcctg3 - arctg2$$

ni hisoblang.
A) $-\frac{\pi}{4}$ B) $\frac{\pi}{2}$ C) $\frac{\pi}{4}$ D) $\frac{\pi}{3}$ E) $\frac{\pi}{6}$

42. (02-7-34) $tg(\pi - arcsin\frac{3}{5})$ ni hisoblang.
A) $-\frac{3}{4}$ B) $\frac{3}{4}$ C) $\frac{1}{4}$ D) $\frac{1}{5}$ E) $\frac{3}{5}$

43. (02-7-35)

$$tg(arctg2 - arccos\frac{12}{13})$$

ni hisoblang.
A) $\frac{19}{22}$ B) $\frac{1}{2}$ C) $\frac{2}{13}$ D) 0 E) $\frac{18}{22}$

44. (02-11-45)

$$ctg\Big(arccos\Big(-\frac{1}{3}\Big) - \pi\Big)$$

ni hisoblang.
A) $2\sqrt{2}$ B) $-2\sqrt{2}$ C) $-\frac{\sqrt{2}}{3}$ D) $\frac{\sqrt{2}}{4}$ E) $-\frac{\sqrt{2}}{4}$

45. (02-5-36)

$$arctg\sqrt{2} - arctg\frac{1}{\sqrt{2}}$$

ni hisoblang.
A) $arctg\frac{\sqrt{2}}{4}$ B) $\frac{\pi}{4}$ C) $arctg\sqrt{2}$ D) $\frac{\pi}{3}$ E) $\frac{\pi}{6}$

46. (02-12-39)

$$cos\Big(2arcsin\frac{4}{5}\Big)$$

ni hisoblang.
A) $-0,28$ B) $0,28$ C) $-0,26$
D) $0,26$ E) $-0,24$

47. (03-3-44)

$$sin\Big(arctg\Big(-\frac{2}{3}\Big)\Big)$$

ni hisoblang.
A) $-\frac{2\sqrt{13}}{13}$ B) $-\frac{2\sqrt{17}}{17}$ C) $-\frac{2\sqrt{21}}{21}$
D) $-\frac{2\sqrt{15}}{15}$ E) $-\frac{2\sqrt{19}}{19}$

48. (03-4-26)

$$tg\Big(arctg\frac{1}{3} + arctg\frac{1}{9}\Big)$$

ning qiymatini hisoblang.
A) $\frac{7}{13}$ B) $\frac{8}{13}$ C) $\frac{5}{13}$ D) $\frac{4}{13}$ E) $\frac{6}{13}$

49. (03-5-45)

$$sin(2arctg3) - cos(2arctg2)$$

ni hisoblang.
A) $1,2$ B) $0,4$ C) $-0,8$ D) $0,8$ E) $1,6$

50. (03-6-66)

$$sin\Big(arcsin\frac{1}{2} + arccos\frac{1}{2}\Big)$$

ni hisoblang.
A) $\frac{\sqrt{3}}{2}$ B) $\frac{\sqrt{2}}{2}$ C) 1 D) $\frac{1}{2}$ E) $\frac{1}{4}$

51. (03-9-35) $tg\Big(arcsin\Big(-\frac{1}{3}\Big) + \frac{\pi}{2}\Big)$ ning qiymatini toping.
A) $\frac{\sqrt{2}}{4}$ B) $-\frac{\sqrt{2}}{4}$ C) $2\sqrt{2}$ D) $-2\sqrt{2}$ E) $\frac{\sqrt{3}}{4}$

52. (03-11-24)

$$ctg\Big(2\pi - 3arcsin\frac{\sqrt{2}}{2}\Big)$$

ni hisoblang.
A) 1 B) $-\frac{\sqrt{3}}{2}$ C) $-\sqrt{3}$ D) $\sqrt{3}$ E) $\frac{1}{\sqrt{2}}$

53. (03-11-83)

$$sin\left(300arccos\left(-\frac{\sqrt{2}}{2}\right)\right)$$

ni hisoblang.
A) 1 B) -1 C) $-\frac{1}{2}$ D) $\frac{1}{2}$ E) 0

2.1.10 Trigonometrik tenglamalar.

A. Eng sodda trigonometrik tenglamalar.

1. $sinx = a, \quad |a| \le 1$, yechim: $x = (-1)^n arcsina + \pi n$;
2. $sinx = 0$, yechim: $x = \pi n$;
3. $sinx = -1$, yechim: $x = -\frac{\pi}{2} + 2\pi n$;
4. $sinx = 1$, yechim: $x = \frac{\pi}{2} + 2\pi n$;
5. $cosx = a, \quad |a| \le 1$, yechim: $x = \pm arccosa + 2\pi n$;
6. $cosx = 0$, yechim: $x = \frac{\pi}{2} + \pi n$;
7. $cosx = -1$, yechim: $x = \pi + 2\pi n$;
8. $cosx = 1$, yechim: $x = 2\pi n$;
9. $tgx = a$, yechim: $x = arctga + \pi n$;
10. $ctgx = a$, yechim: $x = arcctga + \pi n$;

1. (96-6-43) Tenglamani yeching.

$$2sinx = -1$$

A) $-\frac{\pi}{6} + 2\pi k, k \in Z$ B) $-\frac{\pi}{6} + \pi k, k \in Z$
C) $(-1)^k \frac{\pi}{6} + \pi k, k \in Z$ D) $\pm\frac{2\pi}{3} + 2\pi k, k \in Z$
E) $(-1)^{k+1} \frac{\pi}{6} + \pi k, k \in Z$

2. (96-11-60) Tenglamani yeching.

$$sin\Big(3x - \frac{\pi}{2}\Big) = 0$$

A) $\frac{\pi}{3}n, n \in Z$ B) $\frac{\pi}{6} + \frac{\pi}{3}n, n \in Z$
C) $3\pi n, n \in Z$ D) $\frac{\pi}{2} + \frac{\pi}{3}n, n \in Z$
E) $\frac{\pi}{6}n, n \in Z$

3. (96-12-44) Tenglamaning yechimini toping.

$$cos\Big(2x - \frac{\pi}{2}\Big) = 0$$

A) $\frac{\pi}{2}n, \quad n \in Z$ B) $\frac{\pi}{2}$ C) $\pi n, \quad n \in Z$
D) $\frac{\pi}{2} + \frac{\pi}{4}n, \quad n \in Z$ E) $\frac{\pi}{4} + \frac{\pi n}{2}, \quad n \in Z$

4. (97-1-53) Quyidagi sonlardan qaysi biri

$$sin\frac{\pi x}{2} = 1$$

tenglamaning ildizi emas.
A) 5 B) 1996 C) 1 D) 9 E) 65

5. (97-2-43) Tenglamani yeching.

$$2cosx = -\sqrt{3}$$

A) $\pm\frac{\pi}{6} + \pi \cdot k, \quad k \in Z$
B) $(-1)^k \cdot \frac{\pi}{3} + \pi \cdot k, \quad k \in Z$
C) $\pm\frac{5\pi}{6} + 2\pi \cdot k, \quad k \in Z$
D) $\pm\frac{\pi}{4} + 2\pi \cdot k, \quad k \in Z$
E) $\pm\frac{3\pi}{4} + 2\pi \cdot k, \quad k \in Z$

6. (97-4-40) $cosx = \frac{\sqrt{2}}{2}$ tenglamaning $(0; 2\pi)$ oraliqqa tegishli yechimlarini toping.
A) $\frac{3\pi}{4}; \frac{5\pi}{4}$ B) $\frac{\pi}{4}; \frac{7\pi}{4}$ C) $\frac{3\pi}{4}; \frac{7\pi}{4}$
D) $\frac{5\pi}{4}; \frac{7\pi}{6}$ E) $\frac{3\pi}{6}; \frac{5\pi}{6}$

7. (97-6-52) Quyidagi sonlardan qaysi biri

$$cos\frac{\pi x}{2} = 1$$

tenglamaning ildizi emas.
A) 1996 B) 3 C) 4 D) 40 E) 100

8. (97-9-100) Tenglamaning $(0; 2\pi)$ oraliqqa tegishli yechimlarini toping.

$$cosx = -\frac{\sqrt{2}}{2}$$

A) $\frac{3\pi}{4}; \frac{7\pi}{4}$ B) $\frac{3\pi}{4}; \frac{5\pi}{4}$ C) $\frac{\pi}{4}; \frac{5\pi}{4}$
D) $\frac{\pi}{4}; \frac{3\pi}{4}$ E) $\frac{5\pi}{4}; \frac{7\pi}{4}$

9. (97-12-42) Tenglamani yeching.

$$2sinx = -\sqrt{3}$$

A) $x = (-1)^k \frac{\pi}{3} + \pi k, \quad k \in Z$
B) $x = \pm\frac{\pi}{6} + 2\pi k, \quad k \in Z$
C) $x = (-1)^k \frac{\pi}{6} + \pi k, \quad k \in Z$
D) $x = (-1)^{k+1} \frac{\pi}{3} + \pi k, \quad k \in Z$
E) $x = (-1)^{k+1} \frac{\pi}{3} + 2\pi k, \quad k \in Z$

10. (98-12-58) Tenglamani yeching.

$$2sin2x = -1$$

A) $(-1)^{n+1} \frac{\pi}{12} + \frac{\pi n}{2}, \quad n \in Z$
B) $(-1)^n \frac{\pi}{12} + \frac{\pi n}{2}, \quad n \in Z$
C) $(-1)^{n+1} \frac{\pi}{6} + \pi n, \quad n \in Z$
D) $(-1)^{n+1} \frac{\pi}{6} + \frac{\pi n}{2}, \quad n \in Z$
E) $(-1)^n \frac{\pi}{12} + 2\pi n, \quad n \in Z$

11. (00-3-51) Tenglamani yeching.

$$4sin^2 2x = 3$$

A) $(-1)^n \frac{\pi}{6} + \frac{\pi n}{2}, \quad n \in Z$
B) $(-1)^n \frac{\pi}{6} + \pi n, \quad n \in Z$
C) $\pm\frac{\pi}{6} + \frac{\pi n}{2}, \quad n \in Z$
D) $(-1)^n \frac{\pi}{3} + \frac{\pi n}{2}, \quad n \in Z$
E) $\pm\frac{\pi}{3} + \frac{\pi n}{2}, \quad n \in Z$

12. (98-11-102) Tenglamaning eng kichik musbat ildizini toping.

$$tg\pi x^2 = tg(\pi x^2 + 2\pi x)$$

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) 1 D) $\frac{3}{4}$ E) $\frac{\sqrt{2}}{2}$

13. (99-5-32) Tenglamani yeching.

$$tg(\frac{\pi}{2} + \frac{\sqrt{2}\pi}{4} \cdot cos2x) = 1$$

A) $\pm\frac{3\pi}{4} + 2\pi n, \quad n \in Z$ B) $\pm\frac{3\pi}{8} + \pi n, \quad n \in Z$
C) $\pm\frac{\pi}{4} + \pi n, \quad n \in Z$ D) $\pm\frac{3\pi}{8} + 2\pi n, \quad n \in Z$
E) $\pm\frac{\pi}{8} + \pi n, \quad n \in Z$

14. (01-2-82) Ushbu

$$sinx = \frac{2b-3}{4-b}$$

tenglama b ning nechta butun qiymatida yechimga ega bo'ladi?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

15. (01-5-17) Ushbu

$$sin\frac{\pi}{x} = 1$$

tenglamaning $[0,05; 0,1]$ oraliqda nechta ildizi bor?
A) 5 B) 1 C) 2 D) 3 E) 4

16. (98-3-59)

$$sin2x = (cosx - sinx)^2$$

tenglamaning $[0; 2\pi]$ kesmada nechta ildizi bor?
A) 4 B) 8 C) 2 D) 1 E) 3

17. (02-3-80)

$$(8x-1)(x+2)ctg\pi x = 0$$

tenglama $[-2; 2]$ kesmada nechta ildizga ega?
A) 5 B) 4 C) 6 D) 7 E) 3

18. (02-4-33)

$$sin(10\pi/x) = 0$$

tenglamaning nechta butun yechimlari bor?
A) bitta ham yo'q B) 8 C) 16
D) 24 E) cheksiz ko'p

19. (02-7-12)

$$sin(\pi cosx) = 0$$

tenglamani yeching.
A) $\frac{n\pi}{2}, \quad n \in Z$ B) $\pi + 2n\pi, \quad n \in Z$
C) $\frac{\pi}{2} + n\pi, \quad n \in Z$ D) $2n\pi, \quad n \in Z$
E) $n\pi, \quad n \in Z$

20. (02-8-42)

$$sin(\pi cos3x) = 1$$

tenglamani yeching.
A) $\pm\frac{\pi}{9} + \frac{2\pi n}{3}, \quad n \in Z$
B) $\pm\frac{\pi}{6} + \frac{\pi n}{3}, \quad n \in Z$
C) $\pm\frac{\pi}{9} + \frac{\pi n}{3}, \quad n \in Z$
D) $\pm\frac{\pi}{3} + 2\pi n, \quad n \in Z$
E) $\pm\frac{\pi}{3} + \frac{2\pi n}{3}, \quad n \in Z$

21. (02-9-40)

$$ctg\Big(\frac{\pi}{2}(x-1)\Big) = 0$$

tenglamaning $(1; 5)$ oraliqda nechta ildizi bor?
A) 1 B) 2 C) 3 D) 4 E) 5

22. (03-1-16)

$$f(x) = \frac{3\sqrt{x} - 4\sqrt{2-x}}{sin(\pi x)}$$

funksiyaning aniqlanish sohasini toping.
A) $[0; 2]$ B) $[0; 1)$ C) $(0; 1) \cup (1; 2)$
D) $\Big[0; \frac{\pi}{2}\Big) \cup \Big(\frac{\pi}{2}; 2\Big]$ E) $\Big[0; \frac{1}{2}\Big) \cup \Big(\frac{1}{2}; 2\Big]$

23. (03-1-24) Agar $|cosx| = 2 + cosx$ bo'lsa, $2^{cosx} + 3^{sinx}$ ning qiymatini toping.
A) 1 B) 0,5 C) 0,75 D) 1,25 E) 1,5

24. (03-1-28)

$$|sin3x| = \frac{1}{2}$$

tenglamani yeching.
A) $\pm\frac{\pi}{6} + \frac{\pi n}{2}, \quad n \in Z$ B) $\frac{\pi}{3} + 2\pi n, \quad n \in Z$
C) $\pm\frac{\pi}{9} + \frac{\pi n}{3}, \quad n \in Z$ D) $\pm\frac{\pi}{18} + \frac{\pi n}{3}, \quad n \in Z$
E) $\pm\frac{\pi}{12} + \pi n, \quad n \in Z$

25. (03-2-42)*

$$cos^2x = 1$$

tenglamaning nechta ildizi $x^2 \le 10$ shartni qanoatlantiradi?
A) 1 B) 2 C) 3 D) 4 E) 5

26. (03-5-43)

$$\frac{|cosx|}{cosx} = cos2x - 1$$

tenglama $[\pi; 2\pi]$ kesmada nechta ildizga ega?
A) 1 B) 2 C) 3 D) 4 E) $\emptyset$

27. (03-7-77)

$$1 + 2sin\frac{\pi x}{3} = 0 \quad (2 < x < 4)$$

tenglamaning yechimini toping.
A) $2,5; 3,5$ B) $3\frac{1}{2}$ C) $3\frac{1}{4}; 4$ D) 3 E) $\emptyset$

28. (96-3-58) Tenglamaning yechimini toping.

$$sin\Big(2x - \frac{\pi}{2}\Big) = 0$$

A) $\frac{\pi}{4}$ B) $\frac{\pi}{2}n, \quad n \in Z$ C) $\frac{\pi}{4} + \frac{\pi}{2}n, \quad n \in Z$
D) $\pi n, \quad n \in Z$ E) $\frac{\pi}{2} + \pi n, \quad n \in Z$

B.Qo'shish formulalari yordamida yechiladigan tenglamalar.

1. $sin(x+y) = sinxcosy + cosxsiny$;
2. $sin(x-y) = sinxcosy - cosxsiny$;
3. $cos(x+y) = cosxcosy - sinxsiny$;
4. $cos(x-y) = cosxcosy + sinxsiny$;
5. $tg(x+y) = \frac{tgx+tgy}{\ldots}$;

6. $tg(x-y)=\frac{tgx-tgy}{1+tgxtgy}$:

1. (96-1-58) Tenglamaning ildizlarini ko'rsating.

$$cos3x\cdot cosx+0,5=sin3x\cdot sinx$$

A) $\frac{\pi}{4}+2\pi k,\quad k\in Z$ B) $\frac{\pi}{6}+2\pi k,\quad k\in Z$
C) $\frac{\pi}{6}+\pi k,\quad k\in Z$ D) $\pm\frac{\pi}{6}+\frac{\pi k}{2},\quad k\in Z$
E) $-\frac{\pi}{6}+\pi k,\quad k\in Z$

2. (96-3-60) Tenglamaning yechimini ko'rsating.

$$sinx\cdot cos2x+cosx\cdot sin2x=0$$

A) $\frac{\pi}{4}n,\quad n\in Z$ B) $\frac{\pi}{3}n,\quad n\in Z$
C) $\frac{\pi}{2}n,\quad n\in Z$ D) $\frac{\pi}{5}n,\quad n\in Z$
E) $\frac{\pi}{8}n,\quad n\in Z$

3. (96-10-28) Tenglamaning ildizlarini ko'rsating.

$$sin5x\cdot cos2x=cos5x\cdot sin2x-1$$

A) $\pm\frac{\pi}{3}+2\pi k,\quad k\in Z$ B) $\frac{\pi}{3}+\frac{2\pi k}{3},\quad k\in Z$
C) $-\frac{\pi}{6}+\frac{2\pi k}{3},\quad k\in Z$ D) $\frac{\pi}{4}+\pi k,\quad k\in Z$
E) $\frac{\pi}{6}+\pi k,\quad k\in Z$

4. (96-11-10) Tenglamani yeching.

$$cos2x\cdot sin3x+sin2x\cdot cos3x=\frac{1}{2}$$

A) $(-1)^n\frac{\pi}{5}+\frac{\pi}{5}n,\quad n\in Z$
B) $(-1)^n\frac{\pi}{30}+\frac{\pi}{5}n,\quad n\in Z$ C) $\frac{\pi}{30}n,\quad n\in Z$
D) $\frac{\pi}{4}n,\quad n\in Z$ E) $\frac{\pi}{8}n,\quad n\in Z$

5. (96-12-53) Tenglamani yeching.

$$sinx\cdot cos3x+cosx\cdot sin3x=1$$

A) $\frac{\pi}{2}n,\quad n\in Z$ B) $\frac{\pi}{8}$ C) $\frac{\pi}{5}n,\quad n\in Z$
D) $\frac{\pi}{4}n,\quad n\in Z$ E) $\frac{\pi}{8}+\frac{\pi}{2}n,\quad n\in Z$

6. (97-4-42) k ning quyida ko'rsatilgan qiymatlaridan qaysi birida

$$sinkx\cdot cosx-sinx\cdot coskx=0$$

tenglamaning ildizlari $\frac{\pi n}{5}\quad(n\in Z)$ bo'ladi?
A) 5 B) 4 C) 6 D) 7 E) 8

7. (97-9-102) k ning quyida ko'rsatilgan qiymatlaridan qaysi birida

$$coskx\cdot cos4x-sinkx\cdot sin4x=\frac{\sqrt{3}}{2}$$

tenglamaning ildizlari $\pm\frac{\pi}{60}+\frac{\pi n}{5}\quad(n\in Z)$ bo'ladi?
A) 2 B) 3 C) 4 D) 5 E) 6

8. (99-9-34) Tenglamani yeching.

$$tgx-tg\frac{\pi}{3}-tgx\cdot tg\frac{\pi}{3}=1$$

A) $\frac{7\pi}{6}+\pi k,\quad k\in Z$ B) $\frac{5\pi}{6}+2\pi k,\quad k\in Z$
C) $\frac{7\pi}{12}+2\pi k,\quad k\in Z$ D) $\frac{7\pi}{12}+\pi k,\quad k\in Z$
E) $\frac{5\pi}{6}+\pi k,\quad k\in Z$

C.Ko'paytmaga keltiriladigan tenglamalar.

1. $sinx+siny=2sin\frac{x+y}{2}cos\frac{x-y}{2}$;

2. $sinx-siny=2cos\frac{x+y}{2}sin\frac{x-y}{2}$;

3. $cosx+cosy=2cos\frac{x+y}{2}cos\frac{x-y}{2}$;

4. $cosx-cosy=-2sin\frac{x+y}{2}sin\frac{x-y}{2}$;

1. (97-1-51) Tenglamaning eng kichik musbat ildizini toping.

$$(3cos\pi x-\pi)\cdot(2sin\pi x-\sqrt{3})=0$$

A) $\frac{\pi}{6}$ B) $\frac{1}{4}$ C) $\frac{1}{3}$ D) $\frac{1}{2}$
E)to'g'ri javob berilmagan

2. (97-6-49) Tenglamaning $(90^0;180^0]$ oraliqdagi ildizini toping.

$$cos2x\cdot sinx-cos2x=0$$

A) 120^0 B) 135^0 C) 150^0 D) 180^0 E) $\emptyset$

3. (97-6-50) Tenglamaning $[0;3]$ oraliqda nechta ildizi bor?

$$(3sin\pi x-\pi)(2cos\pi x-1)=0$$

A) 1 B) 2 C) 3 D) 4 E) cheksiz ko'p

4. (96-1-60) Agar $90^0<x<180^0$ bo'lsa,

$$cos2x\cdot sinx=cos2x$$

tenglamaning ildizlarini toping.
A) 120^0 B) 110^0 C) 170^0
D) 135^0 E) 135^0 va 165^0

5. (97-1-54) Tenglamani yeching.

$$\sqrt{sinx}\cdot cosx=0$$

A) $\pi k,\quad k\in Z$ B)$\frac{\pi}{2}+k\pi,\quad k\in Z$
C) $\frac{\pi}{2}+2k\pi,\quad k\in Z$ D)$2\pi k,\quad k\in Z$
E) $to'g'ri\quad javob\quad berilmagan$

6. (97-6-54) Tenglamani yeching.

$$\sqrt{cosx}\cdot sinx=0$$

A) $\frac{\pi}{2}+\pi k,\quad k\in Z$ B)$\pi k\quad k\in Z$
C) $2\pi k;\frac{\pi}{2}+\pi k,\quad k\in Z$ D)$\frac{\pi}{2}+2\pi k,\quad k\in Z$
E) $\pi+2\pi k,\quad k\in Z$

7. (97-8-42) Tenglamani yeching.

$$tgx\cdot cosx=0$$

A) $2\pi k,\quad k\in Z$ B)$\pi k\quad k\in Z$
C) $\frac{\pi}{4}+\pi k;\frac{\pi}{2}+2\pi k\quad k\in Z$ D)$\frac{\pi}{2}+\pi k,\quad k\in Z$
E) $\frac{\pi}{2}+2\pi k,\quad k\in Z$

8. (97-12-63) Tenglamaning $[0^0;60^0]$ oraliqdagi ildizini toping.

$$cosx-sin2xcosx=0$$

A) 0^0 B) 30^0 C) 45^0 D) 15^0 E) 60^0

9. (98-2-27) Tenglama yechimga ega bo'ladigan b ning barcha qiymatlarini toping.

$$cosx + cos(120^0 - x) = b$$

A) $0 \le b \le 1$ B) $-1 \le b \le 1$
C) $-1 < b < 1$ D) $b \le 1$ E) $0 < b < 1$

10. (98-9-25) Tenglama k ning qanday qiymatlarida yechimga ega?

$$sin(60^0 + x) - sin(60^0 - x) = k$$

A) $k \in (-1;1)$ B) $k \in [-1;1]$ C) $k \le 1$
D) $k \le -1$ E) $k > 1$

11. (96-9-104) Tenglamaning ildizlarini ko'rsating.

$$sin(\frac{\pi}{6} + x) + sin(\frac{\pi}{6} - x) = 0,5$$

A) $\frac{\pi k}{2}, \quad k \in Z$ B) $\frac{\pi}{6} + 2\pi k, \quad k \in Z$
C) $\pm\frac{\pi}{3} + 2\pi k, \quad k \in Z$ D) $\frac{\pi}{3} + 2\pi k, \quad k \in Z$
E) $\pm\frac{\pi}{12} + \pi k, \quad k \in Z$

12. (00-10-57) Ushbu

$$sin2x + sin4x = 0$$

tenglama $[0; 2\pi]$ oraliqda nechta ildizga ega?
A) $\emptyset$ B) 7 C) 4 D) 8 E) 9

13. (01-7-39) Ushbu

$$sinx + sin2x + sin3x + sin4x = 0$$

tenglamaning $[0^0; 180^0]$ kesmaga tegishli ildizlari yig'indisini toping.
A) 360^0 B) 450^0 C) 144^0 D) 486^0 E) 524^0

14. (01-8-53) Ushbu

$$sin3x + sin5x = sin4x$$

tenglamaning nechta ildizi $|x| \le \frac{\pi}{2}$ tengsizlikni qanoatlantiradi?
A) 2 B) 3 C) 4 D) 5 E) 7

15. (02-1-61)

$$sin6x + sin2x = sin4x$$

tenglamani yeching.
A) $\frac{\pi n}{4}, \quad n \in Z$ B)$\frac{\pi}{3} + 2\pi n, \quad n \in Z$
C) $-\frac{\pi}{3} + \pi n, \quad n \in Z$ D)$\pi n, \quad n \in Z$
E) $\frac{\pi n}{4}, \pm\frac{\pi}{6} + \pi n \quad n \in Z$

16. (02-2-52)

$$cos2x - cos6x - sin4x = 0$$

tenglama $[0; \pi]$ kesmada nechta ildizga ega?
A) 7 B) 6 C) 8 D) 5 E) 4

17. (02-3-29) Agar $sin\alpha$, $sin2\alpha$ va $sin3\alpha$ $(0 < \alpha < \pi)$ lar arifmetik progressiyani tashkil etsa,α ning qiymatini aniqlang.
A) $\frac{\pi}{2}$ B) $\frac{\pi}{6}$ C) $\frac{\pi}{4}$ D) $\frac{\pi}{3}$ E)$\frac{2\pi}{3}$

18. (02-3-57) To'g'ri burchakli uchburchakning α va β o'tkir burchaklari uchun $cos\alpha + sin(\alpha - \beta) = 1$ tenglik o'rinli bo'lsa, β ning qiymatini toping.
A) 30^0 B) 45^0 C) 60^0 D) 75^0
E) aniqlab bo'lmaydi

19. (02-5-38)

$$1 - sin5x = \left(cos\frac{3x}{2} - sin\frac{3x}{2}\right)^2$$

$[360^0; 450^0]$ tenglamaning ildizlari yig'indisini toping.
A) 495^0 B) 1575^0 C) 1170^0 D) 1255^0 E) 975^0

20. (02-6-54) Uchburchakning α va β burchaklari orasida $sin\alpha + sin\beta = \sqrt{2}cos\frac{\alpha-\beta}{2}$ munosabat o'rinli. Shu uchburchakning eng katta burchagini toping.
A) 120^0 B) 150^0 C) 90^0 D) 75^0 E) 100^0

21. (02-7-18)

$$sin5x + sin3x + sinx = 0$$

tenglamani yeching.
A) $\frac{\pi n}{3}; \pm\frac{\pi}{3} + \pi n \quad , n \in Z$
B) $\frac{n\pi}{3}; \frac{\pi}{2} + \frac{\pi n}{2}, \quad n \in Z$
C) $\frac{\pi}{2} + \frac{\pi n}{2}, \quad n \in Z$
D) $\frac{\pi n}{3}, \quad n \in Z$ E) $3\pi n, \quad n \in Z$

22. (02-9-41)

$$\sqrt{6}sinx + \sqrt{3sin2x} = 0$$

tenglamaning $[\pi; 2\pi]$ kesmadagi ildizlari yig'indisini toping.
A) π B) 3π C) $\frac{11\pi}{6}$ D) $\frac{17\pi}{4}$ E) $\frac{9\pi}{2}$

23. (02-10-24)

$$2cos^3\frac{x}{5} + sin^2\frac{x}{5} = 1$$

tenglamani yeching.
A) $\frac{5\pi}{2} \cdot (2n+1), (6k \pm 1)\frac{5\pi}{3}, \quad k, n \in Z$
B) $\pm\frac{\pi}{3} + 2\pi n, \quad n \in Z$
C) $\frac{\pi}{2} + \pi n, \quad n \in Z$
D) $(-1)^n\frac{\pi}{6} + \pi n, \quad n \in Z$
E) $\frac{\pi}{2} + 2\pi n \quad n \in Z$

24. (03-6-63) Qanday eng kichik o'tkir burchak

$$sin(2x + 45^0) = cos(30^0 - x)$$

tenglamani qanoatlantiradi?
A) 25^0 B) 5^0 C) 45^0 D) 30^0 E) 15^0

25. (03-10-45)

$$sin3x = cos5x$$

tenglamani yeching.
A) $\frac{\pi}{15} + \frac{\pi n}{3}, \quad n \in Z$
B) $\frac{\pi}{4} + \pi n; \frac{\pi}{16} + \frac{\pi n}{2}, \quad n \in Z$
C) $\frac{\pi}{16} + \frac{\pi n}{4}; \frac{3\pi}{4} + \pi n \quad n \in Z$
D) $\frac{\pi}{4} + \frac{\pi n}{4}; \frac{3\pi}{4} + \frac{\pi n}{2}, \quad n \in Z$
E) $\frac{\pi n}{2}; \frac{\pi}{4} + \pi n \quad n \in Z$

D.Ko'paytma formulalari yordamida yechiladigan tenglamalar.

1. $sinx \cdot siny = \frac{1}{2}(cos(x-y) - cos(x+y))$;
2. $cosx \cdot cosy = \frac{1}{2}(cos(x-y) + cos(x+y))$;
3. $sinx \cdot cosy = \frac{1}{2}(sin(x-y) + sin(x+y))$;

1. (98-1-59) Tenglama $[0;\pi]$ kesmada nechta ildizga ega?.

$$cosx \cdot cos4x - cos5x = 0$$

A) 1 B) 2 C) 4 D) 3 E) 5

2. (98-8-59) Ushbu

$$cosx \cdot cos2x = cos3x$$

tenglama $[0;2\pi]$ oraliqda nechta ildizga ega?.
A) 5 B) 4 C) 3 D) 2 E) 1

3. (00-5-70) Ushbu
$sin(3x - 45^0) = sin14^0 \cdot sin76^0 -$
$-cos12^0 \cdot sin16^0 + \frac{1}{2}cos86^0$
tenglamaning $[0^0; 180^0]$ kesmadagi ildizlari yig'indisini toping?
A) 135^0 B) 150^0 C) 210^0 D) 215^0 E) 225^0

4. (02-1-19)

$$cos4x \cdot cos5x = cos6x \cdot cos7x$$

tenglamaning $[0; \frac{\pi}{2}]$ kesmadagi ildizlari yig'indisini toping?
A) $\frac{41\pi}{22}$ B) $\frac{31\pi}{22}$ C) $\frac{30\pi}{11}$ D) $\frac{43\pi}{22}$ E) 2π

5. (02-10-60)

$$cos\left(\frac{3\pi+x}{3}\right) \cdot cos\left(\frac{9\pi+2x}{6}\right) = \frac{-5}{48}tg(2arctg1,5)$$

tenglamani yeching.
A) $(-1)^{n+1}\frac{\pi}{4} + \frac{3\pi n}{2}; \quad n \in Z$
B) $(-1)^{n+1}\frac{\pi}{6} + \pi n; \quad n \in Z$
C) $(-1)^n\frac{\pi}{3} + 2\pi n; \quad n \in Z$
D) $(-1)^n\frac{\pi}{6} + \frac{3\pi n}{2}; \quad n \in Z$
E) $\pm\frac{\pi}{3} + 2\pi n; \quad n \in Z$

E.Kvadrat tenglamaga yoki $a \cdot sinx + b \cdot cosx = 0$**,** $a \cdot sin^2x + b \cdot sinxcosx + c \cdot cos^2x = 0$ **tenglamalarga keltiriladigan tenglamalar.**

1. (97-1-46) Tenglamani yeching.

$$2cos^2(x-\pi) + 3sin(\pi+x) = 0$$

A) $\frac{\pi}{2} + \pi n, \quad n \in Z$ B) $(-1)^n\frac{\pi}{6} + \pi n, \quad n \in Z$
C) $\pm\frac{\pi}{3} + 2\pi n, \quad n \in Z$ D) $\pm\frac{\pi}{6} + 2\pi n, \quad n \in Z$
E) $\pi n, \quad n \in Z$

2. (97-1-50) Tenglamaning $[0^0; 90^0]$ oraliqdagi ildizini toping.

$$2sin^2x - \sqrt{3}sin2x = 0$$

A) 30^0 B) 45^0 C) 60^0 D) 90^0 E) 75^0

3. (97-6-45) Tenglamani yeching.

$$2sin^2x + 5sin(1,5\pi - x) = 2$$

A) $\frac{\pi}{2} + \pi n, \quad n \in Z$ B) $(-1)^n\frac{\pi}{6} + \pi n, \quad n \in Z$
C) $\frac{\pi}{2} + 2\pi n, \quad n \in Z$ D) $\pi n, \quad n \in Z$
E) $\pm\frac{\pi}{3} + 2\pi n, \quad n \in Z$

4. (97-11-45) Tenglamani yeching.

$$2sin^2(\pi - x) + 5sin(1,5\pi + x) = 2$$

A) $\pi n, \quad n \in Z$ B) $\frac{\pi}{2} + \pi n, \quad n \in Z$
C) $\frac{\pi}{2} + 2\pi n, \quad n \in Z$ D) $(-1)^n \cdot \frac{\pi}{6} + \pi n, \quad n \in Z$
E) $\pm\frac{\pi}{3} + 2\pi n, \quad n \in Z$

5. (00-3-52) Tenglamaning $[0; 2\pi]$ kesmadagi eng katta va eng kichik ildizlari ayirmasini toping?

$$cos^2x - \frac{1}{2}sin2x = 0$$

A) $\frac{\pi}{2}$ B) $\frac{3\pi}{4}$ C) π D) $\frac{5\pi}{4}$ E) $\frac{3\pi}{2}$

6. (00-5-41) Tenglamani yeching.

$$cos2x - 5sinx - 3 = 0$$

A) $(-1)^n\frac{\pi}{6} + \pi n, \quad n \in Z$
B) $(-1)^{n+1}\frac{\pi}{6} + \pi n, \quad n \in Z$
C) $(-1)^n\frac{\pi}{6} + 2\pi n, \quad n \in Z$
D) $(-1)^{n+1}\frac{\pi}{6} + 2\pi n, \quad n \in Z$
E) $(-1)^n\frac{\pi}{3} + \pi n, \quad n \in Z$

7. (00-8-63) Tenglamani yeching.

$$cos2x = 2cosx$$

A) $\pm arccos\frac{1+\sqrt{3}}{2} + 2\pi n, \quad n \in Z$
B) $\pm\left(\pi - arccos\frac{\sqrt{3}-1}{2}\right) + 2\pi n, \quad n \in Z$
C) $arccos\frac{1+\sqrt{3}}{2} + \pi n, \quad n \in Z$
D) $-arccos\frac{1-\sqrt{3}}{2} + (n+1)\pi, \quad n \in Z$
E) $arccos\frac{1-\sqrt{3}}{2} + 2\pi n, \quad n \in Z$

8. (96-10-55) Agar $0^0 < x < 180^0$ bo'lsa,

$$sin^4x + cos^4x = sinxcosx$$

tenglamaning $(0^0; 180^0)$ oraliqqa tegishli ildizlarini toping.
A)60^0 va 75^0 B) 120^0 C)90^0
D) 45^0 E)45^0va135^0

9. (02-2-63) Qaysi tenglama haqiqiy ildizga ega?
A) $7^{4x} + 3^{2x} + 3^{-x} = -2$
B) $x^2 + 100x - 101 = 0$
C) $\sqrt{(x-5)^2} = 5 - x$
D) $x^2 - 5 = 0$
E) $sin^4x + cos^4x = sin2x$

10. (02-3-79)

$$tgx + \frac{1}{tgx} = 2$$

tenglama $[-2\pi; \pi]$ kesmada nechta ildizga ega?.
A) 3 B) 5 C) 4 D) 6 E) 2

11. (02-10-23)

$$cos2x - 6sinxcosx + 3 = arccos\Big(-\frac{1}{2}\Big) - \frac{2\pi}{3}$$

tenglamani yeching.
A) $\frac{\pi}{4} + \pi n; arctg2 + \pi n, \quad n \in Z$
B) $\pm\frac{\pi}{3} + 2\pi n, \quad n \in Z$
C) $\pm\frac{\pi}{4} + 2\pi n, \quad n \in Z$
D) $(-1)^n\frac{\pi}{4} + \pi n, \quad n \in Z$
E) $(-1)^n arcsin2 + \pi n, \quad n \in Z$

12. (02-10-61)

$$4sin^2x + sin2x = 3$$

tenglamani yeching.
A) $-arctg3 + \pi k; \frac{\pi}{4} + \pi n, \quad k, n \in Z$
B) $\pm\frac{\pi}{4} + \pi n, \quad n \in Z$
C) $(-1)^n arcsin\frac{3}{4} + \pi n, \quad n \in Z$
D) $\pm arccos(\frac{1}{3}) + 2\pi n, \quad n \in Z$
E) $\pm\frac{\pi}{4} + 2\pi n, \quad n \in Z$

13. (02-11-43)

$$3sin^2 2x + 7cos2x - 3 = 0$$

tenglamaning $(-90^0; 180^0)$ intervalga tegishli ildizlari yig'indisini toping.
A) 90^0 B) 105^0 C) 180^0 D) 135^0 E) 150^0

14. (02-11-44)

$$cos2x + 5cosx = 6$$

tenglamaning $[-4\pi; 4\pi]$ kesmaga tegishli ildizlari nechta?
A) 4 B) 5 C) 6 D) 8 E) 9

15. (02-12-40)

$$1 + cos2x - 2sin^2x = 1$$

tenglamaning $[0; 2\pi]$ kesmadagi ildizlari yig'indisini hisoblang.
A) $3,5\pi$ B) $3\frac{1}{6}\pi$ C) 4π D) $3\frac{1}{3}\pi$ E) $4\frac{1}{6}\pi$

16. (03-3-43)

$$cos^2x + sinxcosx = 1$$

tenglamaning $[-320^0; 50^0)$ oraliqqa tegishli ildizlari yig'indisini toping.
A) -535^0 B) -270^0 C) -315^0
D) -240^0 E) -585^0

17. (03-4-25)

$$1 - sinx - cos2x = 0 \quad (x \in [0; 2\pi])$$

tenglamaning ildizlari yig'indisini hisoblang.
A) $3,5\pi$ B) $4,2\pi$ C) 4π D) $3,8\pi$ E) $4,3\pi$

18. (03-6-65)*

$$cos^6x + sin^6x = 4sin^2 2x$$

tenglamani yeching.
A) $\pm arcsin\frac{\sqrt{2}}{\sqrt{19}} + \pi k, \quad k \in Z$
B) $\pm arcsin\frac{2}{\sqrt{17}} + \pi k, \quad k \in Z$
C) $\pm arcsin\frac{3}{\sqrt{19}} + 2\pi k, \quad k \in Z$
D) $\pm\frac{1}{2}arcsin\frac{2}{\sqrt{19}} + \frac{k\pi}{2}, \quad k \in Z$
E) $\pm\frac{1}{2}arcsin\frac{3}{\sqrt{}} + \frac{k\pi}{2}, \quad k \in Z$

F.Darajasini tushurish formulalari yordamida yechiladigan tenglamalar.

1. $sin^2x = \frac{1-cos2x}{2} \quad yoki \quad 1 - cos2x = 2sin^2x;$
2. $cos^2x = \frac{1+cos2x}{2} \quad yoki \quad 1 + cos2x = 2cos^2x;$
3. $tg\frac{x}{2} = \frac{1-cosx}{sinx};$
4. $ctg\frac{x}{2} = \frac{1+cosx}{sinx};$

1. (98-2-26) Tenglamani yeching.

$$2cos^2x - 1 = -\frac{1}{2}$$

A) $(-1)^k\frac{\pi}{6} + \frac{\pi}{2}k; \quad k \in Z$
B) $(-1)^{k+1}\frac{\pi}{6} + \pi k, \quad k \in Z$
C) $\pm\frac{\pi}{6} + \pi k, \quad k \in Z$
D) $\pm\frac{\pi}{3} + \pi k, \quad k \in Z$
E) $\pm\frac{2\pi}{3} + \pi k, \quad k \in Z$

2. (98-6-50) Tenglamani yeching.

$$4cos^2 2x - 1 = cos4x$$

A) $\frac{\pi}{4} + \frac{\pi n}{2}, \quad n \in Z$ B) $\frac{\pi n}{2}, \quad n \in Z$
C) $\frac{\pi}{6} + \frac{\pi n}{2}, \quad n \in Z$ D) $\frac{\pi}{3} + \frac{\pi n}{2}, \quad n \in Z$
E) $\frac{\pi}{8} + \frac{\pi n}{2}, \quad n \in Z$

3. (96-9-50) Ushbu

$$4sin\frac{x}{2} - cosx + 1 = 0$$

tenglamaning $[0; 2\pi]$ kesmada nechta ildizi bor?
A) 0 B) 2 C) 3 D) 1 E) 4

4. (96-12-97) Ushbu

$$sin\frac{x}{2} + cosx - 1 = 0$$

tenglama $[0; 2\pi]$ oraliqda nechta yechimga ega?
A) 3 B) 4 C) 0 D) 2 E) 1

5. (96-13-43) Tenglamaning $[0; 2\pi]$ kesmada nechta ildizi bor?

$$4cos\frac{x}{2} + cosx + 1 = 0$$

A) 1 B) 2 C) 0 D) 3 E) 4

6. (98-11-99) Tenglamani yeching.

$$2cos^2\frac{x}{2} = 1 + cosx + cos2x$$

A) $\frac{\pi}{4} + \frac{\pi k}{2}, \quad k \in Z$ B) $\frac{\pi}{4} + \pi k, \quad k \in Z$
C) $\frac{\pi k}{2}, \quad k \in Z$ D) $\pi k, \quad k \in Z$
E) $\frac{\pi}{6} + \frac{\pi k}{2}, \quad k \in Z$

7. (99-3-37) Tenglamani yeching.

$$sin^2x + sin^2 2x = 1$$

A) $\frac{\pi}{2} + \pi k, \quad k \in Z$ B) $\frac{\pi}{6} + \frac{\pi}{3}k, \quad k \in Z$
C) $\frac{\pi}{2} + 2\pi k, \quad k \in Z$ D) $\frac{\pi}{12} + \frac{\pi}{6}k, \quad k \in Z$
E) $\frac{\pi}{4} + \frac{\pi}{2}k, \quad k \in Z$

8. (99-10-34) Tenglamani yeching.

$$(1+cosx)tg\frac{x}{2}=0$$

A) $\pi k,\quad k\in Z$ B) $\pi+2\pi k,\quad k\in Z$
C) $2\pi k,\quad k\in Z$ D) $\pi+\pi k,\quad k\in Z$
E) $\frac{\pi}{2}+2\pi k,\quad k\in Z$

9. (00-2-47) Agar $|a|=1$ bo'lsa,

$$a\cdot ctgx-1=cos2x$$

tenglama $[0;2\pi]$ kesmada nechta ildizga ega bo'ladi?
A) 4 B) 2 C) 3 D) 5 E) 6

10. (01-1-48) Tenglamani yeching.

$$4sin^2x(1+cos2x)=1-cos2x$$

A) $\pi n,\quad n\in Z$ B) $\pi n;\pm\frac{\pi}{3}+\pi n,\quad n\in Z$
C) $\pm\frac{\pi}{3}+\pi n,\quad n\in Z$ D) $\pi n;\pm\frac{\pi}{3}+2\pi n,\quad n\in Z$
E) $\pi n;\pm\frac{2\pi}{3}+2\pi n,\quad n\in Z$

11. (01-2-81) Ushbu

$$7cos2x-6=cos4x$$

tenglamaning $[0;628]$ kesmaga tegishli ildizlari yig'indisini toping.
A)200π B)199π C)20100π D)1990π E)19900π

12. (01-2-84) Tenglamani yeching.

$$3cosx-4sinx=-3$$

A) $arctg\frac{3}{4}+\pi n,\quad n\in Z$
B) $2arctg\frac{3}{4}+2\pi n,\quad n\in Z$
C) $\pi+2\pi n,\quad n\in Z$
D) $\pi+2\pi n, arctg\frac{3}{4}+\pi n,\quad n\in Z$
E) $\pi+2\pi n, 2arctg\frac{3}{4}+2\pi n,\quad n\in Z$

13. (02-6-43)*

$$8cos^6x=3cos4x+cos2x+4$$

tenglamani yeching.
A) $\frac{\pi}{4}+\pi n;\pi n,\quad n\in Z$
B) $\frac{\pi}{4}+\frac{\pi n}{2};2\pi n,\quad n\in Z$
C) $\frac{\pi}{2}+\pi n;\frac{\pi n}{4},\quad n\in Z$
D) $\pm\frac{\pi}{4}+2\pi n;\pi n,\quad n\in Z$
E) $\frac{\pi}{4}+\frac{\pi n}{2};\pi n,\quad n\in Z$

14. (02-6-44)

$$3sin2x-2cos2x=2$$

tenglama $[0;2\pi]$ kesmada nechta ildizga ega?
A) 5 B) 1 C) 2 D) 3 E) 4

15. (03-10-41)

$$sin^2x+sin^24x=sin^22x+sin^23x$$

tenglamani yeching.
A) $\frac{\pi n}{2},\quad n\in Z$
B) $\frac{\pi}{5}+\frac{2\pi n}{5},\quad n\in Z$
C) $\frac{\pi}{10}+\frac{2\pi n}{5},\quad n\in Z$
D) $\frac{\pi n}{2};\pm\frac{\pi}{3}+\frac{2\pi n}{3},\quad n\in Z$
E) $\frac{\pi}{10}+\frac{\pi n}{5};\frac{\pi n}{2},\quad n\in Z$

16. (03-12-78)

$$cos^2\Big(\frac{\pi}{8}+x\Big)+cos^2\Big(\frac{\pi}{8}-x\Big)=\frac{3}{2}\quad (x\in[-\pi;2\pi])$$

tenglamaning ildizlari yig'indisini toping.
A)0 B)$\frac{5\pi}{4}$ C)$\frac{13\pi}{8}$ D)3π E)$\frac{3\pi}{2}$

G.$sin^mx+cos^nx=1$ **tenglamaga** $m>2,\ n>2$ **yoki** $0<m<2,\ 0<n<2$ **bo'lsa, u holda** **1)**$sin^mx=1$ 2)$cos^nx=1$ **tenglamalarga ajraydi.**

1. (97-5-32) Tenglamani yeching.

$$sin^{1995}x+cos^{1995}x=1$$

A) $2\pi n;\frac{\pi}{2}+2\pi n,\quad n\in Z$
B) $\pi n;\frac{\pi}{3}+2\pi n,\quad n\in Z$
C) $2\pi n,\quad n\in Z$
D) $\frac{\pi}{2}+2\pi n,\quad n\in Z$ E) $\pi n,\ n\in Z$

2. (97-9-32) Tenglamani yeching.

$$sin^{1993}x+cos^{1993}x=1$$

A) $\pi n;\frac{\pi}{3}+2\pi n,\quad n\in Z$
B) $2\pi n;\frac{\pi}{2}+2\pi n,\quad n\in Z$
C) $2\pi n,\quad n\in Z$
D) $\pi n,\quad n\in Z$ E) $\frac{\pi}{2}+2\pi n,\ n\in Z$

3. (97-1-61) Tenglamaning $[-\pi;2\pi]$ oraliqda nechta ildizi bor?

$$sinx+cosx=1$$

A) 0 B) 1 C) 2 D) 3 E) 4

4. (97-6-61) Tenglamaning $[-\pi;\pi]$ oraliqda nechta ildizi bor?

$$sinx+cosx=1$$

A) 0 B) 1 C) 2 D) 3 E) 4

5. (99-5-55) Ushbu

$$cos^3x+sin^4x=1$$

tenglama $[-\pi;\pi]$ oraliqda nechta ildizga ega.
A) 1 B) 2 C) 3 D) 4 E) 5

6. (00-9-59) Ushbu

$$cos^4x+sin^3x=1$$

tenglamaning $[-\frac{3\pi}{2};2\pi]$ kesmada nechta ildizi bor?
A) 4 B) 8 C) 6 D) 7 E) 5

7. (01-4-5) Ushbu

$$\sqrt{sinx}+\sqrt{cosx}=1$$

tenglamaning $[-3\pi;\pi]$ kesmaga tegishli barcha ildizlari yig'indisini toping.
A) -3π B) -2π C) $-\pi$ D) $\frac{3}{2}\pi$ E) 3π

8. (03-10-44)
$$sin^5x + cos^6x = 1$$
tenglamaning $[-\frac{7\pi}{4}; \frac{5\pi}{4}]$ kesmadagi eng katta va eng kichik ildizlari orasidagi ayirmani toping.
A) 2π B) $1,5\pi$ C) $3,5\pi$ D) 3π E) $2,5\pi$

H.Quyidagi tenglamalarning aniqlanish sohasiga e'tibor bering.

(98-1-56) Tenglamani yeching.
$$\frac{sin2x}{tgx-1} = 0$$
A) $\frac{\pi k}{2}, \quad k \in Z$ B) $\frac{\pi}{2} + \pi k, \quad k \in Z$
C) $2\pi k, \quad k \in Z$ D) $\pi + 2\pi k, \quad k \in Z$
E) $\pi k, \quad k \in Z$
Yechish: Ushbu
$$\frac{sin2x}{tgx-1} = 0$$
tenglama
$$tgx - 1 \neq 0, \quad cosx \neq 0$$
bo'lganda aniqlangan. Berilgan tenglamadan $sin2x = 0$ ni hosil qilamiz. Bu tenglamani $sin2\alpha = 2sin\alpha cos\alpha$ ekanidan foydalanib $2sinxcosx = 0$ ko'rinishda yozamiz. Bu erdan $cosx \neq 0$ ni e'tiborga olib, $sinx = 0$ tenglamani, bundan esa $x = \pi k$ ekanini hosil qilamiz.
Javob: $\pi k, \quad k \in Z$ (E).

1. (96-7-59)* Tenglama $[-\pi; 3\pi]$ oraliqda nechta ildizga ega?
$$\frac{tgx}{1-cosx} = 0$$
A) 7 B) 2 C) 3 D) 5 E) 4

2. (97-3-59)* Tenglama $[0; 5\pi]$ oraliqda nechta ildizga ega?
$$\frac{ctgx}{1+sinx} = 0$$
A) 5 B) 4 C) 3 D) 2 E) 6

3. (97-7-59) Tenglama $[0; 4\pi]$ oraliqda nechta ildizga ega?
$$\frac{sin^2x + sinx}{cosx} = 0$$
A) 5 B) 4 C) 7 D) 2 E) 6

4. (97-12-65) Tenglama $[-2\pi; 2\pi]$ oraliqda nechta yechimga ega?
$$\frac{cos^2x - cosx}{sinx} = 0$$
A) 6 B) 4 C) 3 D) 2 E) 1

5. (98-8-56)* Tenglamani yeching.
$$\frac{sin2x}{1+ctgx} = 0$$
A) $\frac{\pi}{2} + \pi k, \quad k \in Z$ B) $\pi k, \quad k \in Z$
C) $\frac{\pi k}{2}, \quad k \in Z$ D) $\frac{\pi}{4} + \pi k, \quad k \in Z$
E) $\pi + 2\pi k, \quad k \in Z$

6. (98-9-26) Tenglamani yeching.
$$\frac{1}{cos^2x} = 2tg^2x$$
A) $\pm\frac{\pi}{4} + 2\pi k, \quad k \in Z$ B) $\pm\frac{\pi}{4} + \pi k, \quad k \in Z$
C) $\pm\frac{\pi}{3} + \pi k, \quad k \in Z$ D) $\pm\frac{\pi}{3} + 2\pi k, \quad k \in Z$
E) $\pm\frac{\pi}{6} + \pi k, \quad k \in Z$

7. (99-1-44) $ctg(x+1) \cdot tg(2x-3) = 1$ tenglamaning $[\pi; 2\pi]$ oraliqdagi yechimini toping.
A) 4 B) 2 C) 3 D) 5 E) $\frac{\pi}{2} + \pi n, \quad n \in Z$

8. (99-2-28) Tenglamani yeching.
$$\frac{1}{1+tg^2x} = \frac{1}{1+ctg^2x}$$
A) $\pi + 2\pi k, \quad k \in Z$ B) $\frac{\pi}{4} + \frac{\pi k}{2}, \quad k \in Z$
C) $2\pi k, \quad k \in Z$ D) $\emptyset$ E) $\pi k, \quad k \in Z$

9. (00-4-47) Tenglamaning ildizlari yig'indisini toping.
$$\sqrt{1-cosx} = sinx \quad (x \in [\pi; 3\pi])$$
A) 2π B) 5π C) 6π D) $3,5\pi$ E) $4,5\pi$

10. (00-9-38) Tenglamani yeching.
$$\sqrt{2+cos^2 2x} = sinx - cosx$$
A) $\frac{\pi}{4} + 2\pi n, \quad n \in Z$ B) $-\frac{\pi}{4} + \pi n, \quad n \in Z$
C) $\frac{3\pi}{4} + 2\pi n, \quad n \in Z$ D) $-\frac{\pi}{4} + 2\pi n, \quad n \in Z$
E) $\frac{\pi}{4} + \pi n, \quad n \in Z$

11. (98-10-105) Tenglamaning $[0; 2\pi]$ kesmada nechta ildizi bor?
$$\frac{1+cosx}{sinx} = cos\frac{x}{2}$$
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

12. (99-3-35)* Tenglamaning $(180^0; 540^0)$ intervalga tegishli ildizlari ayirmasining modulini toping.
$$\frac{1-tg\frac{x}{2}}{1-ctg\frac{x}{2}} = 2sin\frac{x}{2}$$
A) 120^0 B) 135^0 C) 240^0 D) 180^0 E) 360^0

13. (00-8-47) Tenglamani yeching.
$$|tgx + ctgx| = \frac{4}{\sqrt{3}}$$
A) $\pm\frac{\pi}{6} + \frac{\pi k}{2}, \quad k \in Z$ B) $\frac{\pi}{3} + 2\pi k, \quad k \in Z$
C) $(-1)^k\frac{\pi}{6} + 2\pi k, \quad k \in Z$ D) $\pm\frac{\pi}{3} + \pi k, \quad k \in Z$
E) $\frac{2\pi}{3} + \pi k, \quad k \in Z$

14. (00-10-45)* Tenglamani yeching.

$$sin2x + tgx = 2$$

A) $-\frac{\pi}{4} + \pi k, \quad k \in Z$ B) $\frac{\pi}{4} + \pi k, \quad k \in Z$
C) $\frac{\pi}{6} + \frac{\pi k}{2}, \quad k \in Z$ D) $-\frac{\pi}{6} + \frac{\pi k}{2}, \quad k \in Z$
E) $\emptyset$

15. (01-2-32) Tenglamani yeching.

$$\frac{cos3x}{sin3x - 2sinx} = tgx$$

A) $\frac{\pi}{4} + \pi n, \quad n \in Z$ B) $\frac{\pi}{4} + 2\pi n, \quad n \in Z$
C) $\frac{\pi}{4} + \frac{\pi}{2}n, \quad n \in Z$ D) $\frac{\pi}{3} + \frac{\pi}{2}n, \quad n \in Z$
E) $\frac{\pi}{3} + \pi n \quad n \in Z$

16. (01-6-30) Ushbu

$$tg^2x - \frac{2}{cosx} + 1 = 0$$

tenglamaning $[0; 4\pi]$ kesmadagi yechimlari yig'indisini toping.
A) 7π B) $7\frac{2}{3}\pi$ C) 8π D) $7\frac{1}{3}\pi$ E) $8\frac{1}{3}\pi$

17. (01-7-42)* Tenglamani yeching.

$$tgx + tg2x = tg3x$$

A) $\frac{\pi n}{2}, \quad n \in Z$ B) $\frac{\pi n}{3}, \quad n \in Z$
C) $\pi n, \quad n \in Z$ D) $\frac{\pi n}{2}, \quad n \in Z$
E) To'g'ri javob keltirilmagan

18. (01-10-37) Ushbu

$$cos4x + \frac{10tgx}{1 + tg^2x} = 3$$

tenglamaning $[-\frac{\pi}{2}; \frac{\pi}{2}]$ kesmada nechta ildizi bor?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

19. (01-11-21) Tenglamani yeching.

$$tgx\ tg3x = -1$$

A) $\frac{\pi}{2}k, \quad k \in Z$ B) $\pi k, \quad k \in Z$
C) $\frac{\pi}{4} + \frac{\pi}{2}k, \ k \in Z$ D) $\frac{\pi}{4} + \pi k, \quad k \in Z$
E) $\frac{\pi}{2} + \pi k, \quad k \in Z$

20. (98-3-58)

$$\frac{cos2x}{\frac{\sqrt{2}}{2} + sinx} = 0$$

tenglamaning $[0; 4\pi]$ kesmada nechta ildizi bor?
A) 8 B) 6 C) 4 D) 2 E) 12

21. (03-2-28)*

$$cos2x + \sqrt{sin2x - tg\frac{4x - \pi}{4} \cdot tg\frac{4x + \pi}{4}} = 0$$

tenglama $[-\pi; 4\pi]$ oraliqda nechta ildizga ega?
A) 9 B) 7 C) 10 D) 8 E) 5

22. (03-7-39)

$$\sqrt{cos2x + \sqrt{3}sinx} = -2cosx$$

tenglamani yeching.
A) $\frac{2\pi}{3} + 2k\pi, \ k \in Z$ B) $\frac{\pi}{3} + 2k\pi, \ k \in Z$
C) $(-1)^k\frac{\pi}{3} + \pi k, \quad k \in Z$
D) $(-1)^k\frac{2\pi}{3} + 2\pi k, \quad k \in Z$ E) $\emptyset$

23. (03-9-32)

$$ctgx + \frac{sinx}{1 + cosx} = 2, \quad (-180^0 < x < 180^0)$$

tenglamaning ildizlari yig'indisini toping.
A) 150^0 B) 240^0 C) 135^0 D) 180^0 E) -150^0

24. (03-9-33)

$$sinx \cdot tgx - 2sinx + tgx = 2, \quad (-\pi \le x \le \pi)$$

tenglamaning ildizlari nechta?
A) 0 B) 1 C) 2 D) 3 E) 4

1. Turli tenglamalar.

1. (98-5-50) Tenglamani yeching.

$$4^{cos^2x + 2cosx} = 1$$

A) $\pi n; \frac{\pi}{2} + 2\pi n, \ n \in Z$ B) $\frac{\pi}{2} + \pi n, \ n \in Z$
C) $\pi n; -\frac{\pi}{2} + 2\pi n, \ n \in Z$ D) $\frac{\pi}{2} + \pi n; 2\pi n, \ n \in Z$
E) $\frac{\pi}{2} + 2\pi n, \ n \in Z$

2. (99-7-48) Tenglamani yeching.

$$5 \cdot 5^{sin^2x + cos2x} = \frac{1}{25}$$

A) $\emptyset$ B) $\pi n, \quad n \in Z$ C) $\frac{\pi}{2} + 2\pi n, \quad n \in Z$
D) $2\pi n, \quad n \in Z$ E) $\frac{\pi}{4} + 2\pi n, \quad n \in Z$

3. (99-8-77) Tenglamani yeching.

$$2^{-1 + sinx - sin^2x + \dots} = \frac{1}{4}$$

A) $(-1)^n\frac{\pi}{3} + \pi n; \quad n \in Z$
B) $(-1)^{n+1}\frac{\pi}{6} + \pi n, \quad n \in Z$
C) $(-1)^n\frac{\pi}{6} + \pi n, \quad n \in Z$
D) $(-1)^{n+1}\frac{\pi}{4} + \pi n, \quad n \in Z$
E) $(-1)^{n+1}\frac{\pi}{3} + \pi n, \quad n \in Z$

4. (00-9-29)* y va t

$$0,09^{-y^2} - 2 \cdot 0,3^{-y^2} \cdot cos2t + 1 = 0$$

tenglikni qanoatlantiradi. $sin\frac{3ty}{2}$ ni hisoblang.
A) $\frac{3}{2}$ B) $\frac{1}{2}$ C) 0 D) 1 E) $-\frac{1}{2}$

5. (96-7-58) Tenglamani eching.

$$5^{1 + log_5 cosx} = 2,5$$

A) $\frac{\pi}{3} + 2\pi n; \quad n \in Z$ B) $\pm\frac{\pi}{6} + 2\pi n, \quad n \in Z$
C) $\pm\frac{\pi}{3} + 2\pi n, \quad n \in Z$ D) $\frac{\pi}{4} + 2\pi n, \quad n \in Z$
E) $\pm\frac{\pi}{4} + \pi n, \quad n \in Z$

6. (97-3-58) Tenglamani eching.

$$2^{1 - log_2 sinx} = 4$$

A) $\frac{\pi}{6} + 2\pi n; \quad n \in Z$ B) $(-1)^n\frac{\pi}{6} + \pi n, \quad n \in Z$
C) $(-1)^n\frac{\pi}{3} + \pi n, \quad n \in Z$ D) $\frac{\pi}{4} + 2\pi n, \quad n \in Z$
E) $(-1)^n\frac{\pi}{2} + 2\pi n, \quad n \in Z$

7. (97-7-58) Tenglamani eching.

$$3^{1+log_3 ctgx} = \sqrt{3}$$

A) $\frac{\pi}{6} + \pi n; \quad n \in Z$ B) $\frac{\pi}{3} + \pi n, \quad n \in Z$
C) $\frac{\pi}{3} + 2\pi n, \quad n \in Z$ D) $\frac{\pi}{4} + \pi n, \quad n \in Z$
E) $\frac{\pi}{6} + 2\pi n, \quad n \in Z$

8. (97-12-64) Tenglamani yeching.

$$3^{1+log_3 tgx} = \sqrt{3}$$

A) $\frac{\pi}{3} + \pi n; \quad n \in Z$ B) $\frac{\pi}{6} + \pi n, \quad n \in Z$
C) $\frac{\pi}{6} + 2\pi n, \quad n \in Z$ D) $\frac{\pi}{3} + 2\pi n, \quad n \in Z$
E) $\emptyset$

9. (99-2-37) a ning qanday qiymatlarida $log_a sinx = 1$ tenglama yechimga ega?
A) $a \in [-1;1]$ B) $a \in (-1;1)$ C) $a \in (0;1]$
D) $a \in (0;1)$ E) $a \in [0;1)$

10. (96-3-59) Tenglamaning echimini toping.

$$3^{\frac{1}{2}+log_3 cosx} + 6^{\frac{1}{2}} = 9^{\frac{1}{2}+log_9 sinx}$$

A) $\frac{11\pi}{12} + 2\pi n; \quad n \in Z$ B) $\frac{7\pi}{12} + 2\pi n, \quad n \in Z$
C) $\frac{5\pi}{12} + 2\pi n, \quad n \in Z$ D) $\frac{\pi}{4} + 2\pi n, \quad n \in Z$
E) $\frac{3\pi}{4} + 2\pi n, \quad n \in Z$

11. (96-9-45) Tenglamani yeching.

$$log_{cosx} sin2x - 3 + 2log_{sin2x} cosx = 0$$

A) $(-1)^k \cdot \frac{\pi}{6} + \pi k; arcctg2 + 2\pi k \quad k \in Z$
B)$(-1)^k \frac{\pi}{3} + \pi k; arcctg2 + \pi k \quad k \in Z$
C) $(-1)^{k+1} \cdot \frac{\pi}{6} + \pi k; arctg2 + 2\pi k \quad k \in Z$
D) $(-1)^k \cdot \frac{\pi}{3} + \pi k; arctg2 + 2\pi k \quad k \in Z$
E) $\frac{\pi}{6} + 2\pi k; arcctg2 + 2\pi k \quad k \in Z$

12. (96-11-50) Tenglamani yeching.

$$6^{log_6(\sqrt{3}cosx)} + 5^{\frac{1}{2}log_5 6} = 27^{\frac{1}{3}+log_{27} sinx}$$

A) $\frac{3\pi}{4} + 2\pi n; \quad n \in Z$ B) $\frac{7\pi}{12} + 2\pi n, \quad n \in Z$
C) $\frac{5\pi}{12} + 2\pi n, \quad n \in Z$ D) $\frac{11\pi}{12} + 2\pi n, \quad n \in Z$
E) $\frac{\pi}{2} + 2\pi n, \quad n \in Z$

13. (96-12-52) Tenglamaning yechimini toping.

$$4^{log_4(\sqrt{3}cosx)} + 5^{log_5\sqrt{6}} = 7^{log_7(3sinx)}$$

A) $\frac{5\pi}{12} + 2\pi n; \quad n \in Z$ B) $\frac{7\pi}{12} + 2\pi n, \quad n \in Z$
C) $\frac{11\pi}{12} + 2\pi n, \quad n \in Z$ D) $\frac{\pi}{4} + 2\pi n, \quad n \in Z$
E) $\frac{3\pi}{4} + 2\pi n, \quad n \in Z$

14. (96-12-98) Tenglamani yeching.

$$log_{cosx} sin2x - 4 + 4log_{sin2x} cosx = 0$$

A) $arcctg2 + \pi k, \quad k \in Z$
B)$-arcctg2 + \pi k, \quad k \in Z$
C) $arcctg\sqrt{2} + 2\pi k, \quad k \in Z$
D) $-arcctg2 + 2\pi k, \quad k \in Z$
E) $arcctg2 + 2\pi k, \quad k \in Z$

15. (96-13-54) Tenglamaning yechimini toping.

$$log_{sinx} cos2x - 3 + 2log_{cos2x} sinx = 0$$

A) $\{\pm\frac{\pi}{6} + \pi k\}, \quad k \in Z$
B) $\{\pm\frac{\pi}{6} + \pi k; \pm arcsin(\frac{1}{\sqrt{3}}) + \pi k\}$
C) $\{\pm \arcsin(\frac{1}{\sqrt{3}}) + \pi k\}$
D)$\{(-1)^k \cdot \frac{\pi}{6} + \pi k; (-1)^k \cdot arcsin(\frac{1}{\sqrt{3}}) + \pi k\}$
E) $\{\frac{\pi}{6} + 2\pi k; arcsin(\frac{1}{\sqrt{3}}) + 2\pi k\}, \quad k \in Z$

16. (01-2-30) Tenglamani yeching.

$$log_{sinx} cosx = 1$$

A) $\frac{\pi}{4}$ B) $\frac{\pi}{4} + \pi n, \quad n \in Z$
C) $-\frac{\pi}{4} + \pi n, \quad n \in Z$ D) $\frac{\pi}{4} + 2\pi n, \quad n \in Z$
E) $-\frac{\pi}{4} + 2\pi n, \quad n \in Z$

17. (02-9-36)

$$9^{cosx} + 2 \cdot 3^{cosx} = 15$$

tenglamani yeching.
A) $\pi n, \quad n \in Z$ B) $2\pi n, \quad n \in Z$
C) $\frac{\pi}{3} + 2\pi n, \quad n \in Z$ D) $\frac{\pi}{2} + \pi n, \quad n \in Z$
E) $\frac{\pi}{4} + 2\pi n, \quad n \in Z$

18. (03-2-30)

$$3^{cosx} \cdot 3^{cos^2 x} \cdot 3^{cos^3 x} \cdot ... = 3$$

tenglamani yeching.
A) $\pm\frac{\pi}{3} + 2\pi k, \quad k \in Z$ B) $\frac{\pi}{3} + \pi k, \quad k \in Z$
C) $\frac{2\pi}{3} + \pi k, \quad k \in Z$ D) $\pm\frac{\pi}{6} + 2\pi k, \quad k \in Z$
E) $(-1)^k \cdot \frac{\pi}{3} + \pi k, \quad k \in Z$

19. (03-5-38)

$$\frac{lg(sin^2 x)}{lg(25 - x^2)} = 0$$

tenglama nechta ildizga ega?
A) 4 B) 5 C) 3 D) 2 E) cheksiz ko'p

20. (03-5-41)

$$8^{sin^2 x} - 2^{cos^2 x} = 0$$

tenglamani yeching.
A) $\pm\frac{\pi}{6} + \pi n, \quad n \in Z$ B) $\frac{\pi}{6} + \pi n, \quad n \in Z$
C) $-\frac{\pi}{6} + \pi n, \quad n \in Z$ D) $\frac{\pi}{4} + \pi n, \quad n \in Z$
E) $-\frac{\pi}{4} + \pi n, \quad n \in Z$

21. (03-9-34)

$$\sqrt{log_{\frac{1}{6}}(x-1) + 1} \cdot (cos^2 2x - sin^2 2x - 1) = 0$$

tenglamaning ildizlari nechta?
A) $\emptyset$ B) 2 C) 3 D) 4 E) cheksiz ko'p

22. (98-12-75)* Ushbu

$$1 + a \cdot cosx = (a+1)^2$$

tenglama hech bo'lmaganda bitta echimga ega bo'ladigan a ning nechta butun qiymati mavjud?
A) 4 B) 3 C) 5 D) 2 E) 1

23. (00-4-1)* a ning qanday qiymatlarida

$$sin^4x + cos^4x = a$$

tenglama echimga ega?
A) $\frac{1}{2} \le a \le 1$ B) $0 \le a \le \frac{1}{2}$ C) $a \ge \frac{1}{2}$
D) $a \le 1$ E) $0 \le a \le 1$

24. (00-9-33)* Ushbu

$$3sin4x - 2cosx = 5$$

tenglamaning $[-2\pi; 3\pi]$ oraliqda nechta ildizi bor?
A)$\emptyset$ B) 1 C) 3 D)4 E) 5

25. (00-9-36)* Ushbu

$$a \cdot (sin^6x + cos^6x) = sin^4x + cos^4x$$

tenglama ildizga ega bo'ladigan a ning barcha qiymatlarini ko'rsating.
A) $[-1; 1]$ B) $[0; 1]$ C) $[1; 2]$
D) $[1; 1, 5]$ E) $[1; 2, 5]$

26. (01-7-43) Ushbu

$$2x + tgx = 0$$

tenglama $[0; 2\pi]$ kesmada nechta ildizga ega?
A) 0 B) 1 C) 2 D) 3 E) 4

27. (01-10-36)* Ushbu

$$3sin2x + 5sin4x = 8$$

tenglama $[-2\pi; 2\pi]$ kesmada nechta ildizga ega?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

28. (02-6-41)*

$$3sin5x + 4cos5x = 6$$

tenglama $[-\pi; 2\pi]$ kesmada nechta ildizga ega?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

29. (03-7-73)* a parametrning qanday qiymatlarida

$$7sinx - 5cosx = a$$

tenglama echimga ega bo'ladi?
A) $-1 \le a \le 1$ B) $-\sqrt{24} \le a \le \sqrt{24}$
C) $0 \le a \le 1$ D) $2 \le a \le 12$
E) $-\sqrt{74} \le a \le \sqrt{74}$

30. (03-12-61) a parametrning qanday qiymatlarida

$$sin^6x + cos^6x = a$$

tenglama echimga ega?
A) $[0; 1]$ B) $[0, 5; 1]$ C) $[0, 25; 0, 5]$
D) $[0, 25; 1]$ E) $[0, 25; 0, 75]$

2.1.11 Trigonometrik tengsizliklar.

1. $sinx \ge a, \quad -1 \le a \le 1$
$2n\pi + arcsina \le x \le -arcsina + (2n+1)\pi, \quad n \in Z$

2. $sinx \le a, \quad -1 \le a \le 1$
$(2n-1)\pi - arcsina \le x \le arcsina + 2n\pi, \quad n \in Z$

3. $cosx \ge a, \quad -1 \le a \le 1$
$2n\pi - arccosa \le x \le arccosa + 2n\pi, \quad n \in Z$

4. $cosx \le a, \quad -1 \le a \le 1$
$2n\pi + arccosa \le x \le -arccosa + 2(n+1)\pi, \quad n \in Z$

5. $tgx \ge b, \quad arctgb + n\pi \le x < \frac{\pi}{2} + n\pi, \quad n \in Z$

6. $tgx \le b, \quad -\frac{\pi}{2} + \pi n < x \le arctgb + n\pi, \quad n \in Z$

7. $ctgx \ge b, \quad n\pi < x \le arcctgb + n\pi, \quad n \in Z$

8. $ctgx \le b, \quad arcctgb + n\pi \le x < \pi + n\pi, \quad n \in Z$

(97-6-47) Ushbu $y = \sqrt{2sinx - 1}$ funksiyaning aniqlanish sohasini toping.
A) $\left(-\frac{\pi}{6} + 2\pi n; \frac{\pi}{6} + 2\pi n\right), \quad n \in Z$
B) $[\frac{\pi}{6} + 2\pi n; \frac{5\pi}{6} + 2\pi n], \quad n \in Z$
C) $\left(\frac{\pi}{6} + 2\pi n; \frac{5\pi}{6} + 2\pi n\right), \quad n \in Z$
D) $[-\frac{\pi}{6} + 2\pi n; \frac{\pi}{6} + 2\pi n], \quad n \in Z$
E) $[\frac{\pi}{3} + \pi n; \frac{2\pi}{3} + \pi n], \quad n \in Z$

Yechish: $y = \sqrt{2sinx - 1}$ funksiya $2sinx - 1 \ge 0$ bo'lganda aniqlangan. Bu tengsizlikni

$$sinx \ge \frac{1}{2}$$

ko'rinishda yozamiz.
Javob: $\frac{\pi}{6} + 2\pi n \le x \le \frac{5\pi}{6} + 2\pi n, \quad n \in Z$ (B).

1. (96-9-51) Ushbu $sin^2x - \frac{5}{2}sinx + 1 < 0$ tengsizlik x ($x \in [0; 2\pi]$) ning qanday qiymatlarida o'rinli?
A) $[0; \frac{\pi}{6}] \cup [\frac{5\pi}{6}; 2\pi]$ B) $(\frac{\pi}{6}; \frac{5\pi}{6})$
C) $(0; \frac{\pi}{3}) \cup (\frac{2\pi}{3}; 2\pi]$ D) $[0; \frac{\pi}{3}) \cup (\frac{2\pi}{3}; 2\pi]$ E) $\emptyset$

2. (96-9-105) Tengsizlikni yeching.

$$2sin2x \ge ctg\frac{\pi}{4}$$

A) $[\frac{\pi}{6} + 2\pi n; \frac{5\pi}{6} + 2\pi n], \quad n \in Z$
B) $(\frac{\pi}{12} + \pi n; \frac{5\pi}{12} + \pi n), \quad n \in Z$
C) $[\frac{\pi}{12} + \pi n; \frac{5\pi}{12} + \pi n], \quad n \in Z$
D) $[\frac{\pi}{12} + 2\pi n; \frac{5\pi}{12} + 2\pi n], \quad n \in Z$
E) $[-\frac{\pi}{3} + 2\pi n; \frac{\pi}{3} + 2\pi n], \quad n \in Z$

3. (97-9-101) Tengsizlikni yeching.

$$sinx \cdot cosx > \frac{\sqrt{2}}{4}$$

A) $\frac{\pi}{8} + 2\pi k < x < \frac{3\pi}{8} + 2\pi k, \quad k \in Z$
B) $\frac{\pi}{4} + \pi k < x < \frac{3\pi}{4} + \pi k, \quad k \in Z$
C) $\frac{\pi}{8} + \pi k < x < \frac{3\pi}{8} + \pi k, \quad k \in Z$
D) $\frac{\pi}{8} + \pi k \le x \le \frac{3\pi}{8} + \pi k, \quad k \in Z$
E) $\frac{\pi}{8} + \pi k < x < \frac{5\pi}{8} + \pi k, \quad k \in Z$

4. (98-2-28) Ushbu

$$|sinx + 1| > 1,5$$

tengsizlik x ning $(0;\pi)$ kesmaga tegishli qanday qiymatlarida o'rinli bo'ladi?
A) $\frac{\pi}{6} \le x \le \frac{5\pi}{6}$ B) $\frac{\pi}{6} < x < \frac{5\pi}{6}$
C) $\frac{\pi}{3} < x < \frac{2\pi}{3}$ D) $\frac{\pi}{3} \le x \le \frac{2\pi}{3}$
E) $0 < x < \frac{\pi}{6}$

5. (98-5-51) Tengsizlikni yeching.

$$sin5x \cdot cos4x + cos5x \cdot sin4x > \frac{1}{2}$$

A) $\frac{\pi}{6} + 2\pi n < x < \frac{5\pi}{6} + 2\pi n, \quad n \in Z$
B) $\frac{\pi}{54} + 2\pi n < x < \frac{5\pi}{54} + 2\pi n, \quad n \in Z$
C) $\frac{\pi}{36} + \frac{2\pi n}{9} < x < \frac{5\pi}{36} + \frac{2\pi n}{9}, \quad n \in Z$
D) $\frac{\pi}{36} + \frac{2\pi n}{9} < x < \frac{5\pi}{54} + \frac{2\pi n}{9}, \quad n \in Z$
E) $\frac{\pi}{54} + \frac{2\pi n}{9} < x < \frac{5\pi}{54} + \frac{2\pi n}{9}, \quad n \in Z$

6. (98-8-60) Tengsizlikni yeching.

$$1 - 2sin4x < cos^2 4x$$

A) $(\pi k; \frac{\pi}{2} + \pi k), \quad k \in Z$
B) $(-\frac{\pi}{2} + 2\pi k; \frac{\pi}{2} + 2\pi k), \quad k \in Z$
C) $(\frac{\pi k}{2}; \frac{\pi}{4} + \frac{\pi k}{2}), \quad k \in Z$
D) $(-\frac{\pi}{4} + 2\pi k; \frac{\pi}{4} + 2\pi k), \quad k \in Z$
E) $(\frac{\pi}{8} + 2\pi k; \frac{5\pi}{8} + 2\pi k), \quad k \in Z$

7. (99-1-43) Tengsizlikni yeching.

$$2sinx \ge \sqrt{2}$$

A) $\frac{\pi}{4} + 2\pi n \le x \le \frac{3\pi}{4} + 2\pi n, \quad n \in Z$
B) $-\frac{5\pi}{4} + 2\pi n \le x \le \frac{\pi}{4} + 2\pi n, \quad n \in Z$
C) $\frac{\pi}{4} + 2\pi n \le x \le \frac{3\pi}{4} + 2\pi n, \quad n \in Z$
D) $\frac{\pi}{4} + \pi n \le x \le \frac{3\pi}{4} + \pi n, \quad n \in Z$
E) $-\frac{5\pi}{4} + \pi n \le x \le \frac{\pi}{4} + \pi n, \quad n \in Z$

8. (99-2-29) Ushbu

$$|1 + sinx| \le \frac{1}{2}$$

tengsizlikning $[0; 2\pi]$ oraliqdagi eng katta va eng kichik yechimlari ayirmasini toping.
A) π B) $1,5\pi$ C) $\frac{2\pi}{3}$ D) $1,2\pi$ E) $\frac{3\pi}{4}$

9. (96-12-111) x ning qaysi qiymatlarida tengsizlik to'g'ri?($x \in [0; 2\pi]$)

$$cos^2 x - \frac{5}{2}cosx + 1 > 0$$

A) $[0; \frac{\pi}{3}] \cup (\frac{5\pi}{3}; 2\pi]$ B) $(\frac{\pi}{3}; \frac{\pi}{2}] \cup [\frac{3\pi}{2}; \frac{5\pi}{3})$
C)$(\frac{\pi}{3}; \frac{5\pi}{3})$ D) $(\frac{\pi}{3}; \frac{\pi}{2}]$ E) $[\frac{3\pi}{2}; \frac{5\pi}{3})$

10. (96-13-26) Ushbu

$$cos^2 x - \frac{5}{2}cosx + 1 \le 0$$

tengsizlik x ($x \in [0; 2\pi]$) ning qanday qiymatlarida o'rinli?
A) $[0; \frac{\pi}{3}] \cup [\frac{5\pi}{3}; 2\pi]$ B) $[0; \frac{\pi}{3}]$ C) $[\frac{5\pi}{3}; 2\pi]$
D) $[\frac{\pi}{2}; \frac{3\pi}{2}] \cup [\frac{3\pi}{2}; \frac{5\pi}{2}]$ E) $[\frac{\pi}{2}; \frac{5\pi}{2}]$

11. (97-4-41) Tengsizlikni yeching.

$$cos^2 x < \frac{\sqrt{2}}{2} + sin^2 x$$

A) $\frac{\pi}{8} + 2\pi n < x < \frac{7\pi}{8} + 2\pi n, \quad n \in Z$
B) $\frac{\pi}{8} + \pi n < x < \frac{7\pi}{8} + \pi n, \quad n \in Z$
C) $-\frac{\pi}{8} + 2\pi n < x < \frac{\pi}{8} + 2\pi n, \quad n \in Z$
D) $\frac{\pi}{4} + 2\pi n < x < \frac{7\pi}{4} + 2\pi n, \quad n \in Z$
E) $-\frac{\pi}{8} + \pi n < x < \frac{\pi}{8} + \pi n, \quad n \in Z$

12. (98-1-60) Tengsizlikni yeching.

$$1 - 2cos2x > sin^2 2x$$

A) $(\frac{\pi}{2} + \pi k; \pi + \pi k), \quad k \in Z$
B) $(\frac{\pi}{3} + 2\pi k; \frac{2\pi}{3} + 2\pi k), \quad k \in Z$
C) $(\frac{\pi}{4} + \pi k; \frac{3\pi}{4} + \pi k), \quad k \in Z$
D) $(-\frac{\pi}{2} + \pi k; \frac{\pi}{2} + \pi k), \quad k \in Z$
E) $(-\frac{\pi}{3} + 2\pi k; \frac{\pi}{3} + 2\pi k), \quad k \in Z$

13. (98-6-55) Ushbu

$$cos2x \le -\frac{1}{2}$$

tengsizlikning $[0; \pi]$ kesmadagi yechimini toping.
A) $[\frac{\pi}{3}; \frac{2\pi}{3}]$ B) $[0; \frac{2\pi}{3}]$ C)$[-\frac{2\pi}{3}; \frac{4\pi}{3}]$
D)$[\frac{4\pi}{3}; 2\pi]$ E) $[\frac{2\pi}{3}; \frac{4\pi}{3}]$

14. (98-9-24) x ning $(-\pi; \pi)$ oraliqqa tegishli qanday qiymatlarida

$$|cosx + 2,5| \ge 3$$

tengsizlik o'rinli bo'ladi?
A) $[-\frac{\pi}{3}; \frac{\pi}{3}]$ B) $(-\frac{\pi}{6}; \frac{\pi}{6})$ C)$(-\frac{\pi}{3}; \frac{\pi}{3})$
D)$[-\frac{\pi}{6}; \frac{\pi}{6}]$ E) $[-\frac{\pi}{4}; \frac{\pi}{4}]$

15. (98-11-100) Tengsizlikni yeching.

$$(cosx + 2)|x - 5|(x - 2) \le 0$$

A) $(-\infty; 2] \cup \{5\}$ B) $(-\infty; 2]$
C) $[2; 5]$ D) $\{5\}$ E) $\emptyset$

16. (98-12-59) Tengsizlikni yeching.

$$sin^2 3x - cos^2 3x \le -\frac{\sqrt{3}}{2}$$

A) $\left[-\frac{\pi}{36} + \frac{\pi n}{3}; \frac{\pi}{36} + \frac{\pi n}{3}\right], \quad n \in Z$
B) $\left(-\frac{\pi}{36} + \frac{\pi n}{3}; \frac{\pi}{36} + \frac{\pi n}{3}\right), \quad n \in Z$
C) $\left[-\frac{\pi}{6} + 2\pi n; \frac{\pi}{6} + 2\pi n\right], \quad n \in Z$
D) $\left(-\frac{\pi}{6} + 2\pi n; \frac{\pi}{6} + 2\pi n\right], \quad n \in Z$
E) $\left[-\frac{\pi}{36}; \frac{\pi}{36}\right], \quad n \in Z$

17. (99-3-38) Tengsizlikni yeching.

$$4cos^2 x - 3 \ge 0$$

A) $[-\frac{\pi}{3} + 2\pi k; \frac{\pi}{3} + 2\pi k], \quad k \in Z$
B) $[-\frac{\pi}{3} + \pi k; \frac{\pi}{3} + \pi k], \quad k \in Z$
C) $[-\frac{\pi}{6} + \pi k; \frac{\pi}{6} + \pi k], \quad k \in Z$
D) $[-\frac{\pi}{6} + 2\pi k; \frac{\pi}{6} + 2\pi k], \quad k \in Z$
E) $[-\frac{\pi}{12} + \pi k; \frac{\pi}{6} + \pi k], \quad k \in Z$

18. (99-7-49) Tengsizlikni yeching.

$$cos5x \cdot cos4x + sin5x \cdot sin4x < \frac{\sqrt{3}}{2}$$

A) $\frac{\pi}{3} + 2\pi n < x < \frac{5\pi}{3} + 2\pi n, \quad n \in Z$
B) $\frac{\pi}{6} + 2\pi n < x < \frac{11\pi}{6} + 2\pi n, \quad n \in Z$
C) $\frac{\pi}{3} + \pi n < x < \frac{5\pi}{3} + \pi n, \quad n \in Z$
D) $\frac{\pi}{6} + \pi n < x < \frac{11\pi}{6} + \pi n, \quad n \in Z$
E) $\frac{\pi}{4} + 2\pi n < x < \frac{7\pi}{4} + 2\pi n, \quad n \in Z$

19. (99-9-33) Tengsizliklar sistemasini yeching.

$$\begin{cases} 0 \le x \le \pi \\ 2cos^2 x - 1 \ge \frac{1}{2} \end{cases}$$

A) $[0; \frac{\pi}{3}]$ B) $[0; \frac{\pi}{6}] \cup [\frac{5\pi}{6}; \pi]$ C)$[0; \frac{2\pi}{3}]$
D) $[\frac{2\pi}{3}; \pi]$ E) $[\frac{\pi}{6}; \frac{\pi}{2}] \cup [\frac{2\pi}{3}; \pi]$

20. (00-3-55) Quyidagi tengsizlik

$$-1 - \frac{2}{\sqrt{3}} cosx > 0$$

$[-\pi; \pi]$ kesmada nechta butun yechimga ega?
A) 4 B) 3 C) 6 D) 5 E) 2

21. (00-6-56) Tengsizlikni yeching.

$$cosx < sinx$$

A) $(\frac{\pi}{4} + \pi k; \frac{3\pi}{4} + \pi k), \quad k \in Z$
B) $(\frac{\pi}{4} + \pi k; \frac{5\pi}{4} + \pi k), \quad k \in Z$
C) $(\frac{\pi}{4} + 2\pi k; \frac{3\pi}{4} + 2\pi k), \quad k \in Z$
D) $(2\pi k; \pi + 2\pi k), \quad k \in Z$
E) $(\frac{\pi}{4} + 2\pi k; \frac{5\pi}{4} + 2\pi k), \quad k \in Z$

22. (96-1-59) Tengsizlikni yeching.

$$tg\Big(x + \frac{\pi}{4}\Big) \ge 1$$

A) $\Big[-\frac{\pi}{4} + \pi k; \frac{\pi}{2} + \pi k\Big], \quad k \in Z$
B) $[\pi k; \infty) \quad k \in Z$
C) $\Big[\frac{\pi}{4} + 2\pi k; \frac{\pi}{2} + 2\pi k\Big], \quad k \in Z$
D) $\Big[\pi k; \frac{\pi}{4} + \pi k\Big), \quad k \in Z$
E) $\Big[\frac{\pi}{4} + \pi k; \frac{\pi}{2} + \pi k\Big), \quad k \in Z$

23. (97-11-47) Ushbu $y = \sqrt{tgx + 1}$ funksiyaning aniqlanish sohasini toping.
A) $[-\frac{\pi}{4} + \pi n; \frac{\pi}{2} + \pi n], \quad n \in Z$
B) $[\frac{\pi}{4} + \pi n; \frac{\pi}{2} + \pi n], \quad n \in Z$
C) $[-\frac{\pi}{4} + \pi n; \frac{\pi}{2} + \pi n), \quad n \in Z$
D) $(-\frac{\pi}{2} + \pi n; -\frac{\pi}{4} + \pi n], \quad n \in Z$
E) $(-\frac{\pi}{2} + \pi n; \frac{\pi}{4} + \pi n], \quad n \in Z$

24. (99-10-33) Tengsizliklar sistemasining eng katta va eng kichik yechimlari ayirmasini toping.

$$\begin{cases} 0 < x < \frac{\pi}{2} \\ 1 \le tgx \le \sqrt{3} \end{cases}$$

A) $-\frac{\pi}{12}$ B) $\frac{\pi}{6}$ C)$-\frac{\pi}{6}$ D) $\frac{\pi}{3}$ E) $\frac{\pi}{12}$

25. (97-1-48) Ushbu $y = \sqrt{ctgx - 1}$ funksiyaning aniqlanish sohasini toping.
A) $[\pi n; \frac{\pi}{4} + \pi n], \quad n \in Z$
B) $[\frac{\pi}{4} + \pi n; \pi + \pi n), \quad n \in Z$
C) $(\pi n; \frac{\pi}{4} + \pi n], \quad n \in Z$
D) $(\frac{\pi}{4} + \pi n; \frac{\pi}{2} + \pi n), \quad n \in Z$
E) $(-\frac{\pi}{2} + \pi n; \frac{\pi}{4} + \pi n), \quad n \in Z$

26. (97-5-38) Ushbu $y = log_2 sinx$ funksiyaning aniqlanish sohasini toping.
A) $(\pi n; \pi + 2\pi n), \quad n \in Z$
B) $(\frac{\pi}{2} n; \pi + 2\pi n), \quad n \in Z$
C) $(\frac{3\pi}{2} n; \frac{3\pi}{2} + 2\pi n), \quad n \in Z$
D) $(2\pi n; \pi + 2\pi n), \quad n \in Z$
E) $(\pi n; \pi + 2\pi n), \quad n \in Z$

27. (96-9-49) $y = \sqrt{1 + log_{1/2} cosx}$ funksiya x ($x \in [0; 2\pi]$) ning qanday qiymatlarida aniqlangan?
A) $[0; \pi]$ B) $[0; \frac{\pi}{4}] \cup [\frac{7\pi}{4}; 2\pi]$ C)$[0; \frac{\pi}{2}) \cup; (\frac{3\pi}{2}; 2\pi]$
D)$[0; \frac{\pi}{2}] \cup [\frac{3\pi}{2}; 2\pi]$ E) $[0; \frac{\pi}{3}] \cup [\frac{5\pi}{3}; 2\pi]$

28. (97-9-38) Ushbu $y = log_5(5sinx)$ funksiyaning aniqlanish sohasini toping.
A) $(-\pi + 2\pi n; \frac{\pi}{2} + 2\pi n), \quad n \in Z$
B) $(2\pi n; \pi + 2\pi n), \quad n \in Z$
C) $(-\pi n; \frac{\pi}{2} + 2\pi n), \quad n \in Z$
D) $(\pi n; \frac{3\pi}{4} + 2\pi n), \quad n \in Z$
E) $(\pi n; \frac{\pi}{2} + 2\pi n), \quad n \in Z$

29. (98-4-35) Ushbu $y = \sqrt{lg(cosx)}$ funksiyaning aniqlanish sohasiga tegishli nuqtalardan nechtasi $[-10\pi; 10\pi]$ kesmaga tegishli .
A) cheksiz ko'p B) 10 C) 21 D) 5 E) 11

30. (00-10-63) Funksiyaning aniqlanish sohasini toping.

$$y = lgsinx + \sqrt{-x^2 + 7x}$$

A) $(0; \pi) \cup (2\pi; 7]$ B) $(-1; 1)$ C) $[0; 7]$
D) $[0; \pi]$ E)$(0; \pi) \cup (\pi; 2\pi)$

31. (00-10-73) Funksiyaning aniqlanish sohasini toping.

$$y = \frac{\sqrt{log_2 sinx}}{\sqrt{x^2 - 3x + 2}}$$

A) $\frac{\pi}{2} + 2\pi n, \quad n \ne 0, n \in Z$ B) $\frac{\pi}{2} + 2\pi n, \quad n \in Z$
C) $\frac{\pi}{6} + 2\pi n, \quad n \in Z$ D) $(-\frac{\pi}{4}; \frac{\pi}{4}), \quad n \in Z$
E)$\frac{3\pi}{2} + 2\pi n, \quad n \in Z$

32. (99-9-49) Tengsizlikning eng kichik butun yechimini toping.

$$9^{log_3(x-3)} > 1$$

A) 4 B) 6 C) 5 D) 3 E) 7

33. (96-12-91) x ning qaysi qiymatlarida funksiya aniqlangan? ($x \in [0; 2\pi]$)

$$y = \sqrt{1 - log_{\frac{1}{2}} cosx}$$

A) $[\frac{\pi}{3}; \frac{\pi}{2})$ B) $(\frac{3\pi}{2}; \frac{5\pi}{3}]$ C)$[0; \frac{\pi}{3}]$
D)$[\frac{\pi}{2}; \frac{\pi}{2}) \cup (\frac{3\pi}{2}; \frac{5\pi}{3}]$ E) $[\frac{5\pi}{3}; 2\pi] \cup [0; \frac{\pi}{3}]$

34. (96-13-34) Ushbu $y=\sqrt{1+log_{\frac{1}{2}}sinx}$ funksiya $x(x\in[0;2\pi])$ning qanday qiymatlarida aniqlangan?
A) $\left[\frac{\pi}{6};\frac{5\pi}{6}\right]$ B) $\left(0;\frac{\pi}{6}\right]\cup\left[\frac{5\pi}{6};\pi\right)$
C)$\left(0;\frac{\pi}{6}\right]$ D) $(0;\pi)$ E) $\left[\frac{5\pi}{6};\pi\right)$

35. (99-5-19) Tengsizlikning $[0;\pi]$ oraliqqa tegishli barcha yechimlarini aniqlang?

$$(\pi-e)^{ln(cos^4x-sin^4x)}\geq 1$$

A) $[0;\frac{\pi}{2}]\cup[\frac{3\pi}{2};2\pi]$ B) $[0;\frac{\pi}{2})\cup(\frac{3\pi}{2};2\pi]$
C)$[0;\frac{\pi}{4}]\cup[\frac{3\pi}{4};\pi]$ D)$[\frac{\pi}{4};\frac{\pi}{2})\cup(\frac{3\pi}{2};2\pi]$
E) $[0;\frac{\pi}{4})\cup(\frac{3\pi}{4};\pi]$

36. (00-9-28) Tengsizlikni yeching.

$$\left(\frac{\pi}{2}-\frac{e}{3}\right)^{ln(2cosx)}\geq 1\quad(x\in[0;2\pi]).$$

A)$[\frac{\pi}{3};\frac{\pi}{2}]\cup[\frac{3\pi}{2};\frac{5\pi}{3}]$ B)$[\frac{\pi}{3};\frac{5\pi}{3}]$ C)$[\frac{\pi}{3};\frac{\pi}{2})$
D)$[\frac{\pi}{6};\frac{\pi}{2})\cup(\frac{3\pi}{2};\frac{5\pi}{6}]$ E) $[\frac{\pi}{3};\frac{\pi}{2})\cup(\frac{3\pi}{2};\frac{5\pi}{3}]$

37. (01-1-51) Tengsizlikni yeching.

$$sinx>cosx$$

A) $(\pi n;\frac{\pi}{2}+\pi n),\quad n\in Z$
B) $(\frac{\pi}{4}+2\pi n;\frac{5\pi}{4}+2\pi n),\quad n\in Z$
C) $(\frac{\pi}{4}+\pi n;\frac{5}{4}\pi+\pi n),\quad n\in Z$
D) $(\frac{\pi}{4}+\pi n;\frac{\pi}{2}+\pi n),\quad n\in Z$
E) $(\frac{3\pi}{4}+2\pi n;\frac{7\pi}{4}+2\pi n),\quad n\in Z$

38. (01-2-79) $[-13;18]$ kesmadagi nechta butun son

$$y=\sqrt{|x|-x}+\sqrt{-sin^2(2\pi x)}$$

funksiyaing aniqlanish sohasiga tegishli?
A) 31 B) 32 C) 22 D) 63 E) 24

39. (01-4-2) $[0;2\pi]$ kesmaga tegishli nechta nuqta

$$y=ln\left(2sin3x+3cos2x-\frac{17}{3}\right)$$

funksiyaing aniqlanish sohasiga tegishli?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

40. (01-4-3) Ushbu $y=arccos(2sinx)$ funksiyaning aniqlanish sohasiga tegishli bo'lgan x ning $[-\pi;\pi]$ kesmadagi barcha qiymatlarini aniqlang.
A) $[-\frac{\pi}{6};\frac{\pi}{6}]$ B) $[-\frac{\pi}{4};\frac{\pi}{4}]$ C)$[-\frac{\pi}{3};\frac{\pi}{3}]$
D)$[-\pi;-\frac{5\pi}{6}]\cup[-\frac{\pi}{6}\frac{\pi}{6}]\cup[\frac{5\pi}{6};\pi]$
E) $[-\pi;-\frac{2\pi}{3}]\cup[-\frac{\pi}{3};\frac{\pi}{3}]\cup[\frac{2\pi}{3};\pi]$

41. (01-10-39) Tengsizlikni yeching.

$$sin2x<cos2x$$

A) $(-\frac{3\pi}{8}+2\pi n;\frac{\pi}{8}+2\pi n),\quad n\in Z$
B) $(-\frac{3\pi}{4}+2\pi n;\frac{\pi}{4}+2\pi n),\quad n\in Z$
C) $(-\frac{\pi}{8}+\pi n;\frac{\pi}{8}+\pi n),\quad n\in Z$
D) $(-\frac{\pi}{4}+2\pi n;\frac{\pi}{4}+2\pi n),\quad n\in Z$
E) $(-\frac{3\pi}{8}+\pi n;\frac{\pi}{8}+\pi n),\quad n\in Z$

42. (01-11-22) Ushbu

$$2^{\frac{1}{2}}\leq 2^{sinx}\leq 2^{\frac{\sqrt{3}}{2}}$$

tengsizlikning $[0;2\pi]$ oraliqdagi eng katta va eng kichik yechimlari yig'indisini hisoblang.
A) $\frac{2\pi}{3}$ B) π C)$\frac{4\pi}{5}$ D)$\frac{\pi}{2}$ E) $\frac{3\pi}{4}$

43. (02-1-62)

$$cos(sinx)<0$$

tengsizlikni yeching.
A) $(\frac{\pi}{2}+2\pi n;\frac{3\pi}{2}+2\pi n),\quad n\in Z$
B) $(\frac{\pi}{2}+\pi n;\frac{3\pi}{2}+\pi n),\quad n\in Z$
C) $(0;\frac{3\pi}{2}+2\pi n),\quad n\in Z$
D) $(0;\frac{3\pi}{2}),\quad n\in Z$ E) yechimga ega emas

44. (02-6-45)

$$sinx>\sqrt{3}\cdot cosx$$

tengsizlikni yeching.
A) $(\frac{\pi}{3}+2\pi n;\frac{4\pi}{3}+2\pi n),\quad n\in Z$
B) $(\frac{\pi}{6}+\pi n;\frac{2\pi}{3}+\pi n),\quad n\in Z$
C) $(\frac{\pi}{6}+2\pi n;\frac{7\pi}{6}+2\pi n),\quad n\in Z$
D) $(\frac{\pi}{4}+\pi n;\frac{3\pi}{4}+\pi n),\quad n\in Z$
E) $(\frac{\pi}{6}+\frac{\pi n}{2};\frac{\pi}{3}+\frac{\pi n}{2}),\quad n\in Z$

45. (02-8-19)

$$y=\sqrt{log_3 sinx}$$

funksiyaning aniqlanish sohasini toping.
A) $\frac{\pi}{2}+2\pi n,\quad n\in Z$ B) $\frac{\pi}{2}+\pi n,\quad n\in Z$
C) $(0;1)$ D) $(0;\pi)$ E)$\frac{\pi}{4}+2\pi n,\quad n\in Z$

46. (02-9-43)

$$log_{\frac{2}{\sqrt{5}}}\frac{8sin(\pi+x)}{5}>2$$

tengsizlikni yeching.
A) $(-\frac{5\pi}{6}+2\pi k;-\frac{\pi}{6}+2\pi k),\quad k\in Z$
B) $(\frac{\pi}{6}+2\pi k;\frac{5\pi}{6}+2\pi k),\quad k\in Z$
C) $(-\pi+2\pi k;-\frac{5\pi}{6}+2\pi k)\cup(-\frac{\pi}{6}+2\pi k;2\pi k),\quad k\in Z$
D) $(-\pi+2\pi k;-\frac{5\pi}{6}+2\pi k)\cup(2\pi k;\frac{\pi}{6}+2\pi k),\quad k\in Z$
E) $(-\frac{\pi}{6}+2\pi k;\frac{7\pi}{6}+2\pi k),\quad k\in Z$

47. (02-10-25) $y=\sqrt{1-2cos^2x}$ funksiyaning aniqlanish sohasini toping.
A) $[\frac{\pi}{4}+\pi n;\frac{3\pi}{4}+\pi n],\quad n\in Z$
B) $[-\frac{\pi}{2}+2\pi n;\frac{\pi}{2}+2\pi n],\quad n\in Z$
C) $[2\pi n;\pi+2\pi n],\quad n\in Z$
D) $[\frac{\pi}{2}+2\pi n;\frac{3\pi}{2}+2\pi n],\quad n\in Z$
E) $[\frac{\pi}{4}+2\pi n;\frac{7\pi}{4}+2\pi n],\quad n\in Z$

48. (02-10-62)

$$\sqrt{cos^2x-cosx+\frac{1}{4}}\geq\frac{1}{2}$$

tengsizlikni eching.
A) $[\frac{\pi}{2}+2\pi n;\frac{3\pi}{2}+2\pi n]\cup\{2\pi n\},\quad n\in Z$
B) $[-\frac{\pi}{2}+2\pi n;\frac{\pi}{2}+2\pi n]\cup\{2\pi n\},\quad n\in Z$
C) $(-\frac{\pi}{2}+2\pi n;\pi+2\pi n]\cup\{2\pi n\},\quad n\in Z$
D) $[\frac{2\pi}{3}+\pi n;\frac{7\pi}{6}+\pi n],\quad n\in Z$
E) $[\frac{5\pi}{6}+2\pi n;\frac{4\pi}{3}+2\pi n],\quad n\in Z$

49. (02-12-41)

$$\sqrt{sinx} \geq \frac{\sqrt{2}}{2}$$

tengsizlikning $[0;\pi]$ kesmadagi eng katta va ega kichik yechimlari ayirmasini toping.
A) $\frac{5\pi}{6}$ B) $\frac{2\pi}{3}$ C) $\frac{3\pi}{4}$ D) $\frac{2\pi}{5}$ E) $\frac{3\pi}{5}$

50. (03-1-34)

$$\left(cosx+\frac{\pi}{2}\right)\left(sinx-\frac{\pi}{3}\right)\left(tg^2x-\frac{1}{3}\right)\geq 0$$

tengsizlikni yeching.
A) $\left[-\frac{\pi}{3}+\pi n;\frac{\pi}{2}+\pi n\right], \quad n\in Z$
B) $\left[-\frac{\pi}{3}+\pi n;\frac{\pi}{3}+\pi n\right], \quad n\in Z$
C) $\left[-\frac{\pi}{3}+\pi n;\frac{\pi}{6}+\pi n\right], \quad n\in Z$
D) $\left[-\frac{\pi}{6}+\pi n;\frac{\pi}{3}+\pi n\right], \quad n\in Z$
E) $\left[-\frac{\pi}{6}+\pi n;\frac{\pi}{6}+\pi n\right], \quad n\in Z$

51. (03-2-31)

$$cos(\pi sinx)>0$$

tengsizlikni yeching.
A) $\left(\pi k;\frac{\pi}{3}+\pi k\right), \quad k\in Z$
B) $\left(-\frac{\pi}{6}+\pi k;\frac{\pi}{6}+\pi k\right), \quad k\in Z$
C) $\left(-\frac{\pi}{3}+2\pi k;\frac{\pi}{3}+2\pi k\right), \quad k\in Z$
D) $\left(\pi k;\frac{\pi}{6}+\pi k\right), \quad k\in Z$
E) $\left(-\frac{\pi}{6}+2\pi k;\frac{\pi}{6}+2\pi k\right), \quad k\in Z$

52. (03-4-27)

$$1\leq\frac{tg3x+tgx}{1-tg3xtgx}\leq\sqrt{3}\quad(0<x<\pi)$$

tengsizlikning eng katta va ega kichik yechimlari yig'indisini toping.
A) $\frac{\pi}{7}$ B) $\frac{43}{48}\pi$ C) $\frac{5\pi}{48}$ D) $\frac{7\pi}{48}$ E) $\frac{3\pi}{16}$

53. (03-6-64)

$$y=\sqrt{4cos^2 2x-3}$$

funksiyaning aniqlanish sohasini toping.
A) $-\frac{\pi}{3}+2\pi n\leq x\leq\frac{\pi}{3}+2\pi n, \quad n\in Z$
B) $-\frac{\pi}{12}+\frac{\pi n}{2}\leq x\leq\frac{\pi}{12}+\frac{\pi n}{2}, \quad n\in Z$
C) $-\frac{\pi}{6}+\frac{\pi n}{2}\leq x\leq\frac{\pi}{6}+\frac{\pi n}{12}, \quad n\in Z$
D) $-\frac{\pi}{4}+\pi n\leq x\leq\frac{\pi}{4}+\pi n, \quad n\in Z$
E) $-\frac{\pi}{3}+\pi n\leq x\leq\frac{\pi}{3}+\pi n, \quad n\in Z$

54. (03-10-42)

$$|sinx|\leq\frac{\sqrt{3}}{2}$$

tengsizlikni yeching.
A) $\left[-\frac{\pi}{3}+\pi n;\frac{\pi}{3}+\pi n\right], \quad n\in Z$
B) $\left[-\frac{\pi}{6}+\pi n;\frac{\pi}{6}+\pi n\right], \quad n\in Z$
C) $\left[-\frac{\pi}{6}+2\pi n;\frac{\pi}{6}+2\pi n\right], \quad n\in Z$
D) $\left[-\frac{\pi}{3}+2\pi n;\frac{\pi}{3}+2\pi n\right], \quad n\in Z$
E) $\left[-\frac{\pi}{3}+\frac{\pi n}{2};\frac{\pi}{3}+\frac{\pi n}{2}\right], \quad n\in Z$

55. (03-11-27) a parametrning qanday qiymatlarida

$$sinx\leq\frac{3a-6}{a+1}$$

tengsizlik yechimga ega emas?
A) $\left(-1;\frac{5}{4}\right)$ B) $(-1;0)$ C) $(-1;2)$
D) $(-1;5)$ E) $(0;\infty)$

56. (03-12-62)

$$(-2x^2+5x-7)\cdot(3tg^2x-1)\geq 0$$

tengsizlikni eching.
A) yechimga ega emas
B) $\left[-\frac{\pi}{6}+\pi n;\frac{\pi}{2}+\pi n\right), \quad n\in Z$
C) $\left(-\frac{\pi}{2}+\pi n;\frac{\pi}{6}+\pi n\right], \quad n\in Z$
D) $\left[-\frac{\pi}{6}+\pi n;\frac{\pi}{6}+\pi n\right], \quad n\in Z$
E) $(-\infty;\infty)$

2.1.12 Aralash bo'lim.

1. $arcsinx+arccosx=\frac{\pi}{2}, \quad x\in[-1;1].$
2. $arcsina>arcsinb\Leftrightarrow\begin{cases}a>b\\b\geq-1\\a\leq 1\end{cases}$
3. $arccosa>arccosb\Leftrightarrow\begin{cases}a<b\\a\geq-1\\b\leq 1\end{cases}$
4. $arctga>arctgb\Leftrightarrow a>b$
5. $arcctga>arcctgb\Leftrightarrow a<b$

(98-6-51) Tengsizlikni yeching.

$$arcsinx<arcsin(1-x)$$

A) $[0;\frac{1}{2})$ B) $[-1;1]$ C) $(-\infty;\frac{1}{2}]$ D) $[0;2]$ E) $\emptyset$

Yechish: $y=arcsinx, \quad -1\leq x\leq 1$ funksiya o'suvchi ekani ma'lum.U holda berilgan tengsizlik quyidagi

$$\begin{cases}x<1-x\\-1\leq x\leq 1\\-1\leq 1-x\leq 1\end{cases}$$

sistemaga ekvivalent bo'ladi. Uni yechamiz.

$$\begin{cases}2x<1\\-1\leq x\leq 1\\0\leq x\leq 2\end{cases}$$

Demak,

$$0\leq x<\frac{1}{2}$$

Javob: $[0;\frac{1}{2})$ (A).

1. (98-6-53) Tenglamaning eng kichik musbat ildizini toping.
$$arcsin(2sinx) = \frac{\pi}{2}$$
A) $\frac{1}{3}$ B) $\frac{5\pi}{6}$ C)$\frac{1}{2}$ D) $\frac{\pi}{6}$ E) $\frac{2}{\pi}$

2. (98-11-30) Tenglamaning yechimi nechta?
$$arctg|x| = -\frac{\pi}{6}$$
A) 1 B) $\emptyset$ C) 2 D) cheksiz ko'p E) 3

3. (98-11-74) Tengsizlikni yeching.
$$arccosx > arccosx^2$$
A) $(0;1)$ B) $[-1;0)$ C)$[-1;1]$
D) $(-\infty;0)\cup(1;\infty)$ E) $(1;\infty)$

4. (99-8-74) Tengsizlikni yeching.
$$arcsin(log_3 x) > 0$$
A) $(1;3]$ B) $(-1;1)$ C)$[1;+\infty)$
D) $(3;+\infty)$ E) $(1;3)$

5. (99-5-26) Agar
$$4arcsinx + arccosx = \pi$$
bo'lsa, $3x^2$ ning qiymatini hisoblang.
A) 0 B) 1 C) 3 D) 0,75 E) 1,5

6. (00-1-33) Tenglamaning ildizlari yig'indisini toping.
$$2(arccosx)^2 + \pi^2 = 3\pi arccosx$$
A) $\frac{\sqrt{2}}{2}$ B) -1 C) 1 D) $-\frac{\sqrt{2}}{2}$ E) $-\frac{1}{2}$

7. (00-9-32) Agar
$$3arccosx + 2arcsinx = \frac{3\pi}{2}$$
bo'lsa, $|x+3|^3$ ning qiymati nechaga teng bo'ladi?
A) 1 B) 8 C) 27 D) 64 E) 0

8. (01-4-4) Ushbu
$$arccos^2 x - \frac{5\pi}{6}\cdot arccosx + \frac{\pi^2}{6} \le 0$$
tengsizlik o'rinli bo'ladigan kesmaning o'rtasini toping.
A) 0,5 B) 0,4 C) 0,25 D) $\frac{\pi}{4}$ E) $\frac{\pi}{2}$

9. (01-5-18) Ushbu
$$x\cdot arctgx = 1$$
tenglama nechta ildizga ega?
A) 2 B) 1 C) 0 D) 3 E) 4

10. (01-5-19) Ushbu
$$cos(10arctgx) = 1$$
tenglama nechta ildizga ega?
A) 5 B) cheksiz ko'p C) 1
D) 3 E) ildizga ega emas

11. (01-9-14) Ushbu
$$4arctg(x^2 - 3x + 3) - \pi = 0$$
tenglama ildizlarining ko'paytmasini toping.
A) 2 B) 3 C) -3 D) 1 E) 0

12. (01-12-21) Tengsizlikni yeching.
$$arcsinx < \sqrt{x^2 - 1}$$
A) $\{1\}$ B) $\{-1\}$ C)$\{-1;1\}$
D) $(0;\frac{\pi}{2}]$ E) $[-\frac{\pi}{2};0)$

13. (01-12-27) Tengsizlikni yeching.
$$lg(arcsinx) > -1$$
A) $(0;\frac{\pi}{2}]$ B) $[sin0,1;1]$
C) $(sin0,1;1)$ D) $(sin0,1;1]$ E) $\emptyset$

14. (00-10-25) Tenglamaning nechta ildizi bor?
$$arctg|x| = \frac{\pi}{2}$$
A) 2 B) 1 C) $\emptyset$ D) cheksiz ko'p E) 3

15. (02-1-11)*
$$arccosx = arctgx$$
tenglama ildizining $\sqrt{\frac{\sqrt{5}+1}{2}}$ ga ko'paytmasini toping.
A) 1 B) 2 C) $\frac{1}{2}$ D) $\sqrt{2}$ E) $\sqrt{5}$

16. (02-4-37)
$$arctgx < 0$$
tengsizlikni qanoatlantiruvchi x ning eng katta butun qiymatini toping.
A) -2 B) -1 C) 0 D) 1 E) 2

17. (03-6-61)
$$2x = arcctg(tgx)$$
tenglamani yeching.
A) $\frac{\pi}{3}$ B) $\frac{\pi}{4}$ C) $\frac{\pi}{6}$ D) $\frac{2\pi}{3}$ E) $\frac{3\pi}{4}$

2.1.13 Trigonometrik funksiyalar va ularning xossalari.

A. Davri.

1. $y = sinx$ *va* $y = cosx$ funksiyalarning eng kichik musbat davri 2π ga teng.

2. $y = tgx$ *va* $y = ctgx$ funksiyalarning eng kichik musbat davri π ga teng.

1. (96-9-48) Ushbu $y = tg\frac{x}{3} - 2sin\frac{x}{2} + 3cos\frac{2}{3}x$ funksiyaning eng kichik davrini toping.
A) 4π B) 6π C) 3π D) 12π E) 15π

2. (96-12-105) Funksiyaning eng kichik davrini toping.
$$y = tg\frac{x}{3} - 2sinx + 3cos2x$$
A) 6π B) 3π C) 4π D) 9π E) 2π

3. (96-6-42) Quyidagi funksiyalardan qaysi birining eng kichik davri 2πga teng?
A) $y=\frac{2tgx}{1-tg^2x}$ B) $y=sin\frac{x}{2}cos\frac{x}{2}$
C) $y=1-cos^2x$ D) $y=sin^2x-cos^2x$
E) $y=ctg2x\cdot sin2x$

4. (96-13-14) Ushbu $y=ctg\frac{x}{3}+tg\frac{x}{2}$ funksiyaning eng kichik davrini toping.
A) 6π B) 2π C) 3π D) 12π E) 5π

5. (97-2-42) Quyidagi funksiyalardan qaysi birining eng kichik davri $\frac{\pi}{2}$ ga teng?
A) $y=cosxsinx$ B) $y=1+cos2x$
C) $y=2sin\frac{x}{2}\cdot cos\frac{x}{2}$ D) $y=\frac{1-tg^2x}{2tgx}$
E) $y=tgx\cdot cosx$

6. (97-4-38) $y=cos(8x+1)$, $y=sin(4x+3)$, $y=tg8x$ va $y=tg(2x+4)$ funksiyalar uchun eng kichik umumiy davrini toping.
A) 2π B) π C) $\frac{\pi}{2}$ D) $\frac{\pi}{4}$ E) $\frac{\pi}{6}$

7. (97-8-43) Quyidagi funksiyalardan qaysi birining eng kichik davri π ga teng?
A) $f(x)=\frac{tgx}{1-tg^2x}$ B) $f(x)=sin\frac{x}{2}cos\frac{x}{2}$
C) $f(x)=ctgx\cdot sinx$
D) $f(x)=-sin^2x+cos^2x$
E) $f(x)=x-cos^4x$

8. (97-9-98) Quyidagi funksiyalar uchun eng kichik musbat davrni toping.
$y=tg3x$, $y=ctg6x$,
$y=cos(3x+1)$, $y=sin(6x+4)$
A) $\frac{2\pi}{3}$ B) $\frac{\pi}{3}$ C) $\frac{\pi}{6}$ D) π E) 2π

9. (97-12-41) Quyidagi funksiyalardan qaysi birining eng kichik davri 2π ga teng?
A) $f(x)=cos^2x-sin^2x$
B) $f(x)=ctg\frac{x}{2}\cdot sin\frac{x}{2}$
C) $f(x)=2sin\frac{x}{2}\cdot cos\frac{x}{2}$
D) $f(x)=cos^2x+3sin^2x$
E) $f(x)=tg2x-cos2x$

10. (98-5-54) Ushbu $y=13sin^23x$ funksiyaning eng kichik musbat davri toping.
A) $\frac{2\pi}{3}$ B) $\frac{\pi}{3}$ C) $\frac{13\pi}{2}$ D) $\frac{\pi}{4}$ E) $\frac{13\pi}{6}$

11. (98-10-102) Ushbu $y=sin(3x+1)$ funksiyaning davrini toping.
A) $\frac{2\pi}{3}$ B) π C) $\frac{\pi}{3}$ D) 2π
E) to'g'ri javob ko'rsatilmagan

12. (98-12-56) Ushbu $y=cos(\frac{5x}{2}-\frac{5}{2})$ funksiyaning eng kichik musbat davrini aniqlang.
A) $\frac{4\pi}{5}$ B) 2π C) π D) $\frac{2\pi}{5}$ E) $\frac{\pi}{5}$

13. (99-2-26) $y=sin\frac{x}{2}$ funksiya eng kichik musbat davrining $y=cos8x$ funksiya eng kichik musbat davriga nisbatini toping.
A) 12 B) 14 C) 10 D) 18 E) 16

14. (99-3-31) Funksiyaning eng kichik musbat davrini toping.
$$y=2sin\frac{\pi x}{3}+3cos\frac{\pi x}{4}-tg\frac{\pi x}{2}$$
A) 12 B) 12π C) 2π D) 24π E) 24

15. (01-6-29) Ushbu
$$f(x)=\left(2+sin\frac{x}{2}\right)\cdot\left(1-cos\frac{x}{4}\right)\cdot tg\frac{x}{3}$$
funksiyaning eng kichik musbat davrini toping.
A) 22π B) 28π C) 26π D) 30π E) 24π

16. (01-11-35) Ushbu
$$f(x)=2^{sinx}+3^{tgx}$$
funksiyaning eng kichik musbat davrini toping.
A) $\frac{\pi}{2}$ B) 2π C) 3π D) 4π E) $1,5\pi$

17. (02-3-41) Quyidagi funksiyalardan qaysi biri davriy emas?
A) $y=sin\sqrt{x}$ B) $y=\sqrt{sinx}$ C) $y=|sin|x||$
D) $y=sin^2x$ E) $y=\sqrt[3]{sin^2x}$

18. (02-3-45) Quyidagi funksiyalardan qaysi biri davriy emas?
$1)y=sin\sqrt{x}$; $2)y=lg|cosx|$
$3)y=xcosx$; $4)y=sin^2x+1$
A) 1;3 B) 1;2 C) 2;3 D) 1;4 E) 3;4

19. (03-1-17) $y=2+3cos(8x-7)$ funksiyaning eng kichik musbat davrini toping.
A) 2π B) $\frac{\pi}{2}$ C) $\frac{\pi}{3}$ D) $\frac{\pi}{4}$ E) π

20. (03-2-34) $y=1-8sin^2xcos^2x$ funksiyaning eng kichik musbat davrini toping.
A) 2π B) π C) $\frac{\pi}{2}$ D) $\frac{\pi}{4}$
E) funksiya davriy emas

21. (03-4-38) Eng kichik musbat davrga ega bo'lgan funksiyani kursating.
A) $y=sin\frac{4}{3}x$ B) $y=cos\frac{5}{3}x$ C) $y=ctg\frac{3}{2}x$
D) $y=sinxcosx$ E) $y=tg\frac{2}{3}x$

22. (03-6-55) $f(x)=cos\frac{3x}{2}-sin\frac{x}{3}$ funksiyaning eng kichik musbat davrini toping.
A) 6π B) $\frac{4\pi}{3}$ C) 8π D) 10π E) 12π

23. (03-10-43)* $y=sin^6x+cos^6x$ funksiyaning eng kichik musbat davrini aniqlang.
A) 2π B) π C) $\frac{\pi}{2}$ D) $\frac{\pi}{4}$ E) $\frac{\pi}{3}$

B. Juft-toqligi.

1. $y=cosx$- juft funksiya, $y=sinx$, $y=tgx$ va
$y=ctgx$-toq funksiyalar.

1. (97-2-41) Quyidagi funksiyalardan qaysi biri juft?
A) $f(x)=sinx+x^3$ B) $f(x)=cosxtgx$
C) $f(x)=x^2\cdot ctgx$ D) $f(x)=\frac{x^4+x^2}{cosx}$
E) $f(x)=x^3+\frac{3}{x^3}$

2. (97-4-17) k ning qanday butun musbat qiymatlarida $y=(sinx)^{5k+4}$ funksiya juft bo'ladi?
A) toq qiymatlarida
B) juft qiymatlarida
C) 5 ga karrali qiymatlarida
D) barcha qiymatlarida
E) 4 ga karrali qiymatlarida

3. (00-10-72) Quyidagilardan qaysi biri toq funksiya?
A) $y = lg\frac{1+x}{1-x}$ B) $y = lgx^3$
C) $y = cos(x-a)$ D) $y = \frac{a^x+a^{-x}}{2}$
E) Bunday funksiya yo'q

4. (97-8-41) Quyidagi funksiyalardan qaysi biri toq?
A) $f(x) = \frac{tgx}{cosx} - x^3$ B) $f(x) = \frac{sin^2x}{ctg^2x}$
C) $f(x) = tg^4x$ D) $f(x) = \frac{cosx}{x^4}$
E)$f(x) = (1 - sinx)^2$

5. (97-9-77) k ning qanday butun musbat qiymatlarida $y = (ctgx)^{3k+2}$ funksiya juft ham, toq ham bo'lmaydi?
A) 2 ga karrali qiymatlarida
B) 5 ga karrali qiymatlarida
C) toq qiymatlarida
D) juft qiymatlarida
E) hech qanday butun qiymatida

6. (97-12-40) Quyidagi funksiyalardan qaysi biri toq?
A) $f(x) = \frac{cos5x+1}{|x|}$ B) $f(x) = \frac{sin^2x}{x^2-1}$
C) $f(x) = \frac{cos^2x}{x(x^2-1)}$ D) $f(x) = \frac{sin\frac{x}{2}}{x^3}$
E)$f(x) = x^4cosx$

7. (96-6-41) Quyidagi funksiyalardan qaysi biri toq?
A) $f(x) = cosx + x^2$ B) $f(x) = sinx \cdot tgx$
C) $f(x) = ctgx + \frac{1}{x^2}$ D) $f(x) = sinx + \frac{x^3+1}{x^3-1}$
E)$f(x) = x^3 - \frac{2}{x^3}$

8. (98-9-37) Quyidagi funksiyalardan qaysi biri toq?
A) $f(x) = x^4 \cdot cos\frac{x}{2}$ B) $f(x) = |xctgx|$
C) $f(x) = sin2xtg\frac{x}{3}$ D) $f(x) = |x|ctgx$
E)$f(x) = e^{x^2}$

9. (98-11-63) Quyida berilganlardan toq funksiyani toping.
A) $y = |x| - 1$ B) $y = x(|x| + 1)$
C) $y = -cosx$ E) $y = -x^2$
D) $y = \begin{cases} -x, & x \geq 0 \\ x, & x < 0 \end{cases}$

10. (99-2-38) Quyidagi funksiyalardan qaysi biri toq funksiya?
A) $f(x) = sinx \cdot tgx$ B) $f(x) = cosx \cdot ctgx$
C) $f(x) = sin|x|$ D) $f(x) = e^{|x|}$
E)$f(x) = x \cdot sinx$

11. (99-7-17) Funksiyalardan qaysi biri juft ham, toq ham bo'lmagan funksiyalardir?
$y_1 = 2^x + 2^{-x}$ $y_2 = 5^x - 5^{-x}$
$y_3 = \sqrt{sinx} + \sqrt{cosx}$; $y_4 = x^3 + cosx$
A) $y_1; y_2$ B) $y_1; y_3$ C) $y_3; y_4$
D) $y_2; y_3$ E) $y_2; y_4$

12. (01-2-16) Quyidagi funksiyalardan qaysi biri toq funksiya?
A) $x^3 + x + 4$ B) $cosx + tgx$
C) $sinx + tgx - 1$ D) $\frac{sinx}{x \cdot cosx}$
E)$sin2x \cdot cosx/tg^2x$

13. (01-11-34) Ushbu
1) $y = sin(\frac{\pi}{2} - x)$; 2) $y = ctg^2xsin^2x$
va 3) $y = lg(|x| + 1)$ 4) $y = e^{x^2}$
funksiyalardan qaysi biri toq?
A) 1 B) 2 C) 3 D) 4
E) Berilgan funksiyalar ichida toq funksiya yo'q.

14. (98-6-13) Juft funksiyani toping.
A) $\begin{cases} x, & x < 0 \\ -x, & x \geq 0 \end{cases}$ B) $\begin{cases} -x^2, & x < 0 \\ x^2, & x \geq 0 \end{cases}$
C) $y = 4^x$ D) $y = arccosx$
E) $y = x^4 + x^2 + x$

15. (00-10-7) Quyidagi funksiyalardan qaysilari juft funksiya?
$y_1 = \frac{x}{x^4-2}$, $y_2 = \sqrt[3]{x^4}$
$y_3 = arccos(x^4 - 1)$, $y_4 = log_4log_4x$,
$y_5 = (0,25)^x + (0,25)^{-x}$
A) y_2, y_3 B) y_2, y_3, y_4 C) y_3, y_4, y_5
D) y_2, y_3, y_5 E) y_2, y_5

16. (98-11-11) Quyida keltirilgan funksiyalardan qaysilari juft?
$y_1 = \frac{x}{x^2-4}$, $y_2 = \sqrt[3]{x^2}$
$y_3 = arccos(x^2 - 1)$,
$y_4 = log_2(log_3x)$, $y_5 = (0,5)^x + (\sqrt{2})^{2x}$
A) y_2, y_3 B) y_2, y_3, y_4 C) y_3, y_4, y_5
D) y_2, y_3, y_5 E) y_2, y_5

17. (02-2-49) Quysi javobda toq funksiya ko'rsatilgan?
A) $y = sin3x$ B) $y = sin(x + \frac{\pi}{3})$
C) $y = |sin2x|$ D) $y = sin|2x|$
E)$y = sinx + 1$

18. (02-3-44) Quysi javobda toq funksiya ko'rsatilgan?
A) $y = \frac{10^x-10^{-x}}{2}$ B) $y = 10^x$ C) $y = \frac{sinx}{x}$
D) $y = lgcos2x$ E) $y = 5 - x^2 + x$

19. (03-4-39) Toq funksiyani ko'rsating.
A) $f(x) = cos^2x - cosx$ B) $f(x) = cosx + sinx$
C) $f(x) = sin^2xtgx - 2x$ D) $f(x) = e^x + ctgx$
E)$f(x) = lg(|x| + 1)$

20. (03-5-35) Quysi javobda toq funksiya ko'rsatilgan?
A) $y = 2^x - 2^{-x}$ B) $y = 3^x + 3^{-x}$
C) $y = sinx^2$ D) $y = sin^22x + \sqrt{4 - x^2}$
E)$y = 3arctgx + 1$

C.O'sish va kamayish oraliqlari.

1. $y = sinx$ funksiya $[-\frac{\pi}{2}; \frac{\pi}{2}]$ oraliqda o'suvchi.

2. $y = cosx$ funksiya $[0; \pi]$ oraliqda kamayuvchi.

3. $y = tgx$ funksiya $(-\frac{\pi}{2}; \frac{\pi}{2})$ oraliqda o'suvchi.

4. $y = ctgx$ funksiya $(0; \pi)$ oraliqda kamayuvchi.

(96-7-57) Ushbu

$$x = cos\frac{11\pi}{12}, \quad y = cos(-\frac{\pi}{3}), \quad z = sin\frac{11\pi}{12}$$

sonlar uchun qo'yidagi munosabatlardan qaysi biri o'rinli?
A) $x < y < z$ B) $x < z < y$ C) $y < z < x$

D) $z<y<x$ E) $y<x<z$
Yechish: $cos(-\alpha)=cos\alpha$ ekanidan

$$y=cos(-\frac{\pi}{3})=cos\frac{\pi}{3},$$

tenglikni, $sin\alpha=cos\Big(\frac{\pi}{2}-\alpha\Big)$ ekanidan esa

$$z=sin\frac{11\pi}{12}=cos\Big(\frac{\pi}{2}-\frac{11\pi}{12}\Big)=cos\Big(-\frac{5\pi}{12}\Big)=cos\frac{5\pi}{12}$$

ni hosil qilamiz. Endi $cos\frac{11\pi}{12}$, $cos\frac{\pi}{3}$, $cos\frac{5\pi}{12}$ sonlarini
taqoslaymiz.

$$\frac{\pi}{3}<\frac{5\pi}{12}<\frac{11\pi}{12}$$

va $y=cosx$ funksiya $[0;\pi]$ oraliqda kamayuvchi bo'lgani uchun

$$cos\frac{\pi}{3}>cos\frac{5\pi}{12}>cos\frac{11\pi}{12}$$

munosabatlarni hosil qilamiz.
Javob: $x<z<y$ (B).

1. (97-3-57) Ushbu $x=tg\frac{5\pi}{7}$; $y=sin\frac{\pi}{6}$; $z=tg\frac{3\pi}{7}$ sonlar uchun quyidagi munosabatlardan qaysi biri o'rinli?
   A) $z>y>x$ B) $x>z>y$ C) $y>x>z$
   D) $x>y>z$ E) $y>z>x$

2. (97-7-57) Ushbu $x=tg(\frac{5\pi}{6})$, $y=cos(\frac{2\pi}{5})$, $z=tg(-\frac{\pi}{8})$ sonlarni kamayish tartibida yozing.
   A) $x>y>z$ B) $y>x>z$ C) $x>z>y$
   D) $y>z>x$ E) $z>y>x$

3. (97-10-57) Ushbu $x=cos\frac{10\pi}{7}$; $y=cos\frac{6\pi}{7}$; $z=sin\frac{5\pi}{7}$ sonlar uchun quyidagi munosabatlardan qaysi biri o'rinli?
   A) $x<y<z$ B) $y<x<z$ C) $x<z<y$
   D) $y<z<x$ E) $z<y<x$

4. (98-2-23) $p=sin189^0$, $q=cos42^0$, $r=cos88^0$ sonlarni kamayish tartibida yozing.
   A) $q>p>r$ B) $p>q>r$ C) $p>r>q$
   D) $r>q>p$ E) $q>r>p$

5. (98-8-63) $m=cos75^0$, $n=sin50^0$, $p=sin45^0$ va $q=cos85^0$ sonlarni o'sish tartibida yozing.
   A) $q<m<p<n$ B) $m<n<p<q$
   C) $q<n<p<m$ D) $p<m<q<n$
   E) $q<m<n<p$

6. (98-9-21) Quyidagi ayirmalardan qaysi birining qiymati manfiy?
   A) $sin140^0-sin150^0$ B) $cos10^0-cos50^0$
   C) $tg87^0-tg85^0$ D) $ctg45^0-ctg40^0$
   E) $cos75^0-sin10^0$

7. (98-11-98) Quyidagi sonlarning eng kattasini toping.
   A) $sin170^0$ B) $sin20^0$ C) $sin(-30^0)$
   D) $sin(-250^0)$ E) $sin100^0$

8. (98-12-57)* $m=sin75^0$, $n=cos75^0$, $p=tg75^0$ va $q=ctg75^0$ sonlarini kamayish tartibida yozing.
   A) $p>m>q>n$ B) $p>m>n>q$
   C) $p>n>m>q$ D) $m>p>q>n$
   E) $q>p>m>n$

9. (99-1-50) $x=sin60^0$, $y=cos(-600^0)$, $z=ctg\frac{31\pi}{6}$ sonlarni kamayish tartibida yozing.
   A) $z>x>y$ B) $x>y>z$ C) $y>z>x$
   D) $z>y>x$ E) $y>x>z$

10. (99-6-32) Sonlarni o'sish tartibida joylashtiring.

    $a=cos(-13^0)$, $b=-sin(-75^0), c=sin100^0$

    A) $b<a<c$ B) $a<b<c$ C) $a<c<b$
    D) $b<c<a$ E) $c<b<a$

11. (99-9-27) $M=sin72^0$, $N=cos220^0$ va $Q=ctg184^0\cdot sin4^0$ sonlarni kamayish tartibida yozing.
    A) $N>Q>M$ B) $N>M>Q$
    C) $Q>M>N$ D) $Q>N>M$
    E) $M>N>Q$

12. (99-10-26) $k=tg248^0$, $t=cos32^0va$ $q=sin112^0$ sonlarni o'sish tartibida joylashtiring.
    A) $q<t<k$ B) $k<t<q$ C) $t<k<q$
    D) $t<q<k$ E) $k<q<t$

13. (00-7-28) Tengsizlikning qaysi biri noto'g'ri?
    A) $sin65^0>cos35^0$ B) $tg17^0<ctg27^0$
    C) $cos15^0>cos35^0$ D) $cos40^0>sin80^0$
    E) $ctg14^0<tg80^0$

14. (01-1-44) Ushbu $a=sin1$, $b=sin3$ va $c=sin5$ sonlarni kamayish tartibida joylashtiring.
    A) $a>b>c$ B) $a>c>b$ C) $c>b>a$
    D) $c>a>b$ E) $b>c>a$

15. (03-1-27) $a=sin1$; $b=sin2$; $c=sin3$; $d=sin4$; $e=sin5$ sonlarni kamayish tartibida joylashtiring.
    A) $a>b>c>d>e$ B) $e>d>b>c>a$
    C) $b>c>a>d>e$ D) $c>b>a>d>e$
    E) $b>a>c>d>e$

D. Eng katta va eng kichik qiymatlari. Aniqlanish va qiymatlar sohalari.

1. $y=sinx$ va $y=cosx$ funksiyalarning qiymatlari sohasi $[-1;1]$ oraliqdan iborat.

2. $y=tgx$ va $y=ctgx$ funksiyalarning qiymatlari sohasi $(-\infty;\infty)$ oraliqdan iborat.

1. (96-6-32) Ushbu $y=2sin^2x+cos^2x$ ifodaning eng katta qiymatini toping.
   A) 1 B) 1,5 C) 2,6 D) 2 E) 2,5

2. (96-1-56) Ushbu $y=2sin3x+cos3x$ funksiyaning eng katta qiymatini toping.
   A) 3 B) 2 C) $\sqrt{5}$ D) 4 E) 1,5

3. (96-7-30) $y = 5^{1-sinx} - e^{ln2}$ funksiyaning eng kichik qiymatini toping.
A) $1-e^2$ B) 3 C) -1 D) $-2,29$
E) aniqlab bo'lmaydi

4. (98-3-55) Ushbu $y = tg3x + ctg2x$ funksiya x ning qanday qiymatida aniqlanmagan?
A) $x = \frac{\pi k}{2}, \quad k \in Z$ B) $x = \frac{\pi}{6} + \frac{\pi k}{3}, \quad k \in Z$
C) $x = \frac{\pi}{2} + \frac{k\pi}{3}, \quad k \in Z$ D) $x = \frac{k\pi}{4}, \quad k \in Z$
E) to'g'ri javob keltirilmagan.

5. (00-1-43) $[0; 4, 2\pi]$ kesmada $f(x) = |cosx|$ funksiya necha marta eng kichik qiymatga erishadi?
A) 3 B) 5 C) 4 D) 6 E) 7

6. (99-8-71) Ushbu $y = 3sin(2x + \frac{\pi}{4})$ funksiya $[0; 2\pi]$ kesmada nechta nollarga ega bo'ladi?
A) 4 B) 5 C) 3 D) 2 E) 1

7. (97-6-21) $y = 2sinx - 1$ funksiyaning $[0; \frac{\pi}{6}]$ kesmadagi eng katta qiymatini toping.
A) 0 B) 1 C) 0,5 D) $\sqrt{2} - 1$ E) $\sqrt{3} - 1$

8. (97-1-21) $y = 1 + cosx$ funksiyaning $[\frac{\pi}{3}; \frac{\pi}{2}]$ kesmadagi eng kichik qiymatini toping.
A) 0 B) 1 C) $1\frac{1}{2}$ D) $1 + \frac{\sqrt{3}}{2}$ E) $\frac{\sqrt{3}}{2}$

9. (97-8-31) $sin^2\alpha + 2cos^2\alpha$ ning eng katta qiymatini toping.
A) 1,2 B) 1,4 C) 1,6 D) 2 E) 1,8

10. (97-9-99) k ning qanday qiymatlarida $y = 6 + k^3 cos4x$ funksiyaning eng katta qiymati 70 bo'ladi?
A) 4 B) 6 C) -4 D) ± 4 E) ± 6

11. (97-10-30) Quyidagilardan qaysi biri $y = \frac{10}{5^{|cosx|}} + 2lne^3$ funksiyaning eng katta qiymati?
A) 8 B) 16 C) $2 + 2e^3$ D) 18
E) aniqlab bo'lmaydi.

12. (97-11-21) $y = 2 - 2sinx$ funksiyaning $[0; \frac{\pi}{6}]$ kesmadagi eng kichik qiymatini hisoblang.
A) 0 B) $\frac{1}{2}$ C) $2 - \sqrt{3}$ D) 1 E) $2 - \frac{1}{\sqrt{3}}$

13. (97-12-31) $2sin^2\beta + cos^2\beta$ ning eng kichik qiymatini toping.
A) 0,8 B) 1,2 C) 1 D) 0,9 E) 1,1

14. (97-2-32) $sin^2x + 2cos^2x$ ning eng kichik qiymatini toping.
A) 0,9 B) 0,8 C) 1,2 D) 1 E) 1,5

15. (97-3-30) Ushbu $y = \frac{1}{2^{cosx}} + lne^2$ funksiyaning eng katta qiymatini toping.
A) 2,5 B) 3 C) $1 + e^2$ D) 4
E) aniqlab bo'lmaydi.

16. (97-4-39) k ning qanday qiymatlarida $y = 1 + k^2 sin^2x$ funksiyaning eng katta qiymati 10 ga teng bo'ladi?
A) 9 B) -9 C) 3 D) $-5; 3$ E) $3; -3$

17. (97-7-30) Ushbu $y = 3lne + 3^{|sinx|}$ funksiyaning eng kichik qiymatini toping.
A) $3e + 3$ B) 6 C) 4 D) $3\frac{1}{3}$
E) aniqlab bo'lmaydi.

18. (98-8-30) Ushbu $y = 2 - sinx$ funksiyaning $[0; \frac{7\pi}{6}]$ oraliqdagi eng katta qiymatini toping.
A) 3 B) 2 C) 2,5 D) 1 E) $\frac{4-\sqrt{3}}{2}$

19. (98-10-34) $2sin^2x + cos^2x$ ning eng katta qiymatini toping.
A) 1,5 B) 2,5 C) 2 D) 1,8 E) 2,4

20. (98-5-14) Ushbu $f(x) = 5sinx + 6$ funksiyaning eng katta qiymatini toping.
A) -1 B) 11 C) 1 D) 6 E) 7

21. (98-1-30) Ushbu $y = 0,5cosx$ funksiyaning $[-\frac{\pi}{4}; \frac{3\pi}{4}]$ kesmadagi eng kichik qiymatini toping.
A) $-\frac{1}{2}$ B) -1 C) 0 D) $-\frac{\sqrt{2}}{8}$ E) $-\frac{\sqrt{2}}{4}$

22. (99-7-16) Ushbu $f(x) = 6cosx - 7$ funksiyaning eng katta qiymatini toping.
A) -1 B) -7 C) 1 D) 0 E) 7

23. (00-2-31) Quyidagilardan qaysi funksiya $x = \frac{2\pi k}{3} (k \in Z)$ sonlarda eng kichik qiymatga ega bo'ladi?
A) $y = cos(3x + \pi)$ B) $y = 8sin6x$ C) $y = cos3x$
D) $y = cos6x$ E) $y = sin3x$

24. (98-12-21) Ushbu $f(x) = lgcosx$ funksiyaning qiymatlar to'plamini toping.
A) $(-\infty; 0]$ B) $(-\infty; \infty)$ C) $(-1; 1)$
D) $(-1; 0)$ E) $(0; \infty)$

25. (00-7-24) Ifodaning eng kichik qiymatini toping.

$$2sin^2x + \sqrt{3}cos2x$$

A) -1 B) 1 C) $2 - \sqrt{3}$ D) $3 - 2\sqrt{2}$ E) $\sqrt{3} - 2$

26. (98-10-31) Ushbu $f(x) = \frac{sin2x}{cosx}$ funksiyaning qiymatlar sohasini toping.
A) $(-1; 1)$ B) $[-1; 1]$ C) $[-2; 0) \cup (0; 2]$
D) $[-2; 2]$ E) $(-2; 2)$

27. (99-10-32) Ushbu $f(x) = 1 - cos2x - k \cdot cos2x$ funksiya k ning qanday qiymatlarida o'zgarmas bo'ladi?
A) 2 B) -2 C) 1,5 D) $-1,5$ E) -1

28. (99-9-35) t ning qanday qiymatida $y = 1 - cos2x - t(1 + cos2x)$ funksiyaning qiymati o'zgarmas bo'ladi?
A) 1 B) 2 C) -2 D) -1 E) $-1,5$

29. (00-2-30) Qaysi funksiya $x \in (-\frac{\pi}{6}; \frac{5\pi}{6})$ oraliqda faqat musbat qiymatlarni qabul qiladi?
A) $y = sin(x + \frac{\pi}{6})$ B) $y = sin(x + \frac{5\pi}{6})$
C) $y = sin(x - \frac{5\pi}{6})$ D) $y = sin(x - \frac{\pi}{6})$
E) $y = cos(x + \frac{\pi}{6})$

30. (00-5-71) Funksiyaning qiymatlar sohasini toping.

$$y = ctgx \cdot ctg(\frac{\pi}{2} + x) + \frac{tgx \cdot (1 + cos2x)}{2cosx}$$

A) $[-2; 0]$ B) $(-2; -1) \cup (-1; 0)$ C) $(-2; 0)$
D) $[-2; 1) \cup (-1; 0]$ E) $[0; 2]$

31. (01-2-18) Ushbu $y=\frac{x}{2}+sin^2x$ funksiyaning $[-\frac{\pi}{2};\frac{\pi}{2}]$ kesmadagi eng katta qiymatini toping.
A) $-\frac{\pi}{2}+1$ B) $-\frac{\pi}{4}+1$ C) $\frac{\pi}{6}+1$
D) $\frac{\pi}{2}+1$ E) $\frac{\pi}{4}+1$

32. (01-2-83) Ushbu
$$f(x)=\frac{1}{sin^6x+cos^6x}$$
funksiyaning qiymatlar sohasini toping.
A) $[0;1]$ B) $[1;2]$ C) $[1;3]$ D) $[1;4]$ E) $[0;2]$

33. (01-2-87) Ushbu
$$f(x)=cos(7x-\frac{2\pi}{21})\cdot cos(7x+\frac{5\pi}{21})$$
funksiyaning eng katta qiymatini toping.
A) 1 B) 0,5 C) 0,75 D) 0,25 E) 0,4

34. (01-6-41) Ushbu $f(x)=16-6sin2x$ funksiyaning qiymatlar sohasini toping.
A)$(0;22)$ B)$(10;22)$ C)$[0;16]$
D) $[10;22]$ E)$(0;22]$

35. (01-10-34) Ushbu $13sin^25x+17cos^25x$ ifodaning eng kichik qiymatini toping.
A) 12 B) 15 C) 13 D) 17 E) 14

36. (01-10-51) Ushbu
$$y=(sinx+cosx)^2-\frac{1-cos4x}{2sin2x}-cosx$$
funksiyaning qiymatlar sohasini toping.
A) $[0;2]$ B) $(0;2)$ C) $(0;1)\cup(1;2)$
D) $[0;1)\cup(1;2]$ E) $[1;2]$

37. (01-11-23) Ushbu $f(x)=2cos\frac{x}{2}+3$ funksiyaning qiymatlar sohasini toping.
A) $[3;5]$ B) $[4;5]$ C) $[2;5]$
D) $[-1;5]$ E) $[1;5]$

38. (01-12-19) Ushbu $y=\frac{1}{cos^2x}+ctg^2x+1$ funksiyaning eng kichik qiymatini toping.
A) 1 B) 2 C) 3 D) 4 E) 2,5

39. (02-1-23) $y=1+cosx$ funksiya grafigining Ox o'qi bilan urinish nuqtalarining koordinatlarini toping.
A) $\pi+2\pi n,\quad n\in Z$ B) $2\pi n,\quad n\in Z$
C) $\pi+\pi n,\quad n\in Z$ D) $\pi n,\quad n\in Z$
E) $\frac{\pi}{2}+2\pi n,\quad n\in Z$

40. (02-2-60) $y=cos^4x-2sin^2x+7$ funksiyaning eng kichik qiymatini toping.
A) 5 B) 3 C) 2 D) 1 E) -5

41. (02-3-31) $y=cos^2x+cosx+1$ funksiyaning eng kichik qiymatini toping.
A) $\frac{3}{4}$ B) $\frac{1}{4}$ C) $\frac{1}{2}$ D) $\sqrt{2}$ E) $\frac{\sqrt{3}}{2}$

42. (02-6-30) $f(x)=\frac{1}{sin^4x+cos^4x}$ funksiyaning qiymatlar sohasini toping.
A) $[0;1]$ B) $[0;2]$ C) $[1;2]$ D) $[1;4]$ E) $[0;4]$

43. (02-9-42)
$$y=2cos^2\frac{x}{2}+tgx\cdot ctgx$$
funksiyaning qiymatlar to'plamini toping.
A) $[1;3]$ B) $[0;3]$ C) $(1;2)\cup(2;3)$
D) $(-1;0)\cup(0;2)$ E) $(1;3)$

44. (02-10-16)
$$y=\frac{cosx}{cos\frac{x}{2}-sin\frac{x}{2}}$$
funksiyaning qiymatlar to'plamini toping.
A) $(-\sqrt{2};\sqrt{2})$ B) $[-1;1]$ C) $(-\infty;\infty)$
D) $[0;2]$ E) $[-2;2]$

45. (02-12-53)
$$f(x)=3^{log_2(3sin^2x+1)}$$
funksiyaning qiymatlar to'plamini toping.
A) $[1;9]$ B) $[0;9]$ C) $[0;9)$ D) $(1;9)$ E) $[1;9)$

46. (99-5-21)* Ushbu sin^6x+cos^6x ifodaning eng kichik qiymatini toping.
A) $\frac{1}{6}$ B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $\frac{1}{8}$ E) $\frac{1}{12}$

47. (03-1-26)
$$y=sin\Big(\frac{x}{\sqrt{x-1}-\sqrt{3-x}}\Big)$$
funksiyaning aniqlanish sohasini toping.
A) $[1;3]$ B) $[1;2)$ C) $(2;3]$
D) $[1;2)\cup(2;3]$ E) $[0;3]$

48. (03-2-11) $y=cos^2x-\frac{\sqrt{3}}{2}sin2x$ funksiyaning eng katta va eng kichik qiymatlari yig'indisini toping.
A) 1,5 B) 0,5 C) 1 D) 2 E) $-\frac{\sqrt{3}}{2}$

49. (03-2-29) $y=(1+tg^2x)cos^2x-\frac{sin2x}{2cosx}$ funksiyaning qiymatlar sohasini toping.
A) $[0;2]$ B) $(0;2)$ C)$[-1;1]$ D)$(-2;0)$ E)$[-2;0]$

50. (03-5-37)* $y=log_3(1-2cosx)$ funksiyaning qiymatlar to'plamini toping.
A) $(-\infty;1]$ B)$(0;1)$ C)$(0;3)$ D) $(0;1]$ E)$[1;3]$

51. (03-7-36) $(cosx+5)\cdot(3-cosx)$ funksiyaning eng katta qiymatini toping.
A) 8 B) 12 C) 15 D) 16 E) 24

52. (03-7-49) $y=\frac{3}{4}\cdot cos^2(x-\frac{\pi}{4})-1$ funksiyaning qiymatlar sohasini toping.
A) $\Big[-\frac{3}{4};\frac{3}{4}\Big]$ B) $[-1;0]$ C)$[-1;-0,25]$
D)$[-0,25;0]$ E)$\Big[\frac{1}{4};1\Big]$

53. (03-11-15) $y=sin(sinx)$ funksiyaning eng katta qiymatini aniqlang.
A) $sin1$ B)1 C) $\frac{1}{2}$ D) $arcsin1$ E) $\frac{\pi}{2}$

54. (03-11-80)* $y=sin^42x+cos^42x$ funksiyaning eng katta qiymatini ko'rsating.
A) 2 B) 1,5 C) 1 D) 0,5 E) 0,75

E. $-\sqrt{a^2+b^2} \le a\cos x + b\sin x \le \sqrt{a^2+b^2}$ **tengsizlik.**

1. (96-10-15) $y = 2\sin x + \cos x$ funksiyaning eng katta qiymatini toping.
   A) 3 B) $\sqrt{5}$ C) 2 D) -1 E) 5

2. (99-5-28) Ushbu $y = (\sin 3x - \cos 3x)^{12}$ funksiyaning eng katta qiymatini toping.
   A) 36 B) 32 C) 2^{12} D) 64 E) 256

3. (00-1-30) Agar α-o'zgaruvchi miqdor bo'lsa; $4(\sqrt{3}\cos\alpha + \sin\alpha)$ ning eng katta qiymati qanchaga teng bo'ladi?
   A) 9,5 B) 7 C) 8 D) 6,5 E) 7,5

4. (00-3-57) $y = 6\sin 2x + 8\cos 2x$ funksiyaning qiymatlar to'plamini toping.
   A) $[-10;10]$ B) $[-14;14]$ C) $(-\infty;\infty)$
   D) $[0;6]$ E) $[0;8]$

5. (00-9-34) Funksiyaning eng katta qiymatini toping.
   $$y = (\sin 4x + \cos 4x)^6$$
   A) 64 B) 24 C) 32 D) 16 E) 8

6. (01-1-30) Nechta tub son $y = 5\sin 3x - 12\cos 3x$ funksiyaning qiymatlar sohasiga tegishli?
   A) 12 B) 14 C) 6 D) 7 E) 3

7. (01-6-43) Ushbu $f(x) = \sin x + \cos x$ funksiyaning eng katta qiymatini toping.
   A) 1,4 B) $\sqrt{2}$ C) $\sqrt{3}$ D) 1,6 E) 1

8. (01-7-45) Ushbu $f(x) = (\sin x + \cos x)^2$ funksiyaning qiymatlar sohasini toping.
   A) $[-1;1]$ B) $[-2;2]$ C) $[0;2]$
   D) $[-\frac{1}{2};\frac{1}{2}]$ E) $[-\frac{3}{2};\frac{3}{2}]$

9. (02-1-18) $y = (2,(1)+1,(8))\sin x + (1,(2)+1,(7))\cos x$ funksiyaning qiymatlar to'plamini toping.
   A) $[-5;5]$ B) $[-4;4]$ C) $[-3;3]$
   D) $(-4;4)$ E) $(-5;5)$

10. (02-4-34) $y = 3\sin x - 4\cos x$ funksiyaning eng katta qiymatini toping.
    A) 3 B) 4 C) 5 D) 6 E) 7

11. (02-5-40) Nechta butun son $y = 2\sin 3x - 3\cos 3x$ funksiyaning qiymatlar sohasiga tegishli?
    A) 3 B) 4 C) 6 D) 7 E) cheksiz ko'p

12. (03-1-35) $y = (\sqrt{3}\cos 3x + \sin 3x)^7$ funksiyaning eng kichik qiymatini toping.
    A) -14 B) -21 C) -64 D) -128 E) -3^7

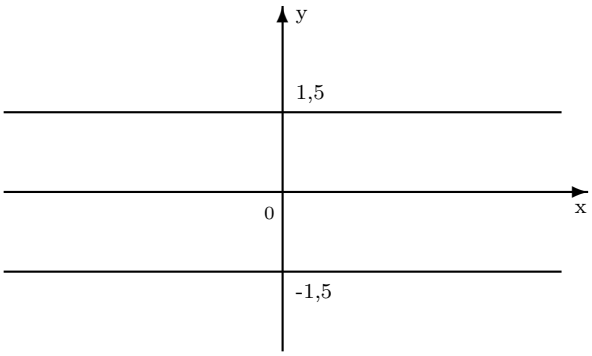
13. (03-9-41) $y = 4\cos 2x - 6\sin 2x + 5$ funksiyaning qiymatlar sohasiga tegishli tub sonlar nechta?
    A) 2 B) 4 C) 5 D) 6 E) 7

14. (03-12-23) $y = 1 - 6\sin 2x + 8\cos 2x$ funksiyaning eng katta qiymatini toping.
    A) 15 B) 14 C) 13 D) 12 E) 11

15. (03-12-27)
    $$y = \frac{8\sin x - 15\cos x + 3}{4}$$
    funksiyaning eng katta qiymatini toping.
    A) 6,5 B) 7,5 C) 5 D) 6 E) 7

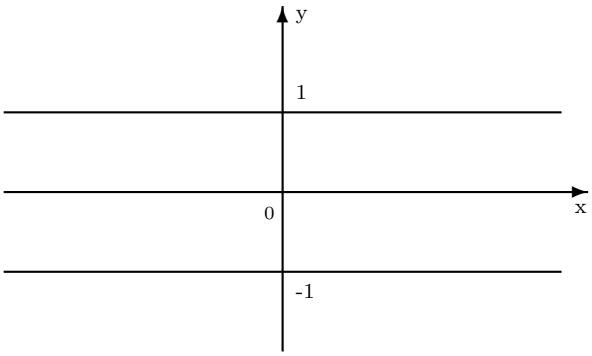
F.Grafigi.

1. (98-3-56) Rasmda quyidagi funksiyalardan qaysi birining grafigi tasvirlangan?



   A) $-1,5\sin(2x+\frac{\pi}{4})$ B) $-1,5\sin(2x-\frac{\pi}{4})$
   C) $1,5\sin(x+\frac{\pi}{4})$ D) $1,5\sin(x-\frac{\pi}{4})$
   E) $-1,5\sin(x-\frac{\pi}{4})$

2. (98-10-103) Rasmda quyidagi funksiyalardan qaysi birining grafigi tasvirlangan?



   A) $\sin(x-\frac{\pi}{4})$ B) $-\sin(x-\frac{\pi}{4})$
   C) $\sin(2(x-\frac{\pi}{4}))$ D) to'g'ri javob keltirilmagan
   E) $-\sin(2(x-\frac{\pi}{4}))$

3. (02-4-40) $y = 2^{tgx}$ funksiya grafigining Oy o'qi bilan kesishish nuqtasi ordinatasini toping.
   A) -2 B) -1 C) 0 D) 1 E) 2

4. (03-6-1) $y = \sin x \cdot \cos x$ funksiya grafigining $[-\pi;\pi]$ kesmaga tegishli qismida ordinatasi 0,25 ga teng bo'lgan nechta nuqta bor?
   A) 4 B) 6 C) 3 D) 8 E) cheksiz ko'p

G. Teskari trigonometrik funksiyalar.

1. $y = \arcsin x$ funksiyaning aniqlanish sohasi [-1;1], qiymatlar sohasi esa - $[-\frac{\pi}{2};\frac{\pi}{2}]$.
   $y = \arcsin x$ funksiya [-1;1] da o'suvchi.

2. $y = arccosx$ funksiyaning aniqlanish sohasi [-1;1], qiymatlar sohasi esa - $[0;\pi]$.
$y = arccosx$ funksiya [-1;1] da kamayuvchi.

3. $y = arctgx$ funksiyaning aniqlanish sohasi $(-\infty;\infty)$, qiymatlar sohasi esa - $(-\frac{\pi}{2};\frac{\pi}{2})$.
$y = arctgx$ funksiya $(-\infty;\infty)$ da o'suvchi.

4. $y = arcctgx$ funksiyaning aniqlanish sohasi $(-\infty;\infty)$, qiymatlar sohasi esa - $(0;\pi)$.
$y = arcctgx$ funksiya $(-\infty;\infty)$ da kamayuvchi.

5. $y = arcsinx$ va $y = arctgx$ - toq funksiyalar, $y = arccosx$ va $y = arcctgx$ funksiyalar esa juft ham emas, toq ham emas.

1. (99-8-35) Ushbu $y = arcsinx + \frac{\pi}{2}$ funksiyaning qiymatlar to'plamini toping.
A) $[0;\pi]$ B) $[-\frac{\pi}{2};\frac{\pi}{2}]$ C) $[\frac{\pi}{2}-1;\frac{\pi}{2}+1]$
D) $[0;\frac{\pi}{2}]$ E) $(0;\pi)$

2. (98-2-38) Ushbu $y = \frac{arcsin2x}{ln(x+1)}$ funksiyaning aniqlanish sohasini toping.
A) $(-\frac{1}{2};\frac{1}{2})$ B) $[-\frac{1}{2};\frac{1}{2}]$ C) $(0;\frac{1}{2})$
D) $(0;\frac{1}{2}]$ E) $[-\frac{1}{2};0)\cup(0;\frac{1}{2}]$

3. (99-3-30) Funksiyaning aniqlanish sohasini toping.
$$y = arcsin\frac{x-3}{2} - lg(4-x)$$
A) $[1;4]$ B) $[1;5]$ C) $(1;4)$
D) $[1;4)$ E) $[1;4)\cup(4;5]$

4. (99-8-78) Funksiyaning aniqlanish sohasiga tegishli butun sonlar nechta?
$$y = \frac{arccos(x-2)+\sqrt{9-x^2}}{log_3(5-2x)}$$
A) 4 B) 2 C) 3 D) 1 E) bunday sonlar yo'q

5. (00-3-58) Funksiyaning aniqlanish sohasini toping.
$$y = arcsin\frac{x-3}{2} - lg(4-x)$$
A) $(-\infty;4)$ B) $[1;4)$ C) $[1;4]$
D) $(-\infty;-1)\cup(1;4)$ E) $[-1;5]$

6. (00-9-25) Funksiyaning aniqlanish sohasini toping.
$$y = arcsin(5^{2x^2+5x+2}) + lg\Big(\frac{x^2+5x+6}{x+2}\Big)$$
A) $(-3;\infty)$ B) $[-2;-\frac{1}{2}]$ C) $[-2;\infty)$
D) $(-2;-\frac{1}{2}]$ E) $(-3;-\frac{1}{2})$

7. (98-7-22) Ushbu $f(x) = lg(arcsinx)$ funksiyaning qiymatlar to'plamini toping.
A) $(-\infty;0]$ B) $(-\infty;\infty)$ C) $(-\infty;lg\frac{\pi}{2}]$
D) $[0;lg\frac{\pi}{2}]$ E) $[lg\frac{\pi}{2};\infty)$

8. (99-8-73) Ushbu $y = arcsin\frac{x^3}{8}$ funksiyaning aniqlanish sohasini toping.
A) $[-2;2]$ B) $[-1;1]$ C) $(-2;2)$
D) $[1;2]$ E) $(-1;2]$

9. (99-10-41) Ushbu
$$y = \frac{\sqrt{x+0,2}}{arccosx}$$
funksiyaning aniqlanish sohasini toping.
A) $(-0,2;1)$ B) $(-0,2;1]$ C) $[-0,2;1]$
D) $[-0,2;1)$ E) $[-1;1)$

10. (98-2-39) Quyidagi funksiyalardan qaysi biri juft?
A) $y = x|x|$ B) $y = arcsin\frac{x}{2}$ C) $y = 5arctgx$
D) $y = \frac{x^2}{cos3x}$ E) $y = x^3|sinx|$

11. (00-9-61) Ushbu
$$y = arcsin\sqrt[4]{3-2x-x^2}$$
funksiyaning aniqlanish sohasiga tegishli butun sonlar nechta?
A) 1 B) 2 C) 3 D) 4 E) 5

12. (98-6-49) Ushbu $x = arccos0,9$; $y = arccos(-0,7)$; $z = arccos(-0,2)$ sonlarni o'sib borish tartibida yozing.
A) $y < z < x$ B) $x < y < z$
C)$y < x < z$ D) $x < z < y$ E) $z < y < x$

13. (02-4-35) $y = (x-10)arctgx$ funksiya grafigining Ox o'qi bilan kesishish nuqtasi abssissasining eng kichik qiymatini toping.
A) -2 B) -1 C) 0 D) 1 E) 2

14. (02-4-36) $y = (x-2)arcsinx$ funksiya grafigining Ox o'qi bilan kesishish nuqtasi abssissasining eng kichik qiymatini toping.
A) -2 B) -1 C) 0 D) 1 E) 2

15. (02-7-5) $y = arcsin(3x-7)$ funksiyaning aniqlanish sohasiga tegishli x ning butun qiymatlari nechta?
A) 2 B) 3 C) 1 D) 4 E) 5

16. (02-11-48) $y = arccos(log_3x - 1)$ funksiyaning aniqlanish sohasiga tegishli butun sonlar nechta?
A) 12 B) 9 C) 8 D) 7 E) 5

17. (03-3-49) Nechta tub son
$$f(x) = 2arcsin\frac{x-3}{3} - 4log_2(5-x)$$
funksiyaning aniqlanish sohasiga tegishli?
A) 1 B) 2 C) 3 D) 4 E) cheksiz ko'p

18. (03-5-33) $y = 4 + \frac{16}{\pi}arcsin(3x-2)$ funksiyaning eng kichik qiymatini toping.
A) -4 B) 4 C) -2 D) 0 E) -6

19. (03-5-36) Nechta butun son $y = 2arcsin\frac{2x-5}{3}$ funksiyaning aniqlanish sohasiga tegishli?
A) 4 B) 3 C) 2 D) 1 E) 5

20. (03-6-62)
$$y = arcsin\frac{2}{2+sinx}$$
funksiyaning aniqlanish sohasini toping.
A) $-\pi + 2\pi k \le x \le \pi + 2\pi k, \quad k \in Z$
B) $x \le \pi + 2\pi k, \quad k \in Z$
C) $x > 2\pi k, \quad k \in Z$
D) $2\pi k \le x \le \frac{\pi}{2} + 2\pi k, \quad k \in Z$
E) $2\pi k < x < \pi + 2\pi k, \quad k \in Z$

21. (03-6-67) $y = arccos|x-2|$ funksiyaning aniqlanish sohasini toping.
A) $1 \le x \le 3$ B) $x > 1$ C) $x < 3$
D) $2 \le x \le 3$ E) $2 < x \le 3$

22. (03-7-58)

$$y = \frac{\sqrt{x^2-5x+6}}{lg(x+5)^2} + \frac{1}{arccos(x+3)}$$

funksiyaning aniqlanish sohasini toping.
A) $(-4;-2]$ B) $(-\infty;2) \cup [3;\infty)$
C) $(-\infty;-3) \cup (-3;2]$ D) $(-4;-2)$
E) $(-\infty;-5) \cup (-5;2] \cup [3;\infty)$

23. (98-9-36) Ushbu $y = \frac{arccosx}{ln(x+\frac{1}{2})}$ funksiyaning aniqlanish sohasini toping.
A) $[-1;1)$ B) $[-1;1]$ C) $(-\frac{1}{2};1]$
D) $(-\frac{1}{2};\frac{1}{2}) \cup (\frac{1}{2};1]$ E) $(0;1]$

2.2 Hosila.

Hosilalar jadvali.

1. $c' = 0, \quad c = const;$
2. $(x^\alpha)' = \alpha x^{\alpha-1};$
3. $(\sqrt{x})' = \frac{1}{2\sqrt{x}};$
4. $(\frac{1}{x})' = -\frac{1}{x^2};$
5. $(a^x)' = a^x lna, \quad (e^x)' = e^x;$
6. $(\log_a x)' = \frac{1}{xlna}, \quad (lnx)' = \frac{1}{x};$
7. $(sinx)' = cosx, \quad (cosx)' = -sinx;$
8. $(tgx)' = \frac{1}{cos^2 x}, \quad (ctgx)' = -\frac{1}{sin^2 x};$

2.2.1 Yig'indi va ayirmaning hosilasi.

1. $(u \pm v)' = u' \pm v'$
2. $(Cu)' = Cu'; \quad C - o'zgarmas.$

1. (96-7-28) Agar $f(x) = 5sinx + 3cosx$ bo'lsa, $f'(\frac{\pi}{4})$ ni hisoblang.
A) $-\sqrt{2}$ B) $\sqrt{2}$ C) $-2\sqrt{3}$ D) $4\sqrt{2}$ E) $4\sqrt{3}$

2. (97-1-19) Hosila $g'(\frac{\pi}{3})$ ni hisoblang.

$$g(x) = \frac{3x^2}{\pi} - 2tgx - \pi$$

A) $1\frac{1}{2}$ B) 10 C) $2\pi - 8$ D) $\pi + 4$ E) -6

3. (97-6-19) Agar $g(x) = ctgx + \frac{12x^3}{\pi^2} + \pi$ bo'lsa, $g'(\frac{\pi}{6})$ ni hisoblang.
A) -1 B) -3 C) 5 D) 3 E) 1,5

4. (97-7-28) Agar $f(x) = 2sinx - 4\sqrt{3}cosx$ bo'lsa, $f'(\frac{\pi}{3})$ ni hisoblang.
A) 7 B) -5 C) $2 + 4\sqrt{3}$ D) $2\sqrt{3} - 2$ E) 5

5. (97-9-34) Ushbu $y = \frac{1}{3}6^x - 6$ funksiyaning $x = 1$ nuqtadagi hosilasini toping.
A) $ln12$ B) $ln36$ C) $ln6$ D) $ln\frac{6}{}$ E) 6

6. (97-11-19) $f'(\pi)$ ni hisoblang.

$$f(x) = 2cosx - \frac{(\sqrt{\pi})^3}{\sqrt{x}} + \frac{\pi}{2}$$

A) $\frac{\sqrt{\pi}}{2}$ B) $-1,5$ C) 0,5 D) 2,5 E) $-\frac{\sqrt{\pi}}{3}$

7. (97-12-55) Agar $f(x) = \frac{1}{3}x^3 - 16x$ bo'lsa, $f'(4)$ ni toping.
A) 1 B) 2 C) 3 D) -1 E) 0

8. (98-1-28) Agar $f(x) = e^x + 5x$ bo'lsa, $f'(ln3)$ ni hisoblang.
A) 8 B) 5 C) $e^3 + 5$ D) e^3 E) 9

9. (98-5-26) Ushbu $y = sin^2 x + cos^2 x$ funksiyaning hosilasini toping.
A) $2sin2x$ B) 0 C) $4sinx$ D) $sin4x$ E) 1

10. (99-4-30) $f'(\frac{\pi}{6})$ ni toping.

$$f(x) = \sqrt{3}sinx + cos\frac{\pi}{3} - \frac{3}{\pi}x^2$$

A) $\sqrt{3}$ B) 0,5 C) $\frac{\sqrt{3}}{2}$ D) 0 E) $2\sqrt{3}$

11. (99-7-27) Ushbu $y = tgx \cdot ctgx$ funksiyaning hosilasini toping.
A) 1 B) 2 C) $-\frac{1}{sin^2 x \cdot cos^2 x}$ D) 0 E) -2

12. (99-8-38) $f'(0)$ ni hisoblang.

$$f(x) = x^3 + 3^x$$

A) $ln3$ B) 1 C) 3 D) 0 E) mavjud emas

13. (00-5-46) $y = (x-3)(x^2+3x+9)$ funksiyaning $x = 3$ nuqtadagi hosilasini aniqlang.
A) 0 B) 3 C) 27 D) -27 E) 9

14. (96-1-30) Agar $f(x) = x^3 - 3x - 4$ bo'lsa,

$$\frac{f'(x)}{x-5} \ge 0$$

tengsizlikning eng kichik butun yechimini toping.
A) 1 B) -1 C) -5 D) 0 E) -2

15. (96-9-81) Agar $f(x) = x^3 - 1,5x^2 - 6x$ bo'lsa, $\frac{f'(x)}{x+6} \ge 0$ tengsizlikning eng kichik butun yechimini toping.
A) -7 B) -2 C) -1 D) 1 E) -5

16. (96-10-32) Agar $f(x) = x^3 - 12x + 7$ bo'lsa,tengsizlikning eng katta butun yechimini toping.

$$\frac{f'(x)}{x-4} \le 0$$

A) 2 B) -4 C) 3 D) -2 E) 1

17. (98-3-22) Agarda

$$f(x) = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 2x + 1$$

bo'lsa,

$$\begin{cases} \frac{f'(x)(x+3)}{x^2-x-6} \ge 0 \\ x \le 4 \end{cases}$$

tengsizliklar sistemasining butun yechimlari nechta?
A) 6 B) 5 C) 4 D) 7 E) cheksiz ko'p

18. (98-5-25) x ning qanday qiymatlarida $f(x) = sinx$ va $g(x) = 5x + 3$ funksiyalar uchun $f'(x) < g'(x)$ tengsizlik bajariladi?
A) $(-\infty; 5)$ B) $(2\pi n; \frac{\pi}{2} + 2\pi n), \quad n \in Z$
C) $(-\infty; \infty)$ D) $(0; \infty)$ E) $(-\infty; 0)$

19. (98-10-70) Ushbu $f(x) = \frac{1}{3}x^3 + \frac{3}{2}x^2 - 4x$ funksiya uchun tengsizliklar sistemasining butun yechimlari nechta?

$$\begin{cases} \frac{f'(x)(x-1)}{x^2-x-6} \le 0 \\ x \ge -4 \end{cases}$$

A) 3 B) 4 C) 5 D) 6 E) cheksiz ko'p

20. (99-7-26) x ning qanday qiymatlarida $f(x) = \frac{1}{3} \cdot x^3$ va $g(x) = -x^2 + 3x$ funksiyalar uchun $f'(x) < g'(x)$ tengsizlik o'rinli bo'ladi?
A) $(-\infty; -3) \cup (1; \infty)$ B) $(-3; 1)$ C) $(1; \infty)$
D) $(-\infty; -3)$ E) $(-3; \infty)$

21. (00-6-27) Agar $f(x) = -4x^3 - 11x^2 - 8x + 7$ bo'lsa, $f'(x) \ge 0$ tengsizlikning nechta butun yechimi bor?
A) 4 B) 3 C) 2 D) 1 E) $\emptyset$

22. (97-5-34) Ushbu $y = 2^x - 1$ funksiyaning $x = 1$ nuqtadagi hosilasini toping.
A) 1 B) $ln2$ C) $ln\frac{4}{e}$ D) $ln4$ E) 2

23. (01-6-42) Agar $f(x) = x^{2/3} + 85\frac{1}{3}lnx$ bo'lsa, $f'(8)$ ning qiymatini toping.
A) 10 B) 12 C) 9 D) 8 E) 11

24. (01-8-29) Agar $f(x) = 16x^3 - 24x^2 + 9x - 1$ bo'lsa, $\frac{f'(x)}{x^2} \le 0$ tengsizlikning butun sonlardan iborat nechta yechimi bor?
A) 4 B) 3 C) 2 D) 1 E) butun echimi yo'q

25. (99-5-53) Agar $\varphi'(x) = lnx$ bo'lsa, x ning

$$\varphi'(x) + \varphi(x) = \frac{1}{x} - \varphi\Big(\frac{1}{x}\Big)$$

tengsizlikni qanoatlantiradigan barcha qiymatlarini toping.
A) $\emptyset$ B) $[1; \infty)$ C) $(1; \infty)$ D) $(0; \infty)$ E) $(0; 1)$

26. (02-2-29) Agar $f(x) = 3x + \frac{3}{x}$ bo'lsa, $f'(x) < 0$ tengsizlikni yeching.
A) $(-1; 0) \cup (0; 1)$ B) $(-\infty; -1)$ C) $(1; \infty)$
D) $(0; 1)$ E) $(-1; 0)$

27. (02-2-32) Nechta nuqtada $f(x) = x^3$ funksiya va uning hosilasi qiymatlari teng bo'ladi?
A) 2 B) 1 C) $\emptyset$ D) 3 E) 4

28. (01-12-49) Agar $f(x) = x^2 + |x|$ bo'lsa, $f'(-1)$ ni toping.
A) -3 B) 3 C) 2 D) -2 E) 0

29. (03-1-51)

$$cosx \ge \Big(-\frac{\pi}{2}x\Big)'$$

tengsizlikni yeching.
A) yechimga ega emas
B) $[-\pi + 2\pi n; \pi + 2\pi n], \quad n \in Z$
C) $\Big[-\frac{\pi}{2} + 2\pi n; \frac{\pi}{2} + 2\pi n\Big], \quad n \in Z$
D) $\Big[-\frac{\pi}{2} + \pi n; \frac{\pi}{2} + \pi n\Big], \quad n \in Z$
E) $(-\infty; \infty)$

30. (03-2-9) Agar $f(x) = x^3 + x - \sqrt{2}$ va $g(x) = 3x^2 + x + \sqrt{2}$ bo'lsa, $f'(x) > g'(x)$ tengsizlikning eng kichik natural yechimini toping.
A) 3 B) 2 C) 6 D) 5 E) 1

31. (03-5-47) Agar $y = 4 - \sqrt[3]{x^2}$ bo'lsa, $y'\Big(-\frac{8}{27}\Big)$ ni hisoblang.
A) 1 B) $\frac{2}{3}$ C) -1 D) $-\frac{2}{3}$ E) 3

32. (03-7-28)

$$f(x) = |x^2 - 14x + 45|. \quad f'(9) = ?$$

A) 0 B) 4 C) 2 D) 7 E) mavjud emas

33. (03-8-48) $f(x) = x^4 + x^3 - 13,5x^2 + 2003$ bo'lsa, $f'(x) \le 0$ tengsizlikning eng kichik natural yechimini toping.
A) 1 B) 2 C) 3 D) 4 E) 5

34. (03-12-20) Agar $f(x) = lnx$ bo'lsa, $f'(x) \le x$ tengsizlikni yeching.
A) $[-1; 0) \cup [1; \infty)$ B) $(-1; 0) \cup [1; \infty)$
C) $(-\infty; -1] \cup [1; \infty)$ D) $[1; \infty)$ E) $(0; 1]$

35. (03-12-73) Agar $f(x) = x^3 + 5x^2 + 4x + 2$ bo'lsa, $f'(x) = f(1)$ tenglamaning eng kichik ildizini toping.
A) -6 B) $-\frac{1}{3}$ C) -2 D) -4 E) $-\frac{2}{3}$

2.2.2 Ko'paytmaning hosilasi.

1. $(u \cdot v)' = u'v + uv'$

1. (96-9-79) Agar $f(x) = 3x \cdot 2^x$ bo'lsa, $f'(0)$ ni toping.
A) -3 B) 3 C) 1 D) -1 E) $3ln2$

2. (96-10-30) Agar $f(x) = 2x \cdot 3^x$ bo'lsa, $f'(0)$ ni toping.
A) -1 B) 2 C) -2 D) 3 E) 0

3. (98-12-39) Ushbu $y = e^x \cdot x^2$ funksiyaning hosilasini toping.
A) $e^x(x^2 + 2x)$ B) $e^x(x^2 + 2)$ C) $e^x(2x + 1)$
D) $e^x(x^2 + x)$ E) $2e^x$

4. (01-9-2) Agar $f(x) = x^3 lnx$ bo'lsa, $xf'(x) = 2f(x)$ tenglamani yeching.
A) $\frac{1}{e}$ B) e C) $\frac{1}{e^2}$ D) $2e$ E) 1

5. (02-10-64) Agar $f(x) = x^3 lnx$ bo'lsa,

$$f'(x) - \frac{2}{x} \cdot f(x) = 0$$

tenglamani yeching.
A) $\frac{1}{e}$ B) e C) $e - 1$ D) 1 E) $e^2 - 2$

2.2.3 Bo'linmaning hosilasi.

1. $(\frac{u}{v})' = \frac{u'v-uv'}{v^2}, \quad v \neq 0$

1. (96-3-81) Agar $f(x) = \frac{x}{1-x}$ bo'lsa, $f'(2)$ ni toping.
   A) -1 B) -2 C) 2 D) 1 E) 4

2. (96-9-22) Ushbu $f(x) = \frac{x^2}{x^2-1}$ funksiya uchun $f'(-2)$ ni hisoblang.
   A) $\frac{4}{9}$ B) $-\frac{4}{9}$ C) $\frac{3}{4}$ D) $-\frac{3}{4}$ E) $\frac{2}{9}$

3. (96-12-79)
$$f(x) = \frac{x}{x+1}, \quad f'(-2) - ?$$
   A) -1 B) -2 C) 1 D) 2 E) 4

4. (96-13-22) $F'(1)$ ni toping.
$$F(x) = \frac{x^2}{x^2+1}$$
   A) $-\frac{1}{2}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$ E) $\frac{1}{3}$

5. (98-3-23) $f'(1)$ ni toping.
$$f(x) = \frac{\sqrt{x}-1}{\sqrt{x}}$$
   A) aniqlanmagan B) 2 C) 1 D) $\frac{1}{2}$ E) 3

6. (98-10-69) $f'(1)$ ni toping.
$$f(x) = \frac{\sqrt{x}+1}{\sqrt{x}}$$
   A) $\frac{1}{2}$ B) aniqlanmagan C) $-\frac{1}{2}$ D) 1 E) 2

7. (99-6-10) Hosila $f'(0)$ ni hisoblang.
$$f(x) = \frac{cosx}{1-x}$$
   A) 4 B) 2 C) 3 D) 0 E) 1

8. (00-10-27) $y'(1)$ ni hisoblang.
$$y = \frac{lnx+2}{\sqrt{x}}$$
   A) 0 B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $\frac{1}{8}$ E) $\frac{1}{\sqrt{2}}$

9. (01-1-32) Agar $f(x) = \frac{x^2-x}{x+2}$ bo'lsa, $f'(2)$ ning qiymatini toping.
   A) 0,625 B) 0,5 C) 0,25 D) $-0,5$ E) 1

10. (01-2-34) Ushbu $y = \frac{x^2-8x+15}{x-3}$ funksiyaning $x = 2$ nuqtadagi hosilasini aniqlang.
    A) 5 B) 3 C) 2 D) -5 E) 1

11. (02-1-27) $f(x) = \frac{8x\sqrt{x}+2}{x}, \quad f'(1) - ?$
    A) 2 B) 1 C) 0 D) 3 E) 1,5

2.2.4 Murakkab funksiyaning hosilasi.

1. $(f(g(x)))' = f'(g(x))g'(x)$

(97-5-33) Ushbu $y = e^{sin^2x}$ funksiyaning hosilasini toping.
A) e^{sin^2x} B) $e^{sin^2x} \cdot sin2x$ C) $2e^{sin^2x} \cdot sinx$
D) $sin^2x \cdot e^{sin^2x-1}$ E) $e^{sin^2x} \cdot cos^2x$
Yechish: Murakkab funksiyaning hosilasini hisob-lash qoidasiga ko'ra $y' = e^{sin^2x} \cdot 2sinx \cdot cosx$ ekanini topamiz. $2sinx \cdot cosx = sin2x$ formulaga ko'ra $y' = e^{sin^2x} \cdot sin2x$ bo'ladi.
Javob: $e^{sin^2x} \cdot sin2x$ (B).

1. (97-6-48) Ushbu $g(x) = \frac{1}{3}ctg3x$ funksiyaning hosilasini $g'(\frac{\pi}{18})$ ni hisoblang.
   A) -2 B) $\frac{4}{3}$ C) 4 D) $-\frac{1}{4}$ E) -4

2. (00-6-26) Agar $f(x) = 3x^2 \cdot e^{sinx} - 8$ bo'lsa, $f'(\pi)$ ning qiymatini toping.
   A) $3\pi(2+\pi)$ B) $3\pi^2(3-\pi)$ C) $2\pi(3+\pi)$
   D) 6π E) $3\pi(2-\pi)$

3. (99-4-33) Agar $f(x) = (x-2)^2 \cdot (x+4)$ bo'lsa, $f'(x) \leq 0$ tengsizlikni eching.
   A) $[-4;2]$ B) $[2;4]$ C) $[-2;2]$
   D) $[-3;2]$ E) $[2;6]$

4. (96-1-28) Agar $f(x) = x \cdot 2^{x+1}$ bo'lsa, $f'(0)$ ni toping.
   A) -2 B) -1 C) 1 D) 2 E) $2ln2$

5. (96-3-29) Ushbu $y = cos(x^3 - 5)$ funksiyaning hosilasini toping.
   A) $-3x^2sin(x^3-5)$ B) $3x^2sin(x^3-5)$
   C) $-sin(3x^2-5)$ D) $sin(3x^2-5)$
   E) $3x^2sin(3x^2-5)$

6. (96-3-33) Ushbu $f(x) = ln(x^2 - 3sinx)$ funksiyaning hosilasini toping.
   A) $\frac{3}{x^2-3sinx}$ B) $\frac{2x+3cosx}{x^2-3sinx}$ C) $\frac{2x-3cosx}{x^2-3sinx}$
   D) $\frac{2x}{x^2-3sinx}$ E) $\frac{3}{x^2-3sinx}$

7. (96-3-34) Ushbu $f(x) = e^{sin2x}$ funksiyaning hosilasini toping.
   A) $sin2x \cdot e^{sin2x-1}$ B) $2cos2x \cdot e^{sin2x}$
   C) $2cos2x \cdot e^{cos2x}$ D) $cos2x \cdot e^{sin2x}$
   E) $2cos2x \cdot e^{sin2x-1}$

8. (96-6-56) Agar $f(x) = lnsinx$ bo'lsa, $f'(\frac{\pi}{6})$ ni toping.
   A) $-\sqrt{3}$ B) $\frac{\sqrt{3}}{3}$ C) $\sqrt{3}$ D) $-\frac{\sqrt{3}}{3}$ E) 1

9. (96-11-30) Ushbu $y = cos(x^2 + 3)$ funksiyaning hosilasini toping.
   A) $-3x \cdot sin(x^2+3)$ B) $-sin(2x+3)$
   C) $cos(2x+3)$ D) $2x \cdot sin(x^2+3)$
   E) $-2x \cdot sin(x^2+3)$

10. (96-11-34) Ushbu $f(x) = ln(x^2 - 3cosx)$ funksiyaning hosilasini toping.
    A) $x^2 - 3cosx$ B) $\frac{2x+3sinx}{x^2-3sinx}$ C) $\frac{2x+3sinx}{x^2-3cosx}$
    D) $\frac{2x+3cosx}{x^2-3sinx}$ E) $\frac{2x-3cosx}{x^2-3sinx}$

11. (96-11-35) Ushbu $f(x)=e^{sin3x}$ funksiyaning hosilasini toping.
A) $3cos3x\cdot e^{sin3x}$ B) $cos3x\cdot e^{sin3x-1}$
C) $3cos3x\cdot e^{cos3x}$ D) $cos3x\cdot e^{sin3x}$
E) $3sin3x\cdot e^{sin3x}$

12. (96-12-30) Ushbu $y=sin(x^3-5)$ funksiyaning hosilasini toping.
A) $-3x^2cos(x^3-5)$ B) $3x^2cos(x^3-5)$
C) $sin(3x^2-5)$ D) $cos(3x^2-5)$
E) $3x^2sin(x^3-5)$

13. (96-12-34) Funksiyaning hosilasini toping.
$$f(x)=ln(x^2+3sinx)$$
A) $\frac{3}{x^2+3sinx}$ B) $\frac{2x+3sinx}{x^2+3sinx}$ C) $\frac{2x+3cosx}{x^2+3sinx}$
D) $\frac{2x-3cosx}{x^2+3sinx}$ E) $\frac{2x}{x^2+3sinx}$

14. (96-12-36) Ushbu $f(x)=e^{cos2x}$ funksiyaning hosilasini toping.
A) $2sin2x\cdot e^{cos2x}$ B) $cos2x\cdot e^{cos2x-1}$
C) $-2sin2x\cdot e^{-2sin2x}$ D) $-2sin2x\cdot e^{cos2x}$
E) $2sin2x\cdot e^{2sin2x}$

15. (97-1-49) Hosila $f'(\frac{\pi}{9})$ ni hisoblang.$f(x)=-\frac{1}{3}\cdot tg3x$ A) $\frac{1}{4}$ B) $-\frac{1}{2}$ C) $-\frac{1}{4}$ D) 2 E) -4

16. (97-1-74) Agar $f(x)=lncosx$ bo'lsa, $f'(\frac{\pi}{4})$ ni hisoblang.
A) 1 B) -1 C) $\frac{\sqrt{2}}{2}$ D) $\sqrt{2}$ E) $\frac{1}{2}$

17. (97-2-56) Agar $f(x)=lncosx$ bo'lsa, $f'(\frac{\pi}{4})$ ni hisoblang.
A) 1 B) -1 C) $\sqrt{3}$ D) $-\sqrt{3}$ E) $\frac{\sqrt{3}}{3}$

18. (97-3-28) Agar $f(x)=2\sqrt{3}cos4x-2cosx$ bo'lsa, $f'(\frac{\pi}{6})$ ni hisoblang.
A) -11 B) 13 C) $\sqrt{3}+1$ D) $\sqrt{3}-2$ E) -13

19. (97-4-28) Ushbu $y=log_2(4x)-cos(x^2+3x)$ funksiyaning hosilasini toping.
A) $\frac{ln2}{x}-sin(x^2+3x)(2x+3)$
B) $\frac{1}{4x}-sin(x^2+3x)(2x+3)$
C) $\frac{1}{4xln2}+sin(x^2+3x)(2x+3)$
D) $\frac{1}{x\cdot ln2}-sin(x^2+3x)$
E) $\frac{1}{x\cdot ln2}-(2x+3)sin(x^2+3x)$

20. (97-5-31) Ushbu $y=sin(sinx)$ funksiyaning hosilasini toping.
A) $sin(sinx)\cdot cosx$ B) $cos(cosx)\cdot cosx$
C) $sin(cosx)\cdot sinx$ D) $cos(sinx)\cdot sinx$
E) $cos(sinx)\cdot cosx$

21. (97-6-62) Agar $f(x)=lnsinx$ bo'lsa, $f'(\frac{\pi}{4})$ ni hisoblang.
A) -1 B) 3 C) $-\sqrt{3}$ D) 1 E) $\frac{\sqrt{2}}{2}$

22. (97-8-57) Agar $f(x)=(x^2+1)^2$ bo'lsa, $f'(\frac{1}{2})$ ni toping.
A) 2,5 B) $-1\frac{2}{5}$ C) $-1\frac{4}{5}$ D) $\frac{2}{5}$ E) $1\frac{4}{5}$

23. (97-9-31) Ushbu $y=sin(cosx)$ funksiyaning hosilasini toping.
A) $sinx\cdot cos(cosx)$ B) $cosx\cdot sin(cosx)$
C) $-sinx\cdot cos(cosx)$ D) $-cosx\cdot sin(cosx)$
E) $cosx\cdot cos(sinx)$

24. (97-9-33) Ushbu $y=e^{ctgx}$ funksiyaning hosilasini toping.
A) $\frac{e^{ctgx}}{cos^2x}$ B) $ctgx\cdot e^{ctgx-1}$ C) $-\frac{e^{ctgx}}{sin^2x}$
D) $e^{ctgx}lnx$ E) $tgx\cdot e^{ctgx}$

25. (97-9-88) Ushbu $y=lg(tg4x)+sin(x^2+x+4)$ funksiyaning hosilasini toping.
A) $\frac{1}{ln10\cdot tg4x\cdot cos^24x}+(2x+1)\cdot cos(x^2+x+4)$
B) $\frac{4}{ln10\cdot tg4x\cdot cos^24x}+(2x+1)\cdot cos(x^2+x+4)$
C) $\frac{4ln10}{tg4x\cdot cos^24x}+(2x+1)\cdot cos(x^2+x+1)$
D) $\frac{ln10}{tg4x\cdot cos^24x}+(2x+1)\cdot cos(x^2+x+1)$
E) $\frac{1}{tg4x\cdot cos^24x}+(2x+1)\cdot cos(x^2+x+1)$

26. (97-10-28) Agar $f(x)=3cos2x-sin2x$ bo'lsa, $f'(\frac{\pi}{8})$ ni hisoblang.
A) $-4\sqrt{2}$ B) $\sqrt{2}$ C) $2\sqrt{2}$ D) $4\sqrt{3}$ E) $4\sqrt{2}$

27. (97-12-62) Hosila $f'(\frac{\pi}{6})$ ni hisoblang.
$$f(x)=0,5tg2x$$
A) $\frac{4}{3}$ B) $-\frac{1}{4}$ C) 4 D) 2 E) $-\frac{1}{2}$

28. (98-7-39) Ushbu $y=-\frac{1}{7}sin(7x-5)$ funksiyaning hosilasini toping.
A) $-\frac{1}{7}\cdot cos(7x-5)$ B) $-7cos(7x-5)$
C) $cos(7x-5)$ D) $-cos(7x-5)$
E) $-7cos7x$

29. (98-7-40) Ushbu $y=log_52x$ funksiyaning hosilasini toping.
A) $\frac{1}{xln2}$ B) $\frac{1}{xln5}$ C) $\frac{2}{xln5}$ D) $\frac{2}{xln2}$ E) $\frac{1}{2x}$

30. (98-8-28) Agar $f(x)=3x-2e^{-x}$ bo'lsa, $f'(ln2)$ ni hisoblang.
A) 1 B) 2 C) 5 D) 4 E) 3

31. (02-1-64) Agar $f(x)=x\cdot sin2x$ bo'lsa, $f'(\pi)+f(\pi)+2$ ni hisoblang.
A) 2π B) 2 C) $2+2\pi$ D) $2-2\pi$ E) 4π

32. (02-5-41) $y=x^2cos3x+2x+1$ funksiyaning $x=\frac{\pi}{6}$ nuqtadagi hosilasi qiymatini hisoblang.
A) $3-\frac{\pi^2}{36}$ B) $2+\frac{\pi^2}{12}$ C) 2 D) $2+\frac{\pi}{3}$ E) $2-\frac{\pi^2}{12}$

33. (98-11-32) $y'(\frac{1}{3})$ ni hisoblang.
$$y=(\sqrt{3x})^{-1}+\sqrt{3x}$$
A) 0 B) 1,5 C) 0,5 D) $-0,5$ E) 1

34. (98-12-38) Ushbu $y=-\frac{1}{3}cos(3x+\frac{\pi}{4})$ funksiyaning hosilasini toping.
A) $sin(3x+\frac{\pi}{4})$ B) $-\frac{1}{3}sin(3x+\frac{\pi}{4})$
C) $\frac{1}{3}sin(3x+\frac{\pi}{4})$ D) $-sin(3x+\frac{\pi}{4})$ E) $sin3x$

35. (99-1-24) Hosilasini hisoblang.
$$y=2-cos2x,$$
A) $2sin2x$ B) $sin2x$ C) $4cos2x$
D) $-sin2x$ E) $-2sin2x$

36. (99-1-25) $y_1=cos^23x$, $y_2=-sin^23x$ va $y_3=2sin6x$ funksiyalardan qaysilarining hosilalari teng?
A) $y_1;y_2$ B) $y_1;y_3$ C) $y_2;y_3$ D) $y_1;y_2;y_3$
E) hosilasi tenglari yo'q

37. (99-3-51) Funksiyaning hosilasini toping.

$$y = e^{-x^2} + lnsin2x + 3$$

A) $e^{-x^2} + \frac{1}{sin2x}$ B) $2xe^{-x^2} + ctg2x$
C) $-2xe^{-x^2} + ctg2x$ D) $-2xe^{-x^2} + 2ctg2x$
E)$e^{-x^2} + \frac{1}{cos2x}$

38. (99-3-52) Hosilasini $y'(\frac{\pi}{8})$ hisoblang.

$$y = -\frac{1}{cos2x} + cos\frac{\pi}{3}$$

A) $2\sqrt{2} - \frac{\sqrt{3}}{2}$ B) $2\sqrt{2} + \frac{\sqrt{3}}{2}$ C) $2\sqrt{2}$
D) $-2\sqrt{2}$ E) $2\sqrt{2} + \frac{1}{2}$

39. (99-6-14) Hosila $f'(\frac{\pi}{6})$ ni hisoblang.

$$f(x) = 2\sqrt{3}cos4x$$

A) -12 B) 12 C) 6 D) -6 E) $\frac{\sqrt{3}}{2}$

40. (99-10-43) Agar $f(x) = sin^2 3x$ bo'lsa, $f'(\frac{\pi}{12})$ ni hisoblang.
A) -3 B) 3 C) 2 D) -2 E) 4

41. (00-2-27) Agar $f(x) = 5sin(2x + \frac{2}{x})$ bo'lsa, $f'(1)$ ni aniqlang.
A) 5 B) 0 C) 2,5 D) $-\frac{1}{5}$ E) mavjud emas

42. (00-3-62) Ushbu $f(x) = sin2x + lncos2x$ funksiya uchun $f'(\frac{\pi}{6})$ ni toping.
A) $\frac{1}{2}(1 - \sqrt{3})$ B) $1 - 2\sqrt{3}$ C) $-\frac{3}{2}$
D) $\frac{3}{2}$ E) $1 - \frac{\sqrt{3}}{2}$

43. (00-8-67) Ushbu $f(x) = sin\left(\frac{1}{x} - 1\right)$ funksiyaning hosilasini toping.
A) $\frac{1}{x}cos(\frac{1}{x} - 1)$ B) $-\frac{1}{x}cos(\frac{1}{x} - 1)$
C) $\frac{1}{x}cos(\frac{1}{x} + 1)$ D) $\frac{1}{x^2}cos(\frac{1}{x} - 1)$
E) $-\frac{1}{x^2}cos(\frac{1}{x} - 1)$

44. (00-8-68) Ushbu $f(x) = \sqrt{2x^2 + 1}$ funksiyaning hosilasini toping.
A) $\frac{2x}{\sqrt{2x^2+1}}$ B) $\frac{-2x}{\sqrt{2x^2+1}}$ C) $\frac{x}{2\sqrt{2x^2+1}}$
D) $\frac{2x}{\sqrt{4x^2+1}}$ E) $\frac{x}{4\sqrt{2x^2+1}}$

45. (01-1-31) Funksiyaning hosilasini toping.

$$y = ln\frac{1 - cosx}{1 + cosx}$$

A) $\frac{1}{sinx}$ B) $\frac{2}{sinx}$ C) tgx D) $ctgx$ E) $\frac{2}{cosx}$

46. (01-2-23) Funksiyaning hosilasini toping.

$$y = |x + 1|$$

$$A)\begin{cases} 1, & agarx \geq -1 \\ -1, & agarx < -1 \end{cases}$$

$$B)\begin{cases} 1, & agarx > -1 \\ x = -1\ da\ hosila\ mavjud\ emas \\ -1, & agarx < -1 \end{cases}$$

C)2 D) 1 E) -1

47. (01-8-57) Agar $f(x) = \frac{sin2x}{\sqrt{x}} + 6$ bo'lsa, $f'(\pi)$ ning qiymatini toping.
A) $\frac{4}{\sqrt{\pi}}$ B) $\frac{4\pi-1}{\sqrt{\pi}}$ C) $\frac{1}{2\sqrt{\pi}}$ D) $\frac{2}{\sqrt{\pi}}$ E) $-\frac{1}{2\pi\sqrt{\pi}}$

48. (01-3-8) $y'(\frac{\pi}{10})$ ni toping.

$$y = \sqrt[3]{sin^2 5x}$$

A) $3\frac{1}{3}$ B) $1\frac{2}{3}$ C) 2 D) 0 E) $2\frac{1}{3}$

49. (01-8-26) Agar $f(x) = e^{1-2x} \cdot cos2x$ bo'lsa, $f'(0)$ ning qiymatini toping.
A) $-2e$ B) 0 C) e D) $2e$ E) $-e$

50. (01-10-49) Agar $f(x) = sin^4 3x$ va $\varphi(x) = 6sin6x$ bo'lsa, $f'(x) = \varphi(x)$ tenglik o'rinli bo'ladigan x ning barcha qiymatlarini toping.
A) $\frac{\pi n}{3}, \quad n \in Z$ B) $\frac{\pi n}{6}, \quad n \in Z$
C) $\frac{\pi n}{4}, \quad n \in Z$ D) $\frac{\pi}{3} + \frac{\pi n}{4}, \quad n \in Z$
E) $\frac{\pi}{4} + \frac{\pi n}{4}, \quad n \in Z$

51. (02-1-66) $f(x) = sin^2 2x$ funksiya berilgan. $\frac{f'(x)}{2cos2x}$ ni toping.
A) $sin2x$ B) $cos2x$ C) $-sin2x$
D) $-cos2x$ E) $2sin2x$

52. (02-2-28) $f(x) = \sqrt{sin2x}$ bolsa, $f'(\frac{\pi}{4})$ ni toping.
A) 0 B) 1 C) $\frac{1}{2}$ D) $\frac{\sqrt{2}}{2}$ E) -1

53. (02-2-54) $g(x) = 3x(2x-1)^5$ funksiya berilgan.x ning shunday qiymatlarini topingki,$g'(x) = 0$ bulsin.
A) $12^{-1}; 2^{-1}$ B) $2; 12$ C) $\emptyset$
D) $1; 2$ E) $3; 4$

54. (02-3-46) $f(x) = \sqrt{tgx}$ bolsa, $f'(\frac{\pi}{4})$ ni hisoblang.
A) 1 B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $\frac{3}{4}$ E) $\frac{3}{2}$

55. (02-9-30) Agar $f(x) = sin^4 x$ bolsa, $f'(\frac{\pi}{4})$ ni hisoblang.
A) $\frac{1}{4}$ B) 1 C) $\frac{1}{2}$ D) $\frac{3}{4}$ E) $\frac{3}{8}$

56. (02-9-32) Agar $f(x) = cos(x + \frac{\pi}{2})$ va $tg(\frac{\alpha}{2}) = \frac{1}{2}$ bolsa, $f'(\alpha)$ ni hisoblang.
A) $-0,6$ B) $\frac{3}{5}$ C) 0,8 D) $-\frac{1}{3}$ E) 0,4

57. (02-10-28) $y = x^x$ funksiyaning hosilasini toping.
A) $x^x(1 + lnx)$ B) $x^{x-1}\frac{lnx+1}{lnx}$ C) x^x
D) $x^x lnx$ E) x^{x-1}

58. (02-10-63) $f(x) = \frac{x}{\sqrt{x^2-2}}$ funksiyaning hosilasini toping.
A) $-\frac{2}{(x^2-2)3/2}$ B) $-\frac{x^2+2}{x^2-2}$ C) $\frac{1}{x^2-2}$
D) $-\frac{2x^2}{x^2-2}$ E) $-\frac{2x^2}{(x^2-2)\sqrt{x^2-2}}$

59. (02-11-50) $y = ln(1 - cosx)$ funksiyaning hosilasini toping.
A) $ctg\frac{x}{2}$ B) $ctgx$ C) $tg\frac{x}{2}$ D) tgx E) $tg^2 x$

60. (02-12-52)

$$y = ln(tgx), \quad y'(\frac{\pi}{12}) = ?$$

A) 2 B) 2,5 C) 3 D) 3,5 E) 4

61. (03-1-50)

$$y = sin^4 2x, \quad y' = ?$$

A) $2sin^2 2xsin4x$ B) $4sin^2 4xsin2x$
C) $4sin2xsin^2 4x$ D) $4sin^2 2xsin4x$
E) $2sin2xsin^2 4x$

62. (03-2-10) Agar $f(x) = e^{1-x} \cdot sin\frac{\pi x}{2}$ bolsa, $f'(1)$ ning qiymatini toping.
A) 1 B) 2 C) $-\sqrt{2}$ D) $-1,5$ E) -1

63. (03-2-24) Agar $f(x) = e^{ax^2+bx+1}$ funksiya uchun $f(1) = f(0) = f'(0)$ bo'lsa, ab ning qiymatini toping.
A) 1 B) 2 C) -4 D) 0 E) -1

64. (03-3-50) Agar $f(x) = \frac{1}{3^{2x}ln3} - ln4$ bo'lsa, $f'(log_3 5)$ ni hisoblang.
A) $\frac{29}{50}$ B) $\frac{2}{25ln^2 3}$ C) $\frac{2}{25}$ D) $-\frac{2}{25}$ E) $-\frac{121}{250}$

65. (03-6-20)

$$f(x) = ln\sqrt{8+x^2}. \quad f'(1) - ?$$

A) $\frac{1}{8}$ B) $\frac{1}{9}$ C)0 D) $\frac{1}{2\sqrt{2}}$ E) $\frac{1}{6}$

66. (03-6-21)

$$f(x) = |x^2 - 14x + 45|. \quad f'(6) - ?$$

A) 0 B) 5 C) 2 D) 7 E) mavjud emas

67. (03-6-68)

$$y = sin^3 2x$$

Funksiyaning hosilasini toping.
A) $3sin^2 2xcos2x$ B) $6sin^2 2xcos2x$
C) $-6sin^2 2xcos2x$ D) $6sin2xcos^2 2x$
E) $3sin4x$

68. (03-7-27)

$$f(x) = ln\sqrt{8+x^2}. \quad f'(0) - ?$$

A) $\frac{1}{8}$ B) $\frac{1}{9}$ C) 0 D) $\frac{1}{2\sqrt{2}}$ E) $\frac{1}{6}$

69. (03-7-74) $f(x) = (3x^2 + x)cos2x$ bo'lsa, $f'(0) + f'(-\frac{\pi}{2})$ ni hisoblang.
A) $-3\pi + 2$ B) 0 C) 3π D) $3\pi - 1$ E) $3\pi^2 + \pi$

70. (03-9-43) Agar $f(x) = \frac{ln2x}{x}$ bo'lsa, $f'(1)$ ni hisoblang.
A) $\frac{2}{e}$ B) $ln2$ C) $\frac{ln2}{e^2}$ D) $ln2 - 1$ E) $1 - ln2$

71. (03-12-72)

$$f(x) = \frac{ln2x}{x}. \quad f'(1) - ?$$

A) $1 - ln2$ B) $ln2 - 1$ C) $ln2$ D) $\frac{2}{e^2}$ E) $\frac{ln2}{e^2}$

2.2.5 Funksiyaning o'sish va kamayish oraliqlari.

1. Agar $f(x)$ funksiya uchun $f'(x) > 0, \quad x \in (a;b)$ bo'lsa, u holda $f(x)$ funksiya $(a;b)$ oraliqda o'suvchi bo'ladi.

2. Agar $f(x)$ funksiya uchun $f'(x) < 0, \quad x \in (a;b)$ bo'lsa, u holda $f(x)$ funksiya $(a;b)$ oraliqda kamayuvchi bo'ladi.

(98-6-18) Ushbu $y = \frac{x^2}{2} - lnx$ funksiyaning o'sish oraliqlarini toping.
A) $[-1;0) \cup [1;\infty)$ B) $[1;\infty)$ C) $[-1;\infty)$
D) $(-\infty;-1) \cup [1;\infty)$ E) $[-1;1]$

Yechish: Ma'lumki, agar $f(x)$ funksiya uchun $f'(x) > 0, \quad x \in (a;b)$ bo'lsa, u holda $f(x)$ funksiya $(a;b)$ oraliqda o'suvchi bo'ladi.Berilgan funksiyaning hosilasini topamiz.

$$y' = x - \frac{1}{x} = \frac{x^2-1}{x} = \frac{(x-1)(x+1)}{x}$$

$y' > 0$ tengsizlikni yechamiz.Uning echimi $(-1;0) \cup (1;\infty)$. Berilgan funksiyaning aniqlanish sohasi $x > 0$ bo'lgani uchun $(-1;0)$ oraliqni chiqarib tashlaymiz. Bundan tashqari $x = 1$ nuqta funksiyaning aniqlanish sohasiga tegishli bo'lgani uchun uni ham funksiyaning o'sish oralig'iga qo'shib qo'yamiz.
Javob: $[1;\infty)$ (B).

1. (96-10-14) Quyidagi funksiyalardan qaysi biri $(0;\infty)$ oraliqda kamayuvchi bo'ladi?
A) $y = x + 8$ B) $y = 3 - x$ C) $y = -\frac{4}{x}$
D) $y = 2x^2$ E) $y = \frac{1}{2}\sqrt{x}$

2. (96-3-20) Ushbu $f(x) = -x^2 + 2x - 1$ funksiyaning o'sish oralig'ini toping.
A) $(1;\infty)$ B) $(0;\infty)$ C) $(-\infty;-1)$
D) $(-1;\infty)$ E) $(-\infty;1]$

3. (96-6-44) a ning qanday qiymatlarida $f(x) = ax + sinx$ funksiya o'zining aniqlanish sohasida o'sadi. Shunday a larning barchasini toping.
A) $|a| > 1$ B) $0 < a < 1$ C) $a \geq 1$
D) $a = 0$ E) $a > 2$

4. (96-1-14) Quyidagi funksiyalardan qaysi biri $(-\infty;0)$ oraliqda o'suvchi bo'ladi?
A) $y = 3x + 2$ B) $y = \frac{3}{x}$ C) $y = 6 - 3x$
D) $y = x^2$ E) $y = \sqrt{-x}$

5. (96-9-64) Quyidagi funksiyalardan qaysi biri $(-\infty;0)$ oraliqda o'suvchi bo'ladi?
A) $y = 0,5 - 2x$ B) $y = \frac{5}{x}$ C) $y = 2 + 3x$
D) $y = 2\sqrt{-x}$ E) $y = 0,5x^2$

6. (96-11-21) Ushbu $f(x) = x^2 + 2x + 4$ funksiyaning o'sish oralig'ini toping.
A) $(-\infty;-1)$ B) $[-1;\infty)$ C) $(1;\infty;)$
D) $(0;\infty)$ E) $(-\infty;1)$

7. (96-12-21) $f(x)=x^2-2x+3$ funksiyaning o'sish oralig'ini toping.
A) $(0;\infty)$ B) $(-\infty;1)$ C) $[1;\infty)$
D) $(-\infty;-1)$ E) $(-1;\infty)$

8. (01-2-35)Ushbu $y=x+\frac{1}{x-1}$ funksiyaning kamayish oraliqlarini toping.
A) $[0;1)\cup(1;2]$ B) $(0;2)$ C) $(0;1)$ D) $(1;2)$
E) $(-\infty;0)\cup(2;\infty)$

9. (97-1-20) Ushbu $y=-\frac{1}{3}\cdot x^3-x^2+3x-5$ funksiyaning o'sish oraliqlarini toping.
A) $(-\infty;-1]$ va $[3;\infty)$ B) $[-1;3]$ C) $[-3;1]$
D) $[1;3]$ E) $(-\infty;-3]$ va $[1;\infty)$

10. (97-2-44) m ning qanday qiymatlarida $y=cosx+mx$ funksiya aniqlanish sohasida kamayadi?
A) $m\in(-\infty;-1]$ B) $m\in(-1;\infty)$
C) $m\in[-1;\infty)$ D) $m\in(-\infty;1)$
E) $m\in[-1;1]$

11. (97-5-25) Ushbu $y=x^2+1$ funksiyaning o'sish oralig'ini ko'rsating.
A) $(-1;\infty)$ B) $(1;\infty)$ C) $[0;\infty)$
D) $(-\infty;1)$ E) $(-\infty;1]$

12. (97-6-20) Ushbu $y=\frac{1}{3}x^3+\frac{7}{2}x^2+12x+1$ funksiyaning kamayish oraliqlarini toping.
A) $[-3;4]$ B) $(-\infty;-4]\cup[-3;\infty)$ C) $[3;4]$
D) $[-4;-3]$ E) $(-\infty;3]\cup[4;\infty)$

13. (97-8-44) k ning qanday qiymatlarida $f(x)=sinx-kx$ funksiya o'zining aniqlanish sohasida o'sadi?
A) $(-\infty;1)$ B) $(1;\infty)$ C) $(-1;0)$
D) $(-\infty;-1]$ E) $(-1;\infty)$

14. (97-9-25) Ushbu $y=x^2-2$ funksiyaning kamayish oralig'ini ko'rsating.
A) $(-\infty;-2)$ B) $(-\infty;2)$ C) $(2;\infty)$
D) $(-2;\infty)$ E) $(-\infty;0]$

15. (97-11-20) Ushbu $y=2x^3+3x^2-12x+7$ funksiyaning kamayish oralig'ini aniqlang.
A) $(-\infty;-2]\cup[1;\infty)$ B) $[-2;1]$ C) $[-1;2]$
D) $[-2;\infty)$ E) $(-\infty;-1]\cup[2;\infty)$

16. (98-11-67) Ushbu $y=\frac{3}{4-x}$ funksiyaning o'sish oraliqlarini toping.
A) $(-\infty;4)\cup(4;\infty)$ B) R C) $(-\infty;\frac{3}{4})\cup(\frac{3}{4};\infty)$
D) R^+ E) $[4;\infty)$

17. (99-2-40) Agar p o'zgarmas son $(p>0)$ bo'lsa, p ning qanday qiymatlarida $f(x)=px-lnx$ funksiya $(0;8]$ oraliqda kamayuvchi bo'ladi?
A) $\frac{1}{4}$ B) $1\frac{1}{6}$ C) $\frac{1}{7}$ D) $\frac{1}{8}$ E) $\frac{3}{5}$

18. (99-3-56) Ushbu $f(x)=\frac{1}{4}x^4-\frac{5}{3}x^3+3x^2+10$ funksiyaning barcha musbat kamayish oraliqlarini toping.
A) $[2;3]$ B) $(-\infty;0]$ va $[2;3]$
C) $(-\infty;3)$ D) $(-\infty;0)$ va $(3;\infty)$
E) $(-\infty;0)$ va $(2;\infty)$

19. (99-6-43) Ushbu $y=\frac{x}{lnx}$ funksiyaning o'sish oralig'ini toping.
A) $[e;\infty)$ B) $(0;1)$ C) $(1;e)$
D) $(-\infty;0)$ E) $(-1;e)$

20. (00-1-44) Qaysi oraliqda $f(x)=ln(4x-x^2)$ funksiya kamayadi?
A) $(0;2)$ B) $(-\infty;0)$ C) $(0;4)$
D) $(2;\infty)$ E) $[2;4)$

21. (00-7-37) Ushbu $f(x)=\frac{2}{3}x^3-4x^2+3$ funksiya kamayadigan oraliqdagi barcha butun qiymatlar yig'indisini toping.
A) 9 B) 8 C) 10 D) 7 E) 11

22. (01-1-35) Ushbu $y=x^2e^{-2x}$ funksiyaning o'sish oraliqlarini toping.
A) $(-\infty;-1)$ B) $[-1;1]$ C) $(-\infty;-1)\cup[0;1]$
D) $(-\infty;\infty)$ E) $[0;1]$

23. (01-3-13) Ushbu
$$y=\frac{x^2}{2}-12ln(x-4)$$
funksiyaning kamayish oralig'ini aniqlang.
A)$[6;\infty)$ B)$(4;\infty)$ C)$(2;4)$ D)$(-2;4)$ E)$(4;6]$

24. (01-4-25) Ushbu $y=sin\frac{x}{2}$ funksiyaning o'sish oraliqlarini toping.
A) $[-\frac{\pi}{2}+2\pi n;\frac{\pi}{2}+2\pi n],\quad n\in Z$
B)$[-\pi+2\pi n;\pi+2\pi n],\quad n\in Z$
C) $[-\frac{\pi}{2}+\pi n;\frac{\pi}{2}+\pi n],\quad n\in Z$
D) $[-\pi+\pi n;\pi+\pi n],\quad n\in Z$
E) $[-\pi+4\pi n;\pi+4\pi n],\quad n\in Z$

25. (01-4-31) Ushbu $y=xlnx$ funksiyaning kamayish oralig'ini toping.
A) $(0;e^{-1}]$ B)$(1;e]$ C)$(0;e]$ D)$(-1;1)$ E)$[0;\frac{1}{e})$

26. (01-4-32) Ushbu $f(x)=\frac{lnx^2}{1+ln^2x}$ funksiyaning o'sish oralig'ini toping.
A) $(0;e]$ B) $(0;\frac{1}{e}]$ C) $[\frac{1}{e};e]$ D) $[0;1)$ E) $(e;\infty)$

27. (01-7-48) a ning qanday qiymatlarida $y=2e^x-ae^{-x}+(2a+1)x-3$ funksiya son o'qining barcha nuqtalarida o'suvchi bo'ladi?
A) $[1;\infty)$ B) $[2;\infty)$ C) $[0;1]\cup[2;\infty)$
D) $(-\infty;\infty)$ E) $[0;\infty)$

28. (01-11-37) Qaysi oraliqda $f(x)=\frac{1}{5}x^5-4x^2$ funksiya monoton kamayadi?
A) $[0;2]$ B) $(0;2]$ C) $[0;2)$
D) $(0;2)$ E) $[0;3]$

29. (02-1-65) $y=2x^3+3x^2-2$ funksiyaning kamayish oraliqlarini aniqlang.
A)$(0;8)$ B)$(-\infty;-1]$ C)$[-1;\infty)$
D)$[-1;0]$ E)$(-\infty;-1)\cup(0;8)$

30. (02-5-43) $y=\frac{1}{4}x^4-\frac{5}{3}x^3+3x^2+10$ funksiyaning kamayish oraliqlarini aniqlang.
A) $(2;3)$ B) $(-\infty;0]\cup[2;3]$
C) $(-\infty;3)$ D) $(-\infty;0)\cup(3;+\infty)$
E) $(-\infty;0)\cup(2;+\infty)$

31. (02-7-15) $y=sin2x-x\quad(x\in[0;\pi])$ funksiyaning o'sish oralig'ini aniqlang.
A) $[0;\frac{\pi}{6}]\cup[\frac{5\pi}{6};\pi]$ B) $[\frac{\pi}{6};\pi]$
C) $[\frac{\pi}{2};\pi]$ D) $[0;\frac{\pi}{2}]$ E) $[0;\frac{\pi}{6}]\cup[\frac{3\pi}{4};\pi]$

32. (02-9-31) $f(x) = -2x^3+15x^2+12$ funksiya o'sadigan kesmaning uzunligini aniqlang.
A) 5 B) 4 C) 6 D) 4,5 E) aniqlab bo'lmaydi.

33. (02-10-30) $y = 3xe^{2-x}$ funksiyaning kamayish oralig'ini ko'rsating.
A)$[1;\infty)$ B)$(-\infty;1]$ C)$(-\infty;1)\cup(1;\infty)$
D)$(0;\infty)$ E)$[0;\infty)$

34. (02-10-31) $f(x) = \frac{1+x}{\sqrt{x}}$ funksiyaning o'sish oralig'i bilan $g(x) = \frac{1}{lgx-lg(4-x)}$ funksiyaning aniqlanish sohasi kesishmasini toping.
A) $[1;2)\cup(2;4)$ B) $(0;4)$ C) $(0;2)\cup(2;4)$
D) $(0;1)\cup(1;2)$ E) $(0;\infty)$

35. (02-10-68) $f(x) = x\cdot e^{2x}$ funksiyaning o'siish oralig'ini ko'rsating.
A)$[-0,5;\infty)$ B)$(0,5;\infty)$ C)$(-\infty;-0,5]$
D)$(0;\infty)$ E)$(-\infty;0)$

36. (02-11-54) Quyidagi funksiyalardan qaysi biri o'zining aniqlanish sohasida o'suvchi bo'ladi?
A) $y = sinx$ B) $y = \frac{lnx}{x}$ C) $y = \frac{1}{x^2+1}$
D) $y = x^2+4$ E) $y = 2x^7-8$

37. (02-12-55)
$$f(x) = \frac{1}{5}x^5 - 4x^2$$
funksiya qaysi oraliqda kamayadi?
A)$(-2;0]$ B)$[0;2]$ C)$[-2;0)$
D)$(0;3)$ E)$[0;3]$

38. (03-4-43) Argumentning $f(x) = \frac{1}{3}x^3+3x^2$ funksiya kamayadigan barcha qiymatlari Ox o'qiga quyilganda, qanday uzunlikdagi kesma hosil bo'ladi?
A) 4 B) 5 C) 6 D) 3 E) 7

39. (03-7-29) k ning qanday qiymatlarida $f(x) = x^3-kx^2+3x-1$ funksiya o'suvchi bo'ladi?
A) $(-\infty;-3)\cup(3;\infty)$ B) $(-\infty;4)$
C) $(-2;2)$ D) $[-3;3]$ E) $(3;\infty)$

40. (03-7-70) $f(x) = 2x^3+7,5x^2-9x$ funksiyaning kamayish oraliqlarini toping.
A) $[0,5;\infty)$ B) $[-3;0,5]$ C) $(-\infty;-3]\cup[0,5;\infty)$
D) $(-\infty-3]$ E) $(-\infty;\infty)$

41. (03-9-45) Agar $f'(x) = x(1-x)(x^2-7x+10)$ bo'lsa, $y = f(x)$ funksiyaning o'sish oraliqlari uzunliklari yig'indisini toping.
A) 1 B) 3 C) 4 D) 6 E) 8

2.2.6 Funksiyaning ekstremumlari.

1. (96-7-29) $f(x) = 3x-x^3$ funksiyaning maksimumini toping.
A) -1 B) 2 C) -2 D) 4
E) maksimumi yo'q.

2. (97-3-29) Ushbu $g(x) = 12x-x^3$ funksiyaning minimumini toping.
A) -32 B) -16 C) 0 D) 16
E) mavjud emas

3. (97-5-40) Ushbu $y = \frac{x^2-2}{x^2+2}$ funksiyaning eng kichik qiymatini toping.
A) 1 B) -1 C) -2 D) 2 E) 0

4. (97-7-29) Ushbu $f(x) = -\frac{2}{3}x^3+8x$ funksiyaning maksimumini toping.
A) 16 B) 0 C) $10\frac{2}{3}$ D) $-11\frac{1}{3}$
E) mavjud emas

5. (97-9-40) Ushbu $y = \frac{x^2-5}{x^2+5}$ funksiyaning eng kichik qiymatini toping.
A) 5 B) -5 C) -1 D) 1 E) 0

6. (97-10-29) Ushbu $y = -4x^3+12x$ funksiyaning minimumini toping.
A) 0 B) -8 C) -16 D) 8
E) mavjud emas

7. (97-11-15) Ushbu $y = x^2-8x+7$ funksiyaning qiymatlari sohasini toping.
A) $(2;\infty)$ B) $[-9;\infty)$ C) $[9;\infty)$
D) $[-4;\infty)$ E) $(-\infty;\infty)$

8. (97-12-20) Ushbu $y = x^2+8x+12$ parabolaning uchi koordinatalar tekisligining qayerida yotadi.
A) I chorakda B) II chorakda
C) OY o'qida D) IV chorakda
E) III chorakda

9. (98-1-24) Agar $A(1;-2)$ nuqta $y = x^2+px+q$ parabolaning uchi bo'lsa, p va q ning qiymatini toping.
A) $p=2,\quad q=-1$ B) $p=4,\quad q=2$
C) $p=q=-2$ D) $p=1,\quad q=-2$
E) $p=-2,\quad q=-1$

10. (98-1-29) Ushbu $f(x) = x^3+2,5x^2-2x$ funksiyaning maksimum nuqtasidagi qiymatini hisoblang.
A) -8 B) 6 C) 10,5 D) -12 E) 14

11. (98-8-29) Ushbu $f(x) = \frac{x^3}{3}+\frac{x^2}{2}-6x$ funksiyaning maksimum nuqtasidagi qiymatini hisoblang.
A) 13,5 B) $11\frac{1}{3}$ C) $-7\frac{1}{3}$ D) $-3,5$ E) $-5\frac{1}{6}$

12. (98-9-8) t ning qanday qiymatida $-t^2+14t-31$ uchhad eng katta qiymatga erishadi?
A) 6 B) 5 C) 8 D) 7 E) 9

13. (99-3-16) Ushbu
$$x^2-ax+a-1=0$$
tenglamaning ildizlari x_1 va x_2 bo'lsin. a ning qanday qiymatida $x_1^2+x_2^2$ yig'indi eng kichik qiymatga ega bo'ladi?
A) 1 B) 2 C) 1,5 D) 2,5 E) 3

14. (99-3-55) Ushbu $f(x) = \frac{(x-1)^2+1}{x-1}$ funksiyaning minimum nuqtasidagi qiymatini toping.
A) -1 B) 2 C) -2 D) 0 E) 1

15. (99-4-21) Agar $2x+y=6$ bo'lsa, xy ning eng katta qiymati nechaga teng bo'ladi?
A) 2,5 B) 4,5 C) 3 D) $-2,5$ E) 6

16. (99-6-44) $y = -2x^2 + 2x + 3$ parabola uchining absissasini toping.
A) $-0,5$ B) 3,5 C) 0,5 D) 2 E) 1

17. (99-6-57) Ushbu $y = -x^2 + 6x - 8$ funksiyaning eng katta qiymatini toping.
A) -1 B) 1 C) 0 D) 2 E) 3

18. (99-8-72) Ushbu $y = \frac{2cos^2x+sin2x}{2sin^2x}$ funksiyaning eng kichik qiymatini toping.
A) $-\frac{1}{4}$ B) $\frac{1}{4}$ C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) 1

19. (99-9-10) Ifodaning eng katta qiymatini toping.

$$\frac{x^2 + 2x + 8}{x^2 + 2x + 3}$$

A) 3,5 B) 2,6 C) 2,4 D) 2,8 E) 3

20. (99-9-14) Agar $a > 0$ bo'lsa, $y = x^2 - 2x - a$ parabolaning uchi koordinatalar tekisligining qaysi choragida joylashadi?
A) I B) II C) III D) IV
E) aniqlab bo'lmaydi.

21. (99-9-48) Ushbu $y = -x^2 + 6x - 12$ funksiyaning qiymatlari sohasini toping.
A) $(-3; \infty)$ B) $[-3; \infty)$ C) $(-\infty; -3)$
D) $(-\infty; -3]$ E) $(-\infty; 3]$

22. (00-8-35) a ning qanday haqiqiy qiymatlarida

$$x^2 + ax + a - 2 = 0$$

tenglama ildizlari kvadratlarining yig'indisi eng kichik bo'ladi?
A) 1 B) 3 C) 2 D) -1 E) 4

23. (97-6-15) Quyidagilardan qaysi biri $y = \sqrt{x^2 - 6x + 11}$ funksiyaning qiymatlar sohasi?
A) $[0; \infty)$ B) $[0; 11]$ C) $[\sqrt{2}; \infty)$
D) $(2; \infty)$ E) $(-\infty; \infty)$

24. (99-3-28) Funksiyaning qiymatlar sohasini toping.

$$y = \sqrt{3x^2 - 4x + 5}$$

A) $[0; \infty)$ B) $[\sqrt{3}; \infty)$ C) $[\sqrt{\frac{3}{2}}; \infty)$
D) $[\sqrt{\frac{11}{3}}; \infty)$ E) to'g'ri javob berilmagan

25. (99-4-25) Ushbu $f(x) = \sqrt{2 - x - x^2}$ funksiyaning eng katta qiymatini toping.
A) $\sqrt{2}$ B) 1,5 C) 3 D) $2\sqrt{2}$
E) eng katta qiymati yo'q

26. (99-8-37) Ushbu $y = \sqrt{3 - x^2 - 2x}$ funksiyaning eng katta qiymatini toping.
A) -2 B) 4 C) 2 D) 3 E) 1

27. (99-10-40) Ushbu $y = (\frac{1}{3})^{x^2-4x}$ funksiyaning eng katta qiymatini toping.
A) 82 B) 81 C) 27 D) 36 E) 45

28. (00-1-34) Ushbu $y = (sin\frac{\pi}{4})^{x^2-2x}$ funksiyaning eng katta qiymatini toping.
A) $-1,5\sqrt{2}$ B) $-\sqrt{2}$ C) $1,5\sqrt{2}$ D) $\sqrt{2}$ E) $2\sqrt{2}$

29. (00-7-35) Ushbu $f(x) = 3^{1+x} + 3^{1-x}$ funksiyaning eng kichik qiymatini toping.
A) 9 B) 4 C) 8 D) 6 E) 5

30. (99-10-42)Ushbu $y = \sqrt{x^2 - 2x + 10}$ funksiyaning qiymatlar sohasini toping.
A) $[3; \infty)$ B) $(3; \infty)$ C) $[5; \infty)$
D) $[2; \infty)$ E) $(2; \infty)$

31. (01-1-34) Ushbu $y = 3x^5 - 5x^3 - 3$ funksiyaning ekstremum nuqtalaridagi qiymatlari yig'indisini hisoblang.
A) -9 B) -6 C) -8 D) -4 E) -2

32. (01-6-44) Ushbu $f(x) = -\frac{x^3}{3} + 2x^2 - 3x$ funksiyaning maksimumi va minimumi ayirmasini toping.
A) $-1\frac{1}{3}$ B) $1\frac{1}{3}$ C) $1\frac{2}{3}$ D) $-1\frac{2}{3}$ E) 1,5

33. (01-8-20) Agar $x > 0$ bo'lsa, $x + \frac{81}{x}$ ning eng kichik qiymatini toping.
A) 30 B) 24 C) 6 D) 12 E) 18

34. (01-8-28) Ushbu

$$y = 3^{x^3 - 3x}$$

funksiyaning maksimumini toping.
A) 81 B) $\frac{1}{9}$ C) 9 D) 3 E) mavjud emas

35. (01-9-39) $y = ax^2 + bx + c, \quad (a > 0)$ funksiya $x = 1$ nuqtada 4 ga teng eng kichik qiymatga ega. Agar $y(2) = 6$ bo'lsa, a, b va c larni toping.
A) $a = 4, \quad b = 2, \quad c = 6$
B) $a = 3, \quad b = 6, \quad c = 2$
C) $a = 6, \quad b = -2, \quad c = 4$
D) $a = 2, \quad b = -4, \quad c = -2$
E) $a = 2, \quad b = -4, \quad c = 6$

36. (01-2-36) Ushbu $y = \frac{lnx}{x}$ funksiyaning eng katta qiymatini toping.
A) e B) 1 C) $\frac{1}{e}$ D) -1 E) $-\frac{1}{e}$

37. (01-2-60) Ko'paytmaning eng kichik qiymatini toping.

$$x(x + 1)(x + 2)(x + 3)$$

A) 3 B) 2 C) 1 D) -1 E) -2

38. (01-10-25)Ushbu $f(x) = 3 - \frac{x^2}{x^4+3x^2+1}$ funksiyaning qiymatlar sohasini toping.
A) $[2,5; 3]$ B) $[2,6; 3]$ C) $[2,7; 3]$
D) $[2,8; 3]$ E) $[2,9; 3]$

39. (01-12-38) $y = -x^2 + bx + c$ funksiya $x = -1$ nuqtada 5 ga teng eng katta qiymatni qabul qilsa, $y(1)$ ni toping.
A) -1 B) 0 C) 1 D) 1,5 E) $-1,5$

40. (02-2-30) $y = \frac{x^3}{3} + 2x^2 - 5x + 7$ funksiya kritik nuqtalari yig'indisini toping.
A) -4 B) -5 C) 5 D) 4 E) -3

41. (02-2-61) ax^2+bx+c kvadrat uchhad $x=8$ da nolga aylanishi hamda $x=6$ da -12 ga teng eng kichik qiymatni qabul qilishi ma'lum. $\sqrt{a+b+c}$ ni toping.
A) $\sqrt{63}$ B) $\sqrt{65}$ C) 8 D) $\sqrt{50}$ E) 7

42. (02-3-22) ax^2+bx+c kvadrat uchhadning $x=1$ da eng katta qiymati 3 ga.$x=-1$ da nolga teng bo'ladi.Bu uchhadning qiymati $x=5$ da nechaga teng bo'ladi?
A) -9 B) -6 C) -12 D) -3 E) $-1,5$

43. (02-3-47) $A(2;5)$ nuqtadan $4x-3y+1=0$ to'g'ri chiziqqacha masofani aniqlang.
A) 1,2 B) 1 C) 1,4 D) 1,3 E) 0,8

44. (02-4-6) $y=x^2+4x+11$ funksiyaning eng kichik qiymatini toping.
A) 4 B) 11 C) $\frac{11}{4}$ D) 7 E) $\frac{4}{11}$

45. (02-2-4) a ning qanday qiymatida

$$(a-7)^2+(a-8)^2+(a-12)^2$$

ifoda eng kichik qiymatga ega bo'ladi?
A) 9 B) 10 C) 8 D) 11 E) 12

46. (02-4-7) a ning qanday qiymatida $y=ax^2+3x-5$ funksiya $x=-3$ nuqtada eng kichik qiymatga ega bo'ladi?
A) 0,4 B) $-0,4$ C) 0,5 D) $-0,5$ E) 0

47. (02-5-37)

$$2cos^2\alpha-3sin\alpha$$

ifodaning eng katta qiymatini toping.
A) 5 B) 3 C) -3 D) $3\frac{1}{8}$ E) 2,5

48. (02-5-44) $y=\frac{x^4}{4}-x^3-\frac{1}{4}$ funksiyaning ekstremum nuqtalaridagi qiymatlari yig'indisini toping.
A) $-\frac{11}{4}$ B) -9 C) -7 D) -5 E) $-7\frac{1}{4}$

49. (02-10-17) $y=\frac{18}{x^2}+\frac{x^2}{2}$ funksiyaning eng kichik qiymatini toping.
A) 6 B) 5 C) 4 D) 3 E) 2

50. (02-11-17) Agar $f(0)=24$ bo'lib $x=\frac{1}{2}$ da $f(x)=ax^2+bx+c$ kvadrat uchhad o'zining 25 ga teng bo'lgan eng katta qiymatga erishsa, kvadrat uchhadning ko'rinishini toping.
A) $-4x^2-4x+24$
B) $-4x^2+24$
C) $8x^2-2x+24$
D) $-4x^2+4x+24$
E) $16x^2-6x+24$

51. (02-11-49) $y=\frac{x^2-4x+9}{x^2-4x+5}$ funksiyaning qiymatlar to'plamiga tegishli tub sonlar nechta?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

52. (02-11-52) $f(x)=0,9x^5-4,5x^3+4$ funksiyaning minimum nuqtasini toping.
A) -1 B) 1 C) $\sqrt{2}$ D) $-\sqrt{2}$ E) $\sqrt{3}$

53. (02-12-16) $y=\frac{3}{x^2-2x+3}$ funksiyaning eng katta qiymatini toping.
A) 3 B) 1 C) aniqlab bo'lmaydi
D) 2,5 E) 1,5

54. (02-12-57)

$$f(x)=\sqrt{24-x^2-2x}$$

funksiyaning eng katta qiymatini toping.
A) $2\sqrt{6}$ B) 4 C) 5,5 D) 4,5 E) 5

55. (02-6-29) $f(x)=\frac{x^2-4x+8}{x^2-4x+5}$ funksiyaning qiymatlar sohasini toping.
A) $[1,6;5]$ B) $[1,6;4]$ C) $[1;4]$
D) $(1;4]$ E) $(0;5]$

56. (03-1-55) $y=3cos^23x-3\sqrt{3}cos3x-sin^23x+4$ funksiyaning eng kichik qiymatini toping.
A)1,545 B)1,2325 C)2,1413 D)1,3125 E)2,125

57. (03-1-57) Qaysi sonni o'zining kvadrati bilan yig'indisi eng kichik bo'ladi?
A) -1 B) $-0,4$ C) $-0,8$ D) $-0,5$ E) $-0,6$

58. (03-2-7) $y=\sqrt{x^2+2x+4}$ funksiyaning qiymatlar sohasini ko'rsating.
A) $[0;\infty)$ B) $[2;\infty)$ C) $(0;\infty)$
D) $[\sqrt{2};\infty)$ E) $[\sqrt{3};\infty)$

59. (03-3-52) Agar m va M $y=x+\frac{1}{x}$ funksiyaning mos ravishda minimum va maksimum nuqtalaridagi qiymatlari bo'lsa, $m-2M$ ning qiymatini toping.
A) -6 B) 6 C) -4 D) 4 E) 3

60. (03-4-42) $f(x)=\frac{1}{6}x^6-\frac{1}{2}x^2+4$ funksiyaning minimumlari yig'indisini toping.
A) $4\frac{2}{3}$ B) $7\frac{1}{3}$ C) $6\frac{2}{3}$ D) $3\frac{2}{3}$ E) $5\frac{1}{3}$

61. (03-5-30) $f(x)=9^x+5\cdot 3^{-2x}$ funksiyaning qiymatlari to'plamini ko'rsating.
A) $[2\sqrt{5};\infty)$ B) $(0;\infty)$ C) $[5;\infty)$
D) $[6;\infty)$ E) $[3\sqrt{5};\infty)$

62. (03-5-32) $f(x)=\frac{2x}{1+x^2}$ funksiyaning qiymatlari to'plamini aniqlang.
A) $[-1;1]$ B) $[0;1]$ C) R D)$[-1;0]$ E)$[0;\infty)$

63. (03-6-22) Agar $f(x)=\frac{7x^2+ax+b}{x}$funksiya grafigi $(2;0)$ nuqtada absissa o'qiga urinib o'tsa,$a-b$ nimaga teng?
A) 0 B) 20 C) -21 D) 28 E) -56

64. (03-7-30) Agar $f(x)=\frac{7x^2+ax+b}{x}$funksiya grafigi $(2;0)$ nuqtada absissa o'qiga urinib o'tsa,$a+b$ nimaga teng?
A) 0 B) 20 C) -21 D) 28 E) -56

65. (03-7-64) Arifmetik progressiyada $a_7=9$. Progressiyaning ayirmasi qanday bo'lganda, $a_1\cdot a_2$ ko'paytmaning qiymati eng kichik bo'ladi?
A) 9 B) $-\frac{31}{30}$ C) $\frac{10}{11}$ D) $\frac{33}{20}$ E) $d>3$

66. (03-7-66) $y=x^3-3x^2-9x+12$ funksiyaning ekstremal qiymatlari ayirmasini toping.
A) 20 B) 12 C) 4 D) 2 E) 32

67. (03-7-72) $y = |x-2| + 2x - 3x^2$ funksiyaning eng katta qiymatini toping.
A) $2\frac{1}{12}$ B) 10 C) $-1\frac{1}{4}$ D) $\frac{1}{2}$ E) $-\frac{1}{12}$

68. (03-7-81) $y = -x^4 + 2x^2 + 5$ funksiyaning qiymatlar to'plamini toping.
A) $(-\infty; 6]$ B) $(-\infty; 6)$ C) $[5; 6]$
D) $(-\infty; 5]$ E) $(-\infty; \infty]$

69. (03-9-46) $f(x) = 0,6x^5 - 2x^3 - 1$ funksiyaning maksimum va minimum nuqtalaridagi qiymatlari yig'indisini toping.
A) -3 B) -2 C) -1 D) 1 E) 2

70. (03-11-7) m va n natural sonlar. $\frac{6}{x} = \frac{1}{m} + \frac{1}{n}$ va $m + n = 18$ bo'lsa, x ning eng katta qiymatini toping.
A) 27 B) 24 C) 18 D) 30 E) 15

71. (03-12-71) $f(x) = 0,6x^5 - 2x^3 - 1$ funksiyaning maksimum nuqtasini toping.
A) 0 B) 1 C) $\sqrt{2}$ D) $-\sqrt{2}$ E) -1

2.2.7 Funksiyaning oraliqdagi eng katta va eng kichik qiymatlari.

1. (97-4-30) Ushbu $f(x) = x^2 - 3x + 1,25$ funksiyaning $[-1; 1]$ oraliqdagi eng katta qiymatini toping.
A) 0 B) $-0,75$ C) 5,25 D) 6,25 E) 4

2. (97-9-90) Ushbu $f(x) = 3x^2 - 4x - 4$ funksiyaning $[0; 3]$ oraliqdagi eng katta qiymatini toping.
A) 10 B) 20 C) 11 D) 16 E) 18

3. (98-2-40) Ushbu $f(x) = -\frac{1}{3}x^3 - \frac{1}{6}x$ funksiyaning $[-1; 1]$ kesmadagi eng katta va eng kichik qiymatlari yig'indisini hisoblang.
A) $-\frac{1}{3}$ B) 0 C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) $-\frac{2}{3}$

4. (98-3-25) Ushbu $y = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 6x$ funksiyaning $[-1; 3]$ kesmadagi eng katta qiymatini toping.
A) $6\frac{5}{6}$ B) $6\frac{1}{6}$ C) 6 D) 6,5 E) $6\frac{2}{3}$

5. (98-4-32) Ikki tomoni yig'indisi 1,6 ga va ular orasidagi burchagi 150^0 ga teng bo'lgan uchburchaklar ichida yuzasi eng katta bo'lgan uchburchakning yuzini toping.
A) $\frac{2}{5}$ B) $\frac{4}{25}$ C) $\frac{4}{9}$ D) $\frac{25}{36}$ E) $\frac{3}{4}$

6. (98-5-27) Ushbu $y = x^2 - 2x + 5$ funksiyaning $[0; 1]$ kesmadagi eng katta qiymatini toping.
A) 5 B) 4 C) -2 D) 0 E) 6

7. (98-9-38) Ushbu $f(x) = x^3 + 2x - 5$ funksiyaning $[-1; 1]$ kesmadagi eng katta va eng kichik qiymatlari orasidagi ayirmani toping.
A) -6 B) 6 C) -5 D) 5 E) 4

8. (98-10-72) $y = 2x^3 + 3x^2 - 12x$ funksiyaning $[0; 2]$ kesmadagi eng kichik qiymatini toping.
A) 0 B) -2 C) -5 D) -7 E) -8

9. (98-11-33) $y = 0,25x^4 - \frac{x^3}{3} - x^2$ funksiyaning $[-2,5; \infty)$ oraliqdagi eng kichik qiymatini aniqlang.
A) $-\frac{3}{8}$ B) $\frac{3}{8}$ C) $\frac{8}{3}$ D) $-\frac{8}{3}$ E) aniqlab bo'lmaydi

10. (99-2-42) $y = 3x^4 - 4x^3$ funksiyaning $[0; 2]$ kesmadagi eng kichik qiymatini toping.
A) 0 B) -16 C) -1 D) 1 E) -12

11. (99-3-53) Ushbu $y = x^3 - 3x^2 + 1$ funksiyaning $[-1; 4]$ kesmadagi eng katta va eng kichik qiymatlari ayirmasini toping.
A) 20 B) 14 C) 15 D) 18 E) 16

12. (99-7-28) Ushbu $y = x^2 - 2x - 1$ funksiyaning $[-1; 1]$ kesmadagi eng katta qiymatini toping.
A) 4 B) 2 C) 0 D) 6 E) 5

13. (00-1-15) Agar $m > 0, \quad n > 0$ va $m + n = 16$ bo'lsa, mn ning eng katta qiymatini toping.
A) 62 B) 72 C) 64 D) 60 E) 66

14. (00-3-66) Ushbu $f(x) = 3x - x^3$ funksiyaning $[-2; 3]$ kesmadagi eng katta va eng kichik qiymatlari ayirmasini toping.
A) 20 B) 18 C) 16 D) 12 E) 14

15. (00-3-67) Bir tomondan imorat bilan chegaralangan, qolgan tomonlari uzunligi 120 m panjaradan iborat to'gri to'rtburchak shaklidagi yer maydonining eng katta yuzini toping.
A) 1600 B) 1500 C) 1800 D) 2000 E) 1750

16. (00-4-52) Ushbu $y = 4x^2 + \frac{1}{x}$ funksiyaning $[0,25; 1]$ kesmadagi eng katta qiymatini hisoblang.
A) 3 B) 4,25 C) 4,5 D) 5 E) 5,25

17. (00-5-47) Ushbu $y = xlnx - xln5$ funksiyaning $[1; 5]$ kesmadagi eng kichik qiymatini toping.
A) $-ln5$ B) $-\frac{5}{e}$ C) $\frac{5}{e}$ D) 0 E) $ln\frac{5}{e}$

18. (00-6-30) $f(x) = sin2x + 2cosx$ funksiyaning $[\frac{\pi}{2}; \pi]$ kesmadagi eng kichik qiymatini toping.
A) 0 B)-2 C)$-1,5\sqrt{3}$ D)-3 E)$-0,5\sqrt{3}$

19. (00-10-28) $y = 12x - x^3$ funksiyaning $[-1; 3]$ kesmadagi eng katta va eng kichik qiymatlari ayirmasini hisoblang.
A) 27 B) 15 C) 5 D) 32 E) 7

20. (01-3-18) Ushbu $f(x) = x^2(x-6)$ funksiyaning $[-1; 3]$ dagi eng katta va eng kichik qiymatlarini aniqlang.
A) $2; -4$ B) $0; -32$ C) $6; -21$
D) $0; -27$ E) $6; -20$

21. (01-7-49) Ushbu $y = 4x^2 + \frac{1}{x}$ funksiyaning $[\frac{1}{4}; 1]$ kesmadagi eng katta va eng kichik qiymatlari yig'indisini toping.
A) $7\frac{1}{4}$ B) $9\frac{1}{4}$ C) $10\frac{1}{4}$ D) 6 E) 8

22. (01-8-56) Ushbu $f(x) = sin2x - 2cosx$ funksiyaning$[\pi; \frac{3\pi}{2}]$ kesmadagi eng katta qiymatini hisoblang.
A) $1,5\sqrt{2}$ B) 0 C) 3 D) 2 E) $2\sqrt{2}$

23. (01-9-49) Ushbu $y = \frac{1}{3}x^3 + x^2 - 8x$ funksiyaning $[1; 3]$ kesmadagi eng katta va eng kichik qiymatlarining ko'paytmasini toping.
A) 48 B) -37 C) 50 D) 56 E) -46

24. (01-11-39) Ushbu $y=\frac{1}{3}x^3-4x$ funksiyaning $[0;2]$ kesmadagi eng katta va eng kichik qiymatlarining ayirmasini toping.
A) $5\frac{1}{3}$ B) $15\frac{2}{3}$ C) $10\frac{2}{3}$ D) $15\frac{1}{5}$ E) $14\frac{2}{3}$

25. (02-9-33) $f(x)=2^x+2^{2-x}$ funksiyaning $[0;2]$ kesmadagi eng kichik qiymatini toping.
A) 2 B) 2,5 C) 3 D) 4 E) 5

26. (02-11-53) $y=3x^2-12x-16$ funksiyaning $[3;8]$ kesmadagi eng kichik qiymatini toping.
A) 18 B) -22 C) -25 D) -28 E) -30

27. (03-2-60) $y=log_{1/3}(x^2+x-2)$ funksiyaning $[3;6]$ kesmadagi eng katta va eng kichik qiymatlari ayirmasini toping.
A) $log_{1/3}6$ B) $log_{1/3}4$ C) log_36
D) log_34 E) $log_{1/3}2$

28. (03-8-52) $y=\frac{x}{2}-\sqrt{x}$ funksiyaning $[0;16]$ kesmadagi eng katta qiymatini hisoblang.
A) 4 B) 8 C) -3 D) 5 E) 12

2.2.8 Urinmaning burchak koeffisienti.

$y=f(x)$ funksiya grafigiga x_0 nuqtada o'tkazilgan urinmaning burchak koeffisienti k va OX o'qining musbat yo'nalishi bilan xosil qilgan burchagi α bo'lsin.

1. $k=f'(x_0)$
2. $tg\alpha=f'(x_0)$
3. $y=f(x)$ va $y=g(x)$ funksiyalar grafiklariga x_0 nuqtada o'tkazilgan urinmalarning parallellik sharti: $f'(x_0)=g'(x_0)$

(96-13-23) Ushbu $y=\frac{x}{1-x}$ funksiyaning grafigiga abssissasi $x_0=3$ bo'lgan nuqtasidan o'tkazilgan urinmaning OX o'qi bilan tashkil etgan burchagi α bo'lsa, $tg2\alpha$ ni toping.
A) $\frac{7}{15}$ B) $\frac{2}{5}$ C) $\frac{8}{15}$ D) $\frac{3}{5}$ E) $\frac{2}{3}$
Yechish: $y=f(x)$ funksiyaning grafigiga abssissasi x_0 bo'lgan nuqtasida o'tkazilgan urinmaning OX o'qi bilan tashkil etgan burchagi α bo'lsa, $tg\alpha=f'(x_0)$ ekani ma'lum. Avval berilgan funksiyaning hosilasini topamiz.

$$y'=\frac{1-x+x}{(1-x)^2}=\frac{1}{(1-x)^2}$$

So'ngra x ning o'rniga $x_0=3$ ni qo'yib

$$tg\alpha=\frac{1}{(1-3)^2}=\frac{1}{4}$$

ni topamiz.Ushbu

$$tg2\alpha=\frac{2tg\alpha}{1-tg^2\alpha}$$

formuladan

$$tg2\alpha=\frac{2\cdot\frac{1}{4}}{1-\frac{1}{16}}=\frac{8}{15}$$

ni hosil qilamiz.
Javob: $\frac{8}{15}$ (C).

1. (96-6-46) Ushbu $y=x^2-3x+2$ parabolaga abssissasi $x_0=2$ bo'lgan nuqtada o'tkazilgan urinmaning burchak koeffisienti nimaga teng.
A) 1 B) 2 C) -3 D) 3 E) -2

2. (97-12-45) Ushbu $y=\frac{1}{2}x^2-lnx$ funksiyaning grafigiga $x_0=2$ nuqtada o'tkazilgan urinmaning burchak koeffisienti toping.
A) $-2,5$ B) 2 C) 1,75 D)1,25 E) 1,5

3. (97-2-46) $y=lnx+x^2$ funksiyaning grafigiga $x_0=\frac{1}{2}$ nuqtada o'tkazilgan urinmaning burchak koeffisienti toping.
A) 3 B) 6 C) 4 D)6,5 E) 3,5

4. (97-8-46) Ushbu $y=\frac{1}{3}x^3-lnx$ funksiyaning grafigiga $x_0=2$ nuqtada o'tkazilgan urinmaning burchak koeffisienti toping.
A) 4 B) 3 C) 2 D)1,5 E) 3,5

5. (00-3-64) $y=2-3x$ to'g'ri chiziq $y=x^2+bx+c$ parabolaga abssissasi $x=0$ bo'lgan nuqtada o'tkazilgan urinma bo'lsa, $b+c$ ni toning.
A) 2 B) -2 C) 3 D) -3 E) -1

6. (96-3-82) $y=\frac{x}{1-x}$ funksiyaning grafigiga abssissasi $x_0=3$ bo'lgan nuqtasidan o'tkazilgan urinmaning OX o'qi bilan tashkil etgan burchagi α bo'lsa, $cos2\alpha$ ni toping.
A) $\frac{1}{2}$ B) $\frac{13}{17}$ C) $\frac{15}{17}$ D) $\frac{13}{16}$ E) $\frac{15}{16}$

7. (96-9-23) $y=\frac{x}{1-x}$ funksiyaning grafigiga abssissasi $x_0=3$ bo'lgan nuqtasidan o'tkazilgan urinmaning OX o'qi bilan tashkil etgan burchagi α bo'lsa, $ctg2\alpha$ ni toping.
A) $\frac{17}{7}$ B) $\frac{17}{6}$ C) $\frac{15}{8}$ D) $\frac{17}{9}$ E) $\frac{17}{10}$

8. (96-12-80) $y=\frac{x}{1-x}$ funksiyaning grafigiga abssissasi $x_0=3$ bo'lgan nuqtasidan o'tkazilgan urinmaning OX o'qi bilan tashkil etgan burchagi α bo'lsa, $sin2\alpha$ ni toping.
A) $\frac{7}{16}$ B) $\frac{7}{17}$ C) $\frac{9}{16}$ D) $\frac{8}{17}$ E) $\frac{9}{17}$

9. (97-4-29) $y=3x^2+2x$ funksiya grafigiga abssissasi $x_0=-3$ nuqtada o'tkazilgan urinma OX o'qining musbat yo'nalishi bilan qanday burchak hosil qiladi?
A) $arctg3$ B) $\pi-arctg16$ C) $\pi-arctg3$
D) $-arctg16$ E) 60^0

10. (97-9-89) $y=x^2+3x+4$ funksiyaning grafigiga abssissasi $x_0=-2$ bo'lgan nuqtasidan o'tkazilgan urinma OX o'qining musbat yo'nalishi bilan qanday burchak hosil qiladi?
A) 135^0 B) 45^0 C) 70^0 D) $-arctg2$ E) 50^0

11. (98-2-42) Ushbu $f(x)=-\frac{\sqrt{3}}{2}x^2+1$ funksiyaning grafigiga $x_0=\frac{1}{3}$ nuqtada o'tkazilgan urinmaning OX o'qi bilan tashlik qilgan burchagini toping.
A) 30^0 B) 60^0 C) 120^0 D) 150^0 E) 135^0

12. (98-9-39) Ushbu $f(x)=\frac{\sqrt{3}}{3}\cdot x^3-1$ funksiyaning grafigiga $x_0=1$ nuqtada o'tkazilgan urinmaning OX o'qi bilan tashlik qilgan burchagini toping.
A) 60^0 B) 30^0 C) 45^0 D) 120^0 E) 150^0

13. (98-11-34) Qaysi nuqtada $y=\sqrt[3]{x}$ funksiya grafigiga abssissa o'qiga 30^0 li burchak ostida joylashgan?
A) $(\frac{1}{\sqrt{3}};\frac{1}{\sqrt[4]{3}})$ B) $(\frac{1}{\sqrt[4]{27}};\frac{1}{\sqrt{3}})$ C) $(\frac{1}{\sqrt{3}};\frac{1}{\sqrt[4]{3}})$
D) $(\frac{1}{\sqrt{3}};\frac{1}{\sqrt[4]{27}})$ E) $(\frac{1}{\sqrt[4]{27}};\frac{1}{\sqrt[4]{3}})$

14. (98-11-76) Qaysi nuqtada $y=1+e^{x-1}$ funksiyaning grafigiga o'tkazilgan urinma OX o'qi bilan 45^0 li burchak hosil qiladi?
A) $x=1$ B) $x=0$ C) $x=-1$
D) $x=2$ E) $x=-2$

15. (99-2-41) Abssissasi $x_0=3$ bo'lgan nuqtasidan $f(x)=\sqrt{3}lnx$ funksiyaga o'tkazilgan urinma OY o'qi bilan qanday burchak tashkil qiladi?
A) $arctg3$ B) 60^0 C) 30^0
D) $arctg2$ E) $90^0-arctg2$

16. (99-10-44) Ushbu $y=\sqrt{3}\cdot x^2-3\sqrt{3}\cdot x+4$ funksiyaning grafigiga $x_0=2$ nuqtada o'tkazilgan urinma OY o'qi bilan qanday burchak tashkil qiladi?
A) 120^0 B) 60^0 C) 30^0 D) 150^0 E) 135^0

17. (00-4-53) Ushbu $y=\frac{sin3x}{\sqrt{3}}$ funksiyaning grafigiga abssissalar o'qini koordinata boshida qanday burchak ostida kesib o'tadi?
A) 30^0 B) 60^0 C) 75^0 D) 80^0 E) 50^0

18. (00-7-39) $f(x)=\frac{1}{3}x^3-2x$ funksiyaning grafigiga o'tkazilgan urinma OX o'qining musbat yo'nalishi bilan 135^0 burchak tashlik qiladi.Urinish nuqtasining koordinatalarini toping.
A) $(1;-1\frac{2}{3})$ yoki $(-1;1\frac{2}{3})$ B) $(1;-1\frac{1}{3})$ C) $(-1;1\frac{2}{3})$
D) $(2;-1\frac{1}{3})$ E) $(-1;1\frac{1}{3})$ yoki $(1;-1\frac{1}{3})$

19. (00-10-29) Ushbu $y=\sqrt[3]{x}+\frac{1}{3}$ funksiyaning grafigiga o'tkazilgan urinma abssissa o'qi bilan 45^0 li burchak tashlik etadi.Urinish nuqtasining ordinatasini toping.
A) $\frac{\sqrt{3}+1}{2}$ B) $\frac{\sqrt{3}-1}{2}$ C) $\frac{\sqrt{3}-1}{3}$
D) $\frac{\sqrt{3}+1}{3}$ E) $\frac{\sqrt{3}-1}{\sqrt{3}+1}$

20. (98-3-26) Ushbu $y=\frac{1}{3}x^3+\frac{1}{2}x^2-6x$ funksiyaning grafigiga o'tkazilgan urinma x ning qanday qiymatlarida $y=6x-1$ to'g'ri chiziqqa parallel bo'ladi?
A) -3 va 2 B) -4 va 3 C) -2 va 1
D) -5 va 4 E) -6 va 5

21. (98-6-28) Qaysi nuqtada $y=x^3-2x^2+4$ va $y=x^3-lnx$ funksiyalarning grafiklariga o'tkazilgan urinmalar o'zaro parallel bo'ladi?
A) $x=\frac{1}{2}$ B) $x=\pm\frac{1}{2}$ C) $x=2$
D) $x=-\frac{1}{2}$ E) $x=3$

22. (98-10-73) $y=2x^3+3x^2-6x$ funksiyaning grafigiga o'tkazilgan urinma x ning qanday qiymatlarida $y=6x+1$ to'g'ri chiziqqa parallel bo'ladi?
A) -2 va 3 B) 1 va 3 C) -2 va 1
D) 2 va -1 E) -1 va 3

23. (98-11-37) $y=x^2-2x+1$ dagi qanday nuqtada o'tkazilgan urinma $y=-4(x+1)$ to'g'ri chiziqqa parallel bo'ladi?
A) $(-1;\frac{1}{4})$ B) $(-1;4)$ C) $(1;\frac{1}{4})$
D) $(1;4)$ E) $(0;4)$

24. (98-11-77) Agar $f(x)$ funksiyaning grafigiga $x_0=2$ nuqtada o'tkazilgan urinmaning tenglamasi $2x-3y=6$ bo'lsa, $f'(2)$ qanchaga teng bo'ladi?
A) $\frac{2}{3}$ B) $\frac{3}{2}$ C) 2 D) 3 E) 4

25. (99-3-54) Ushbu $y=x^2+1$ to'g'ri chiziqqa o'tkazilgan urinma $y=2x+3$ to'g'ri chiziqqa parallel.Urinish nuqtasining ordinatasini toping.
A) 0 B) 2 C) 4 D) $\frac{1}{2}$ E) $\frac{1}{4}$

26. (99-5-37) Ushbu $y=(x-\frac{1}{2})^2+\frac{3}{2}$ to'g'ri chiziqqa o'tkazilgan urinmasi $y=3x+7$ to'g'ri chiziqqa parallel bo'lgan nuqtadan koordinata boshigacha bo'lgan masofani aniqlang.
A) 5,5 B) 3,75 C) 4,25 D) 6,85 E) 4,75

27. (00-1-46) $y=-\frac{1}{2}x^2+2x$ funksiya grafigining qaysi nuqtasiga o'tkazilgan urinma $y=-2x$ tenglama bilan berilgan to'g'ri chiziqqa parallel bo'ladi?
A) $(-4;0)$ B) $(0;4)$ C) $(4;0)$
D) $(0;-4)$ E) $(2;4)$

28. (00-9-41) $y=(2x+1)^2$ egri chiziqqa o'tkazilgan urinmasi $y=2x+\frac{1}{2}$ to'g'ri chiziqqa parallel bo'lgan nuqtadan koordinatalar boshigacha bi'lgan masofani aniqlang.
A) $\frac{\sqrt{2}}{2}$ B) $\frac{\sqrt{2}}{4}$ C) $\frac{\sqrt{2}}{8}$ D) $\frac{1}{2}$ E) 1

29. (00-10-32) Qaysi nuqtada $y=x^2+2x+8$ funksiyalarning grafigiga o'tkazilgan urinma $y+2x-8=0$ to'g'ri ciziqqa parallel bo'ladi?
A) $(-2;8)$ B) $(2;8)$ C) $(-2;-8)$
D) $(2;-8)$ E) $(2;8)$

30. (01-3-25) Ushbu

$$y=x^2+ln(x-1)$$

funksiyaning grafigiga $x=2$ nuqtada o'tkazilgan urinmaning burchak koeffisienti toping.
A) 12 B) 5 C) 3 D)1 E) 9

31. (01-11-38) Ushbu $f(x)=\frac{x+2}{x-2}$ funksiyaning grafigiga o'tkazilgan urinma OX o'qining musbat yo'nalishi bilan 135^0 burchak tashlik etadigan nuqtasining abssissasini toping.
A) 1 va 4 B) 2 va 3 C) 0 va 5
D) 1 va 5 E) 0 va 4

32. (02-3-49) $y=x^2$ parabolaning abssissasi 3 ga teng nuqtasiga o'tkazilgan urinmaga parallel va $(3;4)$ nuqtadan o'tuvchi to'g'ri chiziq tenglamasini aniqlang.
A) $y=6x-14$ B) $y=3x-8$ C) $y=6x+14$
D) $y=\frac{1}{6}x-14$ E) $y=-\frac{1}{6}x+12$

33. (02-5-42) $y=ln2x$ funksiyaning grafigiga A nuqtasiga o'tkazilgan urinma og'ish burchagining tangensi $\sqrt{2}$ ga teng. A nuqtaning abssissasini toping.
A) $\frac{\sqrt{3}}{2}$ B) $1+\sqrt{2}$ C) $\frac{\sqrt{2}}{2}$
D) $\frac{1}{2\sqrt{2}}$ E) $\sqrt{2}-1$

34. (02-6-53) $f(x)=0,5x^2+x-1,5$ funksiyaning grafigiga abssissasi 2 ga teng bo'lgan nuqtadasiga

o'tkazilgan urinmaning burchak koeffisienti toping.
A) 1 B) 2 C) 3 D)4 E) 2,4

35. (02-12-54) $y = -5x + 3$ to'g'ri chiziq, $f(x) = x^2 - x$ funksiyaning grafigiga o'tkazilgan urinmaga parallel. Urinish nuqtasining koordinatalarini toping.
A) $(-2;6)$ B) $(1;0)$ C) $(2;4)$
D) $(0;0)$ E) $(2;2)$

36. (03-2-8) Qaysi to'g'ri chiziq $y = 4 - x^2$ funksiya grafigiga $x_0 = 2$ nuqtada o'tkazilgan urinmaga parallel bo'ladi?
A) $y = 4 - 4x$ B) $y = 2x + 8$ C) $y = x + 8$
D) $y = 4x + 8$ E) $y = -8 + 4x$

37. (03-3-51) $y = sin\frac{x}{2}$ $(x \in (0;\pi))$ funksiyaning grafigiga (x_0, y_0) nuqtada o'tkazilgan urinmaning burchak koeffisienti $\frac{\sqrt{3}}{4}$ ga teng. $x_0 \cdot y_0$ ni hisoblang.
A) $\frac{2}{3}$ B) $\frac{1}{6}$ C) $\frac{2\pi}{3}$ D) $-\frac{2\pi}{3}$ E) $\frac{\pi}{6}$

38. (03-11-19) $(x+3)^2 + (y-5)^2 = 45$ aylananing $A(0;11)$ nuqtasiga o'tkazilgan urinmaning burchak koeffisientini toping.
A) $-\frac{1}{2}$ B) -2 C) $\frac{1}{2}$ D) 2 E) $\frac{2}{3}$

2.2.9 Urinmaning tenglamasi.

1. $y - y_0 = f'(x_0)(x - x_0)$

1. (99-4-31) $y = e^{2-x} \cdot cos\frac{\pi x}{2}$ funksiyaga abssissasi $x_0 = 2$ bo'lgan nuqtada o'tkazilgan urinmaning tenglamasini ko'rsating.
A) $y = x - 1$ B) $y = 1 - x$ C) $y = 2x - 1$
D) $y = x + 3$ E) $y = x - 3$

2. (00-3-63) $y = lnx$ funksiyaning grafigiga abssissasi $x_0 = 1$ bo'lgan nuqtada urinma o'tkazilgan.Bu urinmaning abssissasi 15 ga teng nuqtasi ordinatasini toping.
A) 12 B) 13 C) 14 D) 15 E) 16

3. (00-5-48) $y = 4 - x^2$ parabolaga abssissasi $x_0 = 1$ nuqtada urinma o'tkazilgan.Bu urinmaning OY o'qi bilan kesishadigan nuqtasining koordinatasini toping.
A) $(0;5)$ B) $(0;1)$ C) $(0;-5)$
D) $(0;-1)$ E) $(0;2)$

4. (96-1-29) Ushbu $f(x) = 2x^2 - 1$ funksiya grafigiga abssissasi $x_0 = 0$ bo'lgan nuqtada o'tkazilgan urinma tenglamasini ko'rsating.
A) $y = -1$ B) $y = 2$ C) $y = 2x + 1$
D) $y = 1$ E) $y = x - 1$

5. (96-9-80) $y = -2x^2 - 1$ funksiya grafigiga abssissasi $x_0 = 0$ bo'lgan nuqtada o'tkazilgan urinma tenglamasini ko'rsating.
A) $y = 1$ B) $y = -2x$ C) $y = x - 1$
D) $y = -1$ E) $y = 4x$

6. (96-10-31) $y = 1 - 2x^2$ funksiya grafigiga abssissasi $x_0 = 0$ nuqtada o'tkazilgan urinma tenglamasini ko'rsating.
A) $y = 1$ B) $y = -1$ C) $y = -x$
D) $y = 1 - 4x$ E) $y = 2x - 1$

7. (99-8-39) Ushbu $f(x) = 4 - x^2$ funksiya grafigining abssissa o'qini musbat yo'nalishi bilan kesishgan nuqtasiga o'tkazilgan urinmasi tenglamasini yozing.
A) $y = -4x + 8$ B) $y = 4x + 8$
C) $y = 2x - 3$ D) $y = -2x + 5$ E) $y = -4x$

8. (99-8-70) Ushbu $y = 2sin\frac{x}{3}$ funksiya grafigining $M(\frac{3\pi}{2};2)$ nuqtasiga o'tkazilgan urinmaning tenglamasini yozing.
A) $y = 2$ B) $y - 1 = 0$ C) $y = x$
D) $y = x - 2$ E) $y = -2x$

9. (99-9-52) Abssissasi $x_0 = 0$ nuqtadan $y = x^3$ funksiya grafigiga o'tkazilgan urinmaning tenglamasini ko'rsating.
A) $y = x$ B) $y = -0,5x$ C) $y = 0$
D) $y = 0,5x$ E) $y = 2x$

10. (00-6-28) $y = 3lnx - 0,5x$ funksiya grafigiga abssissasi $x_0 = 3$ nuqtada o'tkazilgan urinmaning tenglamasini tuzing.
A) $y = 0,5x - 1,5$ B) $y = 3x - ln3$
C) $y = x - 3ln3$ D) $y = 3x - 0,5$
E) $y = 0,5x + 3ln3 - 3$

11. (00-10-58) Ushbu $f(x) = cos2x$ funksiyaga $(\frac{\pi}{4}; f(\frac{\pi}{4}))$ nuqtadan o'tkazilgan urinma tenglamasini ko'rsating.
A) $y = \frac{\pi}{2} - 2x$ B) $y = \pi - 3x$ C) $y = \frac{\pi}{2} + 3x$
D) $y = \pi - 2x$ E) $y = 2\pi + 3x$

12. (01-1-33) Ushbu $y = x^2 + 3x + 2$ funksiyaning grafigiga abssissasi $x = 0$ nuqtada urinma o'tkazilgan.Shu urinmaning abssissasi $x = 11$ bo'lgan nuqtasining ordinatasini toping.
A) 36 B) 33 C) 35 D) 32 E) 34

13. (01-4-35) Ushbu $f(x) = x^3$ funksiya grafigining $A(-1;-1)$ nuqtasiga o'tkazilgan urinmasi tenglamasini ko'rsating.
A) $y = 3x - 2$ B) $y = 3x + 2$
C) $y = x + 2$ D) $y = x - 2$ E) $y = 3x$

14. (01-6-46) $y = f(x)$ funksiyaning grafigiga o'tkazilgan urinma OX o'qi bilan 45^0 li burchak tashlik qiladi.Agar urinish nuqtasining abssissasi 2 ga teng va $f(2) = 18$ bo'lsa, urinmasi tenglamasini ko'rsating.
A) $y = x + 16$ B) $y = x - 16$ C) $y = x + 18$
D) $y = x - 18$ E) $y = x + 14$

15. (01-7-47) Ushbu $y = -x^2 - 2$ chiziqning $y = 4x + 1$ to'g'ri chiziqqa parallel bo'lgan urinmasi tenglamasini ko'rsating.
A) $y = 4x + 6$ B) $y = 4x - 6$ C) $y = 4x - 2$
D) $y = 4x + 2$ E) $y = 4x + 10$

16. (01-8-27) $f(x) = x - lnx$ funksiyaning grafigiga o'tkazilgan gorizontal urinmaning

tenglamasini tuzing.
A) $y=2$ B) $y=1$ C) $y=2-ln2$
D) $y=1+ln2$ E) $y=1,5$

17. (02-1-67) $y=x-3x^2$ funksiyaning grafigiga $x_0=2$ nuqtada o'tkazilgan urinmaning tenglamasini yozing.
A) $y=1-6x$ B) $y=-11x+12$ C) $y=3x+1$
D) $y=x-3$ E) $y=-12x-1$

18. (02-8-20) a ning qanday qiymatlarida $y=a+xln81$ to'g'ri chiziq, $y=9^x+2\cdot 3^{x+1}-xln81$ funksiya grafigining urinmasi bo'ladi?
A) 7 B) 5 C) 6 D) 8 E) 9

19. (02-10-29) $f(x)=log_3(2x+1)$ funksiya grafigining abssissasi $x_0=1$ nuqtasiga o'tkazilgan urinma tenglamasini ko'rsating.
A) $y=\frac{2x}{3ln3}-\frac{2}{3ln3}+1$
B) $2x-y\cdot ln3-2+ln3=0$
C) $xln3+y=0$
D) $xln3+y+1=0$
E) $\frac{x}{ln3}+2y-2=0$

20. (02-10-65) $y=\sqrt{(5-x^{\frac{2}{3}})^3}$ egri chiziqqa $M(1;8)$ nuqtada urinma o'tkazilgan.Bu urinmaning koordinata o'qlari orasidagi kesmasi uzunligini toping.
A) $5\sqrt{5}$ B) 10 C) 5 D) $7\sqrt{3}$ E) $5\sqrt{7}$

21. (03-2-23) $y=lnx$ funksiya grafigiga o'tkazilgan urinma koordinata boshidan o'tadi.Shu urinmaning tenglamasini yozing.
A) $y=x$ B) $y=2x$ C) $y=ex$
D) $y=\frac{x}{e}$ E) $y=3x$

22. (03-6-69) $y=x^2-2x$ parabolaga uning biror nuqtasida o'tkazilgan urinmaning burchak koeffisenti 4 ga teng. Shu urinmaning tenglamasini toping.
A) $y=4x-4$ B) $y=4x+9$ C) $y=4x+4$
D) $y=4x-5$ E) $y=4x-9$

23. (03-9-44) $A(1;4)$ nuqtadan $y=-2-\frac{2}{x}$ funksiyaning grafigiga ikkita urinma o'tkazilgan. Urinish nuqtalari abssissalarining yig'indisini toping.
A) -1 B) 1 C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) $-\frac{2}{3}$

2.2.10 Hosilaning mexanik ma'nosi.

$S(t)$ qonuniyat bilan harakatlanayotgan moddiy nuqtaning tezligi $\vartheta(t)$, tezlanishi esa $a(t)$ bo'lsin.

1. $\vartheta(t)=S'(t)$
2. $a(t)=\vartheta'(t)$

(99-2-39) Moddiy nuqta $S(t)=3t^3-3t^2+12t(m)$ qonuniyat bo'yicha harakatlanyapti. Uning tezlanishi 0 ga teng bo'lgan paytda tezligi necha m/min bo'ladi?
A) 8 B) 7 C) 9 D) 11 E) 10

Yechish: To'g'ri chiziq bo'ylab $S(t)$ qonun bilan harakatlanayotgan nuqtaning tezligi uchun $\vartheta(t)=S'(t)$, tezlanishi uchun esa $a(t)=\vartheta'(t)$ formulalar o'rinlidir. Demak, $\vartheta(t)=9t^2-6t+12$, $a(t)=\vartheta'(t)=18t-6$. Nuqtaning tezlanishi 0 ga tengligidan

$$18t-6=0,\Rightarrow t=\frac{6}{18}=\frac{1}{3}$$

ekanini topamiz.Uni tezlikning ifodasiga qo'yib

$$\vartheta(\frac{1}{3})=9\cdot\left(\frac{1}{3}\right)-6\cdot\frac{1}{3}+12=1-2+12=11$$

ni topamiz.
Javob: 11 (D).

1. (96-3-83) To'g'ri chiziq bo'ylab $x(t)=-t^3+6t^2+15t$ qonun bo'yicha harakatlanayotgan moddiy nuqta harakat boshlangandan necha sekunddan keyin to'xtaydi.
A) 1 B) 2 C) 3 D) 4 E) 5

2. (96-9-14) To'g'ri chiziq bo'ylab $x(t)=-\frac{1}{3}t^3+\frac{3}{2}t^2+4t$ qonun bo'yicha harakatlanayotgan moddiy nuqtaharakat boshlangandan necha sekunddan keyin to'xtaydi.
A) 5 B) 3 C) 2 D) 4 E) 6

3. (96-12-81) To'g'ri chiziq bo'ylab $x(t)=-t^3+3t^2+9t$ qonun bo'yicha harakatlanayotgan moddiy nuqta harakat boshlangandan necha sekunddan keyin to'xtaydi?
A) 1 B) 2 C) 3 D) 4 E) 5

4. (96-13-24) To'g'ri chiziq bo'ylab $x(t)=-\frac{1}{3}t^3+\frac{1}{2}t^2+6t$ qonun bo'yicha harakatlanayotgan moddiy nuqta harakat boshlangandan necha sekunddan keyin to'xtaydi?
A) 2 B) 1 C) 4 D) 5 E) 3

5. (98-2-41) Moddiy nuqta $S(t)=lnt+\frac{1}{16}t$ qununiyat bo'yicha to'g'ri chiziqli harakatlanayapti. Harakat boshlangandan qancha vaqt o'tgach, nuqtaning tezligi $\frac{1}{8}$ m/s ga teng bo'ladi?
A) 15s B) 17s C) 16s D) 14s E) 18s

6. (98-9-40) Moddiy nuqta $S(t)=e^t+cost+5t$ qununiyat bo'yicha harakatlanayapti. Shu nuqtaning $t=0$ dagi tezligini toping.
A) 5 B) 8 C) 4 D) 7 E) 6

7. (98-12-107) Moddiy nuqta $S(t)=-\frac{1}{6}t^3+3t^2-5$ qununiyat bo'yicha harakatlanayapti. Uning tezlanishi nolga teng bo'lganda,tezligi qanchaga teng bo'ladi?
A) 24 B) 18 C) 12 D) 6 E) 15

8. (99-3-57) Ikki moddiy nuqta $S_1(t)=2,5t^2-6t+1$ va $S_2(t)=0,5t^2+2t-3$ qununiyat bo'yicha harakatlanayapti. Qaysi vaqtda birinchi nuqtaning tezligi ikkinchisinikidan uch marta ko'p bo'lishi mumkin?
A) 2 B) 3 C) 4 D) 5 E) 6

9. (99-9-51) Moddiy nuqta to'g'ri chiziq bo'ylab $S(t)=6t^2-2t^3+5$ qununiyat bo'yicha harakatlanayapti. Uning tezlanishi 0 ga teng bo'lgandagi oniy tezligi nimaga teng.
A) 8 B) 6 C) 7 D) 9 E) 6,5

10. (00-3-65) To'g'ri chiziq bo'ylab $s = \frac{t^2}{t^2+3}$ qonuniyat asosida harakatlanayotgan jismning $t = 1$ bo'lgan ondagi tezligini toping.
A) 0,4 B) 0,5 C) 0,225 D) 0,375 E) 0,45

11. (00-7-38) Moddiy nuqta to'g'ri chiziq bo'ylab $S(t) = -\frac{1}{12}t^4 + \frac{2}{3}t^3 + \frac{3}{2}t^2$ qonuniyat bo'yicha harakatlanayapti. Harakat boshlangandan qancha sekund o'tgach, uning tezlanishi eng katta bo'ladi?
A) 1,5 B) 2,5 C) 3 D) 1,75 E) 2

12. (01-3-19) Ushbu $S(t) = 4t^2 - \frac{t^3}{3}$ qonuniyat bilan harakatlanayotgan jismning eng katta tezligini aniqlang.
A) 16 B) 20 C) 12 D) 24 E) 36

13. (01-6-45) Moddiy nuqta $s(t) = t^4(km)$ qonununiyatga ko'ra harakatlanayapti. Nuqtaning bolib o'tgan yo'li 16 km ga teng bo'lgan paytdagi tezligini (km/s) aniqlang.
A) 28 km/s B) 30 km/s C) 34 km/s
D) 32 km/s E) 26 km/s

14. (01-11-40) To'g'ri chiziq bo'ylab harakatlanayotgan moddiy nuqtaning tezligi $\vartheta(t) = lnt - \frac{1}{8}t(m/s)$ qonuniyat bo'yicha o'zgaradi. Vaqtning qanday onida (sek.) nuqtaning tezlanishi nolga teng bo'ladi?
A) 6 B) 7 C) 8 D) 9 E) 5

15. (02-3-50) $S = t\sqrt{t}$ qununiyat bilan harakatlanayotgan moddiy nuqtaning $t = 2$ sekunddagi tezlanisini hisoblang (S metrlarda).
A) $\frac{3}{8}\sqrt{2}$ B) $\frac{3}{4}\sqrt{2}$ C) $\frac{3}{16}\sqrt{2}$ D) $3\sqrt{2}$ E) $\frac{\sqrt{2}}{8}$

16. (02-11-51) To'g'ri chiziq bo'ylab $S(t) = \frac{3t+2}{t+3}$ qonuniyat bo'yicha harakatlanayotgan moddiy nuqtaning $t = 2$ sek ondagi tezligini (m/sek) aniqlang.
A) 0,2 B) 0,25 C) 0,28 D) 0,32 E) 0,5

17. (03-4-44) Ikki moddiy nuqta $S_1(t) = 2t^3 - 5t^2 - 3t(m)$ va $S_2(t) = 2t^3 - 3t^2 - 11t + 7(m)$ qununiyatlar bo'yicha harakatlanayapti. Bu ikki nuqtaning tezliklari teng bo'lgan paytda birinchi nuqtaning tezlanishini (m/s^2) toping.
A) 10 B) 8 C) 14 D) 9 E) 11

2.2.11 Boshlang'ich funksiya va integral.

1. $\int f(x)dx = F(x) + C, \quad bundaF'(x) = f(x)$ va $F(x)$ funksiya $f(x)$ ning boshlang'ich funksiyasi.
2. $\int x^\alpha dx = \frac{x^{\alpha+1}}{\alpha+1} + C, \quad (\alpha \neq -1);$
3. $\int sinxdx = -cosx + C;$
4. $\int cosxdx = sinx + C;$
5. $\int \frac{1}{sin^2x}dx = -ctgx + C;$
6. $\int \frac{1}{cos^2x}dx = tgx + C;$
7. $\int \frac{1}{x}dx = ln|x| + C;$
8. $\int a^x dx = \frac{a^x}{lna} + C;$
9. $\int e^x dx = e^x + C;$
10. $\int tgxdx = -ln|cosx| + C;$
11. $\int ctgxdx = ln|sinx| + C;$

2.2.12 Boshlang'ich funksiyani topish qoidalari.

1. $\int f'(x)dx = f(x) + C.$
2. $\int (f(x) + g(x))dx = \int f(x)dx + \int g(x)dx.$
3. $\int Cf(x)dx = C\int f(x)dx.$

(00-3-70) Ushbu $f(x) = 2x - \frac{1}{x^2} - cos2x$ funksiyaning boshlang'ich funksiyasini toping.
A) $x^2 + \frac{1}{x} + \frac{1}{2}sin2x + C$
B) $x^2 - \frac{1}{x} + \frac{1}{2}sin2x + C$
C) $x^2 + \frac{1}{x} - \frac{1}{2}sin2x + C$
D) $x^2 + \frac{1}{x} - sin2x + C$
E) $x^2 - \frac{1}{x} - sin2x + C$

Yechish: Boshlang'ich funksiya topish qoidalaridan foydalanib $f(x) = 2x - \frac{1}{x^2} - cos2x$ uchun boshlang'ich funksiya $F(x) = x^2 + \frac{1}{x} - \frac{1}{2}sin2x + C$ ekanini hosil qilamiz.
Javob: (C).

1. (96-1-32) Ushbu $f(x) = 1 - \frac{1}{cos^2 3x}$ funksiyaning boshlang'ich funksiyasining umumiy ko'rinishini toping.
A) $x + \frac{1}{3}ctgx + C$ B) $x - \frac{1}{3}tgx + C$
C) $x - \frac{1}{3}tg3x + C$ D) $tg3x + C$
E) $x - \frac{1}{3}ctg3x + C$

2. (96-3-31) Ushbu $2sin3x$ funksiya uchun boshlang'ich funksiyasining umumiy ko'rinishini toping.
A) $-\frac{2}{3}cos3x + C$ B) $\frac{2}{3}cos3x + C$
C) $-\frac{3}{2}sin2x + C$ D) $\frac{3}{2}sin2x + C$
E) $\frac{2}{3}sin3x + C$

3. (96-3-35) Quyidagi funksiyalardan qaysi biri $y' = 2y$ tenglamaning echimi bo'ladi?
A) $C\frac{e^x}{2}$ B) Ce^{2x} C) $Ce^{\frac{x}{2}}$ D) $2e^x$ E) e^x

4. (96-3-84) Ushbu $f(x) = x^3$ funksiyaning $(2; 1)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.
A) $\frac{x^2}{2} - 1$ B) $\frac{x^2}{2} + 1$
C) $\frac{x^4}{4} - 3$ D) $\frac{x^4}{2} + 3$ E) mavjud emas

5. (96-6-47) Quyidagi funksiyalarning qaysi biri uchun $F(x) = 2cosx + sinx + c$ funksiya boshlang'ich funksiya bo'ladi?
A) $f(x) = -2sinx - cosx$
B) $f(x) = 2sinx + cosx$
C) $f(x) = -2sinx + cosx$
D) $f(x) = 2sinx - cosx$
E) $f(x) = -2sinx - cosx + 1$

6. (96-6-48) Agar $y = f(x)$ funksiyaning boshlang'ich funksiyasi $F(x)$ bo'lsa,$2f(2x)$ funksiyaning boshlang'ich funksiyasini toping.
A) $2F(2x)$ B) $\frac{1}{2}F(2x)$ C) $F(2x)$
D) $2F(x)$ E) $\frac{1}{2}F(x)$

7. (96-7-32) $f(x)=2cos^2x$ funksiya boshlang'ich funksiyasining umumiy ko'rinishini ko'rsating.
A) $2sin^2x+C$ B) $x+\frac{1}{2}sin2x+C$
C) $\frac{2}{3}cos^3x+C$ D) $2x-\frac{1}{2}sin2x+C$
E) $-\frac{2}{3}sin^3x+C$

8. (96-9-24) $f(x)=-x+\frac{x^2}{2}$ funksiyaning $(6;0)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.
A) $-1+x-5$ B) $-\frac{x^2}{2}+\frac{x^3}{6}-18$
C) $-1+x+5$ D) $-\frac{x^2}{2}+\frac{x^3}{6}+18$
E) $(6;0)$ nuqtadan o'tuvchi boshlang'ich funksiya yo'q.

9. (96-9-83) $f(x)=1+\frac{1}{cos^24x}$ funksiya boshlang'ich funksiyasining umumiy ko'rinishini toping.
A) $x-\frac{1}{4}ctgx+C$ B) $x+\frac{1}{4}tgx+C$
C) $x+\frac{1}{4}tg4x+C$ D) $tg4x+C$
E) $x+\frac{1}{4}ctg4x+C$

10. (96-10-34) Ushbu $f(x)=1+\frac{1}{sin^24x}$ funksiya boshlang'ich funksiyasining umumiy ko'rinishini toping.
A) $x-\frac{1}{4}ctg4x+C$ B) $x+\frac{1}{4}tg4x+C$
C) $x-ctg4x+C$ D) $x+\frac{1}{4}ctgx+C$
E) $x+\frac{1}{4}ctg4x+C$

11. (96-11-32) Ushbu $3sin2x$ funksiya uchun boshlang'ich funksiyasining umumiy ko'rinishini ko'rsating.
A) $-\frac{3}{2}\cdot cos2x+C$ B) $-\frac{2}{3}\cdot cos2x+C$
C) $\frac{3}{2}\cdot sin2x+C$ D) $-\frac{3}{2}\cdot sin2x+C$
E) $\frac{2}{3}\cdot cos2x+C$

12. (96-11-36) Quyidagi funksiyalardan qaysi biri $2y'=y$ tenglamaning yechimi bo'ladi?
A) $C\frac{e^x}{2}$ B) $Ce^{\frac{x}{2}}$ C) Ce^{2x} D) $2e^x$ E) e^x

13. (96-12-32) $2cos3x$ funksiya uchun boshlang'ich funksiyasining umumiy ko'rinishini toping.
A) $\frac{3}{2}sin3x+C$ B) $-\frac{3}{2}sin3x+C$
C) $\frac{2}{3}sin3x+C$ D) $-\frac{2}{3}cos3x+C$
E) $\frac{2}{3}cos3x+C$

14. (96-12-37) Quyidagi funksiyalardan qaysi biri $y'=3y$ tenglamaning yechimi bo'ladi?
A) $Ce^{\frac{x}{3}}$ B) $C\frac{e^x}{3}$ C) $3e^x$ D) e^x E) Ce^{3x}

15. (96-12-82) $f(x)=x^2$ funksiyaning $(3;2)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.
A) $\frac{x^3}{3}+7$ B) $\frac{x^3}{3}-7$ C) $2x-4$ D) $2x+4$
E) Bunday boshlang'ich funksiya mavjud emas.

16. (96-13-25) Ushbu $F(x)=x-\frac{x^2}{2}$ funksiyaning $(6;0)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.
A) $1-x+5$ B) $1-x-5$
C) $\frac{x^2}{2}-\frac{x^3}{6}-18$ D) $\frac{x^2}{2}-\frac{x^3}{6}+18$
E) $(6;0)$ nuqtadan o'tuvchi boshlang'ich funksiya yo'q.

17. (97-1-23) Agar $F'(x)=x+2$ va $F(2)=2$ bo'lsa, $F(x)$ funksiyani aniqlang.
A) $F(x)=\frac{1}{2}x^2+2x+2$
B) $F(x)=\frac{1}{2}x^2+2x-4$
C) $F(x)=2x^2+2x-10$
D) $F(x)=x^2+x-2$
E) $F(x)=x^2+2x-6$

18. (97-2-47) $F(x)=3tgx+5x+c$ funksiya quyidagi funksiyalardan qaysi birining boshlang'ich funksiyasi?
A) $y=-\frac{3}{sin^2x}+5$ B) $y=\frac{3}{sin^2x}+5$
C) $y=3ctgx+c$ D) $y=-\frac{3}{cos^2x}+5$
E) $y=\frac{3}{cos^2x}+5$

19. (97-2-48) Agar $y=F(x)$ funksiya $y=f(x)$ funksiyaning boshlang'ich funksiyasi bo'lsa, $y=f(\frac{x}{2})$ funksiyaning boshlang'ich funksiyasini toping.
A) $y=F(\frac{x}{2})$ B) $y=\frac{1}{2}F(\frac{x}{2})$ C) $y=2F(\frac{x}{2})$
D) $y=2F(x)$ E) $y=\frac{1}{2}F(x)$

20. (97-3-32) Ushbu $f(x)=sin^22x$ funksiya uchun boshlang'ich funksiyasining umumiy ko'rinishini ko'rsating.
A) $\frac{1}{3}sin^32x+C$ B) $-\frac{1}{2}cos^22x+C$
C) $\frac{1}{2}x-\frac{1}{8}sin4x+C$ D) $\frac{1}{2}x+\frac{1}{2}cos4x+C$
E) $x-cos4x+C$

21. (97-4-31) Agar $F'(x)=cosx+2x$ va $F(\pi/2)=3$ bo'lsa, $F(x)$ ni toping.
A) $F(x)=-sinx+x^2+2$
B) $F(x)=sinx+\frac{1}{2}x+\frac{\pi^2}{4}$
C) $F(x)=sinx+\frac{1}{2}x^2+2-\frac{\pi}{4}$
D) $F(x)=sinx+x^2+2-\frac{\pi^2}{4}$
E) $F(x)=sinx+x^2+1-\frac{\pi^2}{4}$

22. (97-5-35) Ushbu $f(x)=sin^2x$ funksiyaning boshlang'ich funksiyasini toping.
A) $-\frac{1}{2}x+\frac{1}{4}sin2x+C$ B) $\frac{1}{2}x-\frac{1}{4}sin2x+C$
C) $\frac{1}{4}sin2x+C$ D) $-\frac{1}{4}sin2x+C$
E) $\frac{1}{2}x-\frac{1}{4}cos2x+C$

23. (97-6-23) Agar $F'(x)=2x-1$ va $F(1)=2$ bo'lsa, $F(x)$ ni toping.
A) $F(x)=3x^2-3x+2$ B) $F(x)=x^2-x+2$
C) $F(x)=x^2+x$ D) $F(x)=\frac{x^2}{2}-x+2\frac{1}{2}$
E) $F(x)=2x^2-x+1$

24. (97-7-32) Ushbu $f(x)=sinx\cdot cos2x$ funksiya boshlang'ich funksiyasining umumiy ko'rinishini ko'rsating.
A) $\frac{1}{3}sin3x+\frac{1}{2}sinx+C$
B) $\frac{1}{2}cosx-\frac{1}{3}cos3x+C$
C) $\frac{1}{2}cosx-\frac{1}{6}cos3x+C$
D) $-cosx\cdot sin2x+C$
E) $-\frac{1}{2}sin2x\cdot cosx+C$

25. (97-8-47) $F(x)=ctgx-2x+C$ quyidagi funksiyalardan qaysi birining boshlang'ich funksiyasi?
A) $f(x)=\frac{1}{sin^2x}-2$ B) $f(x)=\frac{1}{cos^2x}-2$
C) $f(x)=-\frac{1}{cos^2x}-2$ D) $f(x)=\frac{1}{sin^2x}+2$
E) $f(x)=-\frac{1}{sin^2x}-2$

26. (97-8-48) Agar $y=F(x)$ funksiya $y=f(x)$ funksiyaning boshlang'ich funksiyasi bo'lsa, $y=2f(-2x)$

funksiyaning boshlang'ich funksiyasini toping.
A) $y=-2F(-2x)$ B) $y=-F(-2x)$
C) $y=-\frac{1}{2}F(-2x)$ D) $y=F(-2x)$
E) $y=2F(-2x)$

27. (97-9-35) Ushbu $f(x)=ctg^2x$ funksiyaning boshlang'ich funksiyasini toping.
A) $x-ctgx+C$ B) $-x-ctgx+C$
C) $-x+tgx+C$ D) $-x-tgx+C$
E) $-\frac{2ctgx}{sin^2x}+C$

28. (97-9-91) Agar $f'(x)=\frac{1}{x\cdot ln10}+10x+5$ va $f(1)=6$ bo'lsa, $f(x)$ ni toping.
A) $f(x)=lnx+5x^2+5x-4$
B) $f(x)=\frac{1}{10}lnx+5x^2+5x+4$
C) $f(x)=-lgx+5x^2+5x+10$
D) $f(x)=lgx+5x^2+5x-4$
E) $f(x)=\frac{1}{10}lgx+5x^2+5x+6$

29. (97-10-32) Quyidagilardan qaysi biri $f(x)=sin2x\cdot cosx$ funksiya boshlang'ich funksiyasining umumiy ko'rinishi?
A) $-\frac{1}{2}cos2x\cdot sinx+C$
B) $\frac{1}{6}cos3x+\frac{1}{2}cosx+C$
C) $-\frac{1}{6}cos6x-\frac{1}{6}cosx+C$
D) $\frac{1}{2}cos2x\cdot sinx+C$
E) $-\frac{1}{2}cosx-\frac{1}{6}cos3x+C$

30. (97-11-23) Agar $F'(x)=x-4$, $F(2)=0$ bo'lsa, $F(x)$ ni toping.
A) $F(x)=x^2-2x$ B) $F(x)=x^2-4x+4$
C) $F(x)=2x^2-4x$ D) $F(x)=\frac{1}{2}x^2-4x+6$
E) $F(x)=\frac{1}{2}x^2-2x+2$

31. (97-12-46) $F(x)=-2ctgx-3x+c$ funksiya quyidagi funksiyalardan qaysi birining boshlang'ich funksiyasi bo'ladi?
A) $f(x)=-\frac{2}{sin^2x}+3$ B) $f(x)=\frac{2}{cos^2x}-3$
C) $f(x)=\frac{2}{sin^2x}-3$ D) $f(x)=-\frac{2}{cos^2x}+3$
E) $f(x)=-\frac{2}{sin^2x}-3$

32. (97-12-47) Agar $y=F(x)$ funksiya $y=f(x)$ funksiyaning boshlang'ich funksiyasi bo'lsa,$y=-2f(-2x)$ funksiyaning boshlang'ich funksiyasini toping.
A) $-F(-2x)$ B) $2F(-2x)$ C) $-2F(-2x)$
D) $F(-2x)$ E) $F(-x)$

33. (98-1-31) Ushbu $y=e^{1-3x}$ funksiyaning boshlang'ich funksiyasini ko'rsating.
A) $-3e^x+c$ B) $e^{1-3x}+c$ C) $-3e^{1-3x}+c$
D) $-\frac{1}{3}e^{1-3x}+c$ E) $-\frac{1}{3}e^x+c$

34. (98-2-43) Ushbu $F(x)=e^x-\frac{1}{3}sin3x+ctgx+c$ funksiya quyidagi funksiyalardan qaysi birining boshlang'ich funksiyasi?
A) $f(x)=e^x-cos3x-\frac{1}{sin^2x}$
B) $f(x)=e^x+cos3x-\frac{1}{sin^2x}$
C) $f(x)=e^x-cos3x+\frac{1}{sin^2x}$
D) $f(x)=e^x+cos3x+\frac{1}{sin^2x}$
E) $f(x)=e^x-cos3x-\frac{1}{cos^2x}$

35. (98-3-27) Ushbu $f(x)=\frac{1}{cos^2(\frac{x}{3}+1)}$ funksiyaning boshlang'ich funksiyasini toping.
A) $\frac{1}{3}tg(\frac{x}{3}+1)+C$ B) $3tg(\frac{x}{3}+1)+C$
C) $-\frac{1}{3}tg(\frac{x}{3}+1)+C$ D) $-3tg(\frac{x}{3}+1)+C$
E) $3tg\frac{x}{3}+C$

36. (98-5-28) Ushbu $y=2(2x+5)^4$ funksiyaning boshlang'ich funksiyasini toping.
A) $Y=(2x+5)^5+C$ B) $Y=\frac{(2x+5)^5}{3}+C$
C) $Y=\frac{(2x+5)^5}{4}+C$ D) $Y=\frac{(2x+5)^5}{5}+C$
E) $Y=4(2x+5)^3+C$

37. (98-6-29) Ushbu $xcosx^2$ funksiyaning boshlang'ich funksiyasini ko'rsating.
A) $\frac{x^2}{2}\cdot sinx^2+C$ B) $-\frac{1}{2}\cdot sinx^2+C$
C) $\frac{1}{3}\cdot sinx^3+C$ D) $-\frac{1}{3}\cdot sinx^3+C$
E) $\frac{1}{2}\cdot sinx^2+C$

38. (98-8-31) Ushbu $y=\frac{2}{e^x}$ funksiyaning boshlang'ich funksiyasini toping.
A) $\frac{2}{e^x}+C$ B) $2lnx+C$ C) $e^{-x}+C$
D) $\frac{1}{2e^x}+C$ E) $-2e^{-x}+C$

39. (98-9-41) $F(x)=2cos2x+sinx+C$ funksiya quyidagi funksiyalardan qaysi birining boshlang'ich funksiyasi hisoblanadi?
A) $f(x)=-4sin2x-cosx$
B) $f(x)=4sinx+cosx$
C) $f(x)=-2sin2x+cosx$
D) $f(x)=-4sin2x+cosx$
E) $f(x)=-2sinx-cosx$

40. (98-10-74) Ushbu $f(x)=\frac{1}{sin^2(3x+1)}$ funksiyaning boshlang'ich funksiyasini toping.
A) $-\frac{1}{3}ctg(3x+1)+C$ B) $\frac{1}{3}ctg(3x+1)+C$
C) $\frac{1}{3}tg(3x+1)+C$ D) $-\frac{1}{3}tg(3x+1)+C$
E) $-3ctg(3x+1)+C$

41. (98-11-78) Ushbu $\sqrt{x}+\sqrt[3]{x}$ funksiyaning boshlang'ich funksiyasini toping.
A) $\frac{2}{3}\sqrt{x^3}+\frac{3}{4}\sqrt[3]{x^4}+C$ B) $\frac{3}{2}\sqrt{x^3}+\frac{3}{4}\sqrt[3]{x^4}+C$
C) $\frac{2}{3}\sqrt{x}+\frac{3}{4}\sqrt[3]{x}+C$ D) $\frac{2}{3}\cdot\sqrt{x^3}+\frac{3}{4}\cdot\sqrt{x^4}+C$
E) $\frac{1}{2}\cdot\sqrt{x^3}+\frac{1}{4}\cdot\sqrt[3]{x^4}+C$

42. (99-1-26) Ushbu $f(x)=\frac{1}{x^2}-cosx$ funksiyaning boshlang'ich funksiyasini toping.
A) $-\frac{1}{x}-sinx+C$ B) $-\frac{1}{x^3}-sinx+C$
C) $\frac{1}{x^2}-sinx+C$ D) $\frac{1}{x}+sinx+C$
E) $-\frac{1}{x^2}+sinx+C$

43. (99-8-1) Agar $f'(x)=sin2x+\frac{1}{x-1}$ bo'lsa, $f(x)$ ni toping.
A) $cos2x+ln|x-1|+C$
B) $2cos2x+ln|x-1|+C$
C) $-cos2x+ln|x-1|+C$
D) $-\frac{1}{2}cos2x+ln|x-1|+C$
E) $-2cos2x+ln|x-1|+C$

44. (99-2-43) $F(x)=\frac{1}{2}x^2+cosx+C$ funksiya $y=f(x)$ funksiyaning boshlang'ich funksiyasi. $y=f(x)$ funksiyaning hosilasini toping.
A) $2cos^2\frac{x}{2}$ B) $2sin^2(\frac{\pi}{4}-\frac{x}{2})$ C)$1+2\cdot cosx$
D) $2\cdot sin^2\frac{x}{2}$ E) $1+2\cdot sinx$

45. (99-3-59) Ushbu $f(x)=x+ctg^2x$ funksiyaning boshlang'ich funksiyasini toping.
A) $\frac{x^2}{2}+\frac{1}{3}ctg^3x+C$ B) $\frac{x^2}{2}-\frac{1}{3}ctg^3x+C$

C) $\frac{x^2}{2}-x-ctgx+C$ D) $\frac{x^2}{2}-x+ctgx+C$
E) $\frac{x^2}{2}+x-ctgx+C$

46. (99-3-60) Ushbu $f(x)=\frac{4}{(3-2x)^2}$ funksiyaning grafigi $(-\frac{1}{2};\frac{1}{16})$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.
A) $\frac{4}{3-2x}+\frac{9}{16}$ B) $-\frac{4}{3-2x}+\frac{49}{16}$ C) $-\frac{2}{3-2x}+\frac{17}{16}$
D) $\frac{8}{3-2x}+\frac{33}{16}$ E) $\frac{2}{3-2x}-\frac{7}{16}$

47. (99-4-32) $y=\pi sin\pi x+2x-4$ funksiyaning $x=1$ bo'ganda qiymati 3 ga teng bo'ladigan boshlang'ich funksiyasi x ning qanday qiymatida nolga aylanadi?
A) 0 B) 1 C) 0,5 D) 2 E) -2

48. (99-7-29) Ushbu $y=\frac{2x}{(x^2+1)ln10}$ funksiyaning boshlang'ich funksiyasini toping.
A) $Y=\frac{lg(x^2+1)}{ln10}+C$ B) $Y=lg(x+1)+C$
C) $Y=\frac{x^2}{(x^2+1)ln10}+C$ D) $Y=lg(x^2+1)+C$
E) $Y=ln(x^2+1)+C$

49. (99-8-40) Ushbu $f(x)=\frac{3}{4\sqrt{x}}$ funksiyaning boshlang'ich funksiyasini toping.
A) $\frac{3}{2}\sqrt{x}+C$ B) $3\sqrt{x}+C$ C) $\frac{4}{3}\sqrt{x}+C$
D) $-\frac{3}{2}\sqrt{x}+C$ E) $6\sqrt{x}+C$

50. (99-8-41) Ushbu $f(x)=3x^2-2$ funksiyaning boshlang'ich funksiyalaridan qaysi birining grafigi $M(2;4)$ nuqtadan o'tadi?
A) $F(x)=x^3-2x$ B) $F(x)=x^3-2x+1$
C) $F(x)=x^3-2x+5$ D) $F(x)=x^3-2x+8$
E) $F(x)=x^3-2x-2$

51. (99-10-45) Ushbu $f(x)=2cos^2(\frac{x}{2})$ funksiyaning $M(0;3)$ nuqtadan o'tadigan boshlang'ich funksiyasini toping.
A) $F(x)=x-sinx+3$
B) $F(x)=-x+sinx+3$
C)$F(x)=x+sinx+3$
D) $F(x)=x+cosx+3$
E) $F(x)=x-cosx+3$

52. (00-5-49) Funksiyaning boshlang'ichini toping.

$$\Big(\frac{sin2x-2sin^2x}{1-tgx}\Big)^2$$

A) $\frac{1}{2}x+\frac{1}{8}sin4x+C$ B) $\frac{1}{2}x^2-\frac{1}{8}sin4x+C$
C) $\frac{1}{2}x^2+\frac{1}{8}sin4x+C$ D) $\frac{1}{2}x-\frac{1}{8}sin4x+C$
E) $-\frac{1}{2}-\frac{1}{8}sin4x+C$

53. (00-8-69) Ushbu $f(x)=\frac{1}{2\sqrt{(1-x)^3}}$ funksiyaning boshlang'ich funksiyasini toping.
A) $\frac{1}{\sqrt{1-x}}$ B) $\frac{2}{\sqrt{1-x}}$ C) $-\frac{3}{\sqrt{1-x}}$
D) $\frac{6}{\sqrt{1-x}}$ E) $\frac{6}{\sqrt{(1-x)^3}}$

54. (00-9-1) $F(x)=lncosx+C$ funksiya quyidagi funk-siyalardan qaysi birining boshlang'ich funksiyasi bo'ladi?

$$1)y=-ctgx;\quad 2)y=ctgx;$$

$$3)y=tgx;\quad 4)y=-tgx.$$

A) 1 B) 2 C) 3 D) 4
E) hech qaysisining boshlang'ich funksiyasi bo'lmaydi.

55. (01-1-36) Ushbu $f(x)=3x^2-2cos(2x+\frac{\pi}{3})$ funksiyaning grafigi koordinat boshidan o'tuvchi boshlang'ich funksiyani toping.
A) $x^3-\frac{1}{2}sin(2x+\frac{\pi}{3})-\frac{\sqrt{3}}{2}$
B) $3x^3-sin2x-\frac{\sqrt{3}}{2}$
C) $x^3-sinx+\frac{1}{2}$
D) $x^3-sin(2x+\frac{\pi}{3})+\frac{\sqrt{3}}{2}$
E) $x^3+sin(2x+\frac{\pi}{3})-\frac{1}{2}$

56. (01-1-37) Agar $F'(x)=e^x+sin2x$ va $F(0)=3,5$ bo'lsa, $F(x)$ ini toping.
A) $e^x-\frac{1}{2}cos2x+3$ B) $e^x-\frac{1}{2}cos2x+4$
C) $e^x-cos2x+4,5$ D) $e^x-cosx+3$
E) $e^x+\frac{1}{2}cosx+3$

57. (01-2-37) Ushbu $f(x)=\frac{cos2x}{sinx-cosx}$ uchun boshlang'ich funksiyani toping.
A) $sinx-cosx+C$ B) $ctg2x+C$
C) $cos2x-sinx+C$ D) $sin2x-cosx+C$
E) $-sinx+cosx+C$

58. (01-4-21) Ushbu $f(x)=-\frac{4cos(2x)}{sin^2(2x)}$ funksiyaning boshlang'ich funksiyasini toping.
A) $tgx+ctgx+C$ B) $tgx-ctgx+C$
C) $ctgx-tgx+C$ D) $\frac{tgx}{ctgx}+C$
E) $\frac{ctgx}{tgx}+C$

59. (01-4-24) Ushbu $f(x)=\frac{1}{x}$ funksiyaning grafigi $(e;2)$ nuqtadan o'tuvchi boshlang'ich funksiyalarini toping.
A) $2ln|x|$ B) $3-ln|x|$ C)$eln|x|$
D) $ln|x|+1$ E) $ln|x|-1$

60. (01-7-51) Ushbu $f(x)=\frac{1}{\sqrt{x-2}}$ funksiyaning grafigi $A(3;5)$ nuqtadan o'tuvchi boshlang'ich funksiyalarini toping.
A) $\sqrt{x-2}+4$ B) $2\sqrt{x-2}+3$
C)$\sqrt{x-2}+3$ D) $2\sqrt{x-2}+4$ E) $\frac{1}{\sqrt{x-2}}+4$

61. (01-8-30) Agar $F'(x)=e^{-3x}$ va $F(1)=0$ bo'lsa, $F(x)$ ni toping.
A) $-3e^{-3x}+1$ B) $-\frac{1}{3}e^{-3x}+\frac{1}{3}$
C) $\frac{1}{3}e^{-3x}+e$ D) $-3e^{-3x}-\frac{1}{3}e^{-3}$
E) $-\frac{1}{3}e^{-3x}+\frac{1}{3}e^{-3}$

62. (01-9-50) Ushbu $f(x)=ln^{-1}x-ln^{-2}x$ funksiya uchun boshlang'ich funksiyani toping.
A) $\frac{lnx}{x}+C$ B) $\frac{lnx}{x^2}+C$
C) $\frac{x}{lnx}+C$ D) $\frac{x^2}{lnx}+C$ E) $xlnx+C$

63. (01-9-51) Ushbu $f(x)=\sqrt{\frac{1+tg^2x}{1+ctg^2x}}$, $(0<x<\frac{\pi}{2})$ funksiya uchun boshlang'ich funksiyani toping.
A) $\frac{1}{sin^2x}+C$ B) $\frac{sinx}{cos^2x}+C$
C) $\frac{cosx}{sin^2x}+C$ D) $-lncosx+C$ E) $lncosx+C$

64. (01-9-52) Ushbu $f(x)=\frac{1-sin^2x}{1-sinx}-\frac{1-cos^2x}{1-cosx}$ funksiya uchun boshlang'ich funksiyani toping.
A) $cosx+sinx+C$

B) $cosx - sinx + C$
C) $-cosx + sinx + C$
D) $-cosx - sinx + C$
E) $cosxsinx + C$

65. (01-11-41) Agar $F'(x) = 3x^2 - 2x$ va $F(0) = 4$ bo'lsa, $F(x)$ ni toping.
A) $F(x) = x^4 + 2x^2 - 4$
B) $F(x) = x^4 - 2x^2 + 4$
C) $F(x) = x^4 - x^2 - 4$
D) $F(x) = x^3 - x^2 + 4$
E) $F(x) = x^3 - x^2 - 4$

66. (01-12-50) Ushbu $f(x) = (lnsinx+1)\cdot cosx$ funksiya uchun boshlang'ich funksiyani toping.
A) $cosx \cdot lnsinx + C$ B) $sinx \cdot lnsinx - +C$
C) $sinx \cdot lncosx + C$ D) $x + lnsinx + C$
E) $x + lncosx + C$

67. (01-12-51) Ushbu $f(x) = \frac{sin2x-2cosx}{2(sinx-sin^2x)}$, $(0 < x < \frac{\pi}{2})$ funksiya uchun boshlang'ich funksiyani toping.
A) $\frac{1}{sin^2x} + C$ B) $-\frac{1}{cos^2x} + C$
C) $lnsinx + C$ D) $\frac{2}{cos^2x} + C$ E) $-lnsinx + C$

68. (02-1-69) Agar $F'(x) = sinx$ va $F(1) = 3$ bo'lsa, $F(x)$ ni toping.
A) $3 - cos1 + cosx$ B) $3 + sin1 - sinx$
C) $3 + cos1 - cosx$ D) $3 + sin1 + sinx$
E) mavjud emas

69. (02-2-31) Agar $f'(x) = 6x^2 - 3x + 5$ va $f(4) = 130$ bo'lsa, $f(0) =?$
A) 6 B) 4 C) -4 D) -6 E) 8

70. (02-3-51) $f(x) = (tgx + ctgx)^2$ funksiyaning boshlang'ich funksiyasini toping.
A) $tgx - ctgx + C$ B) $tgx - ctgx + 2x + C$
C) $tgx - ctgx + 4x + C$ D)$tgx - ctgx - 4x + C$
E) $2tgx - 2x + C$

71. (02-10-32) $f(x) = 6x^2 - 6x + 7$ funksiyaning $M(1;0)$ nuqtadan o'tuvchi boshlang'ich funksiyasini ko'rsating.
A) $2x^3 - 3x^2 + 7x - 6$ B) $6x^2 - 6x$
C) $6x^3 - 6x^2 + 7x - 7$
D) $3x^3 - 3x^2 + 7x - 7$
E) $2x^3 - 3x^2 + 7x + 1$

72. (02-10-67) $f(x) = x^{-4}$ funksiyaning $M(2;-3)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.
A) $-\frac{71x^3+8}{24x^3}$ B) $-\frac{4}{x^5} - 2\frac{7}{8}$
C) $-2x^{-3} - 3$ D) $-4x^{-5} - 3$
E) $x^{-4} - 1$

73. (03-2-61) $f(x) = (x-1)x^3 + e^{3x} - \frac{1}{3x}$ funksiyaning boshlang'ich funksiyasini toping.
A) $\frac{1}{5}x^5 - \frac{1}{4}x^4 + \frac{1}{3}e^{3x} - \frac{1}{3}ln|x| + C$
B) $\frac{1}{4}x^4 - \frac{1}{5}x^5 - \frac{1}{3}e^{3x} + \frac{1}{3}ln|x| + C$
C) $\frac{1}{5}x^5 - \frac{1}{4}x^4 + \frac{1}{3}e^{3x} + \frac{1}{3}ln|x| + C$
D) $\frac{x^4-x^3}{3} + 3e^{3x} + \frac{1}{3}ln|x| + C$
E) $\frac{e^{3x}-x^2}{3} - \frac{x^4-x^3}{3} + C$

74. (03-3-54) $f(x) = \frac{1}{sin^2 2xcos^2 2x}$ funksiyaning boshlang'ich funksiyasini toping.
A) $tg2x - ctg2x + C$ B) $tg2x + ctg2x + C$
C) $\frac{1}{2}tg2x - \frac{1}{2}ctg2x + C$ D) $\frac{1}{2}tg2x + \frac{1}{2}ctg2x + C$
E) $tgx - ctgx + C$

75. (03-6-19) $f'(x) = 6x^3 - 8x + 3, \quad f(2) = 0.$ $f(-2) =?$
A) 10 B) 12 C) -12 D) 18 E) -18

76. (03-7-26) $f'(x) = 6x^3 - 8x + 3, \quad f(-2) = 0.$ $f(2) =?$
A) 10 B) 12 C) -12 D) 18 E) -18

77. (03-7-80) $f(x) = 8x^3 - 5$ funksiyaning grafigi $M(1;4)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.
A) $2x^4 - 5x + 7$ B) $24x^2 + \frac{1}{6}$ C) $2x^4 - 5x$
D) $2x^4 - 5x + 1$ E) $4x^4 - 5x + 7$

78. (03-9-48) $f(x) = x - 1 - ctg^2x$ funksiyaning boshlang'ich funksiyasini toping.
A) $\frac{x^2}{2} - ctgx + C$ B) $\frac{x^2}{2} + ctgx + C$
C) $\frac{x^2}{2} - tgx + C$ D) $\frac{x^2}{2} + tgx + C$
E) $x^2 + ctgx + C$

79. (03-11-18) Agar $f'(x) = 12x^2 - 2x - 14$ va $f(2) = 5$ bo'lsa, $f(0)$ ni aniqlang.
A) 5 B) 6 C) 3 D) 0 E) -5

2.2.13 Aniq integral.

(98-8-32) Hisoblang.

$$\int_{-\frac{\pi}{2}}^{\pi} |cosx|dx$$

A) 1 B) 3 C) -1 D) 4 E) 2,5

Yechish: $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$ da $cosx \ge 0$ ekanidan bu oraliqda $|cosx| = cosx$ tenglik, $\frac{\pi}{2} \le x \le \pi$ da esa $cosx \le 0$ ekanidan bu oraliqda $|cosx| = -cosx$ tenglik o'rinli ekani kelib chiqadi. Shu sababli berilgan integralni ikkita integralga ajratib hisoblaymiz.

$$\int_{-\frac{\pi}{2}}^{\pi} |cosx|dx = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} cosxdx - \int_{\frac{\pi}{2}}^{\pi} cosxdx =$$

$$= sinx \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} - sinx \int_{\frac{\pi}{2}}^{\pi} = sin\frac{\pi}{2} - sin(-\frac{\pi}{2}) -$$

$$-sin\pi + sin\frac{\pi}{2} = 1 + 1 - 0 + 1 = 3$$

Javob: 3 (B).

1. (96-1-31) Integralni hisoblang.

$$\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} sinxdx$$

A) $\frac{\sqrt{3}}{2}$ B) $\frac{\sqrt{2}}{2}$ C) $\frac{1}{2}$ D) $-\sqrt{2}$ E) $-\frac{1}{2}$

2. (96-6-49) Integralni hisoblang.

$$\int_0^{e^2-1} \frac{dx}{x+1}$$

A) 3 B) 2 C) -2 D) -3 E) e^2

3. (96-7-31) Hisoblang.

$$\int_0^2 (1-2x)^2 dx$$

A) $4\frac{1}{2}$ B) $-3\frac{1}{3}$ C) 9 D) $4\frac{2}{3}$ E) $-4\frac{1}{2}$

4. (96-9-82) Hisoblang.

$$\int_0^{\frac{\pi}{4}} sin2xdx$$

A) $\frac{1}{2}$ B) -1 C) $-\frac{1}{2}$ D) 1 E) $\sqrt{2}$

5. (96-10-33) Integralni hisoblang.

$$\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} cos2xdx$$

A) $\frac{1}{2}$ B) $-\frac{\sqrt{3}}{4}$ C) 0 D) $\frac{\sqrt{3}}{4}$ E) $-\frac{1}{4}$

6. (97-1-22) Integralni hisoblang.

$$\int_{-\frac{\pi}{2}}^{0} cos3xdx$$

A) $\frac{1}{3}$ B) 0 C) $-\frac{1}{3}$ D) $\frac{2}{3}$ E) $-\frac{1}{2}$

7. (97-1-62) Hisoblang.

$$\int_{-1}^{2} |2-x|dx$$

A) 2 B) 3 C) 3,5 D) 4 E) 4,5

8. (97-2-49) Hisoblang.

$$\int_0^{\frac{\pi}{4}} (1+tg^2x)dx$$

A) $\sqrt{3}$ B) 1 C) $\frac{\sqrt{3}}{3}$ D) -1 E) $-\sqrt{3}$

9. (97-3-31) Hisoblang.

$$\int_0^1 (3x-1)^2 dx$$

A) 3 B) 1 C) $-\frac{1}{3}$ D) $\frac{7}{9}$ E) $2\frac{1}{3}$

10. (97-6-22) Hisoblang.

$$\int_{\frac{\pi}{4}}^{-\frac{\pi}{4}} cos2xdx$$

A) 0 B) -2 C) -1 D) $\sqrt{2}$ E) $-2\sqrt{2}$

11. (97-6-63) Hisoblang.

$$\int_{-2}^{3} |3-x|dx$$

A) 9 B) 8 C) 4 D) 16 E) 12,5

12. (97-7-31) Hisoblang.

$$\int_{-1}^{0} (2x+1)^2 dx$$

A) $\frac{1}{6}$ B) $\frac{2}{3}$ C) 1 D) $\frac{1}{3}$ E) -1

13. (97-8-49) Hisoblang.

$$\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} (1+ctg^2x)dx$$

A) $\frac{\sqrt{3}}{3}$ B) 1 C) $\sqrt{3}-1$ D) -1 E) $\frac{\sqrt{3}}{3}-1$

14. (97-10-31) Hisoblang.

$$\int_{-1}^{0} (1+3x)^2 dx$$

A) 1 B) -1 C) $\frac{7}{9}$ D) $-\frac{1}{3}$ E) $\frac{2}{3}$

15. (97-11-22) Integralni hisoblang.

$$\int_0^{\frac{\pi}{2}} sin5xdx$$

A) $\frac{1}{5}$ B) $-\frac{2}{5}$ C) 1 D) -1 E) 0

16. (97-12-48) Integralni hisoblang.

$$\int_e^{2e} \frac{1}{2x-e}dx$$

A) $ln3$ B) $2ln3$ C) $ln\frac{1}{3}$ D) 3 E) $ln\sqrt{3}$

17. (98-1-32) Integralni hisoblang.

$$\int_0^{2\pi} |sinx|dx$$

A) 2 B) 4 C) 0 D) 1 E) 3

18. (98-2-44) Integralni hisoblang.

$$\int_0^{\frac{\pi}{6}} sin2xdx$$

A) $-\frac{1}{4}$ B) $\frac{1}{4}$ C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) $\frac{2}{3}$

19. (00-1-45) To'g'ri chiziq bo'ylab harakatlanayotgan moddiy nuqtaning tezligi $V(t) = 3t^2 - 2t + 2$ (m/s) tenglama bilan ifodalanadi. Harakat boshlangandan 3 sek. o'tgunga qadar bu nuqta qancha masofani (m) bosib o'tadi?
A) 24 B) 26 C) 22 D) 20 E) 25

20. (98-3-29) Ushbu $\vartheta(t) = (t^2+t)$ $\frac{m}{sek}$ tezlik bilan to'g'ri chiziq bo'ylab harakatlanayotgan moddiy nuqta dastlabki 6 sek vaqt oralig'ida qancha masofani bosib o'tadi?
A) 80 B) 85 C) 90 D) 96 E) 94

21. (98-4-43) a ning qanday qiymatlarida

$$\int_0^2 (t - log_2 a)dt = 2log_2 \frac{2}{a}$$

tenglik o'rinli bo'ladi?
A) $a \in (2;\infty)$ B) $a \in (1;2)$ C) $a \in (0;\infty)$
D) $a \in (-1;1)$ E) $a \in (4;32)$

22. (98-7-41) Hisoblang.

$$\int_{-2}^{0}(|x|+1)dx$$

A) 3 B) 2 C) 4 D) -4 E) 8

23. (98-9-42) Hisoblang.

$$\int_{\frac{\pi}{12}}^{\frac{\pi}{4}}\frac{dx}{sin^2 2x}$$

A) $\frac{\sqrt{3}}{3}$ B)$-\frac{\sqrt{3}}{2}$ C) $\frac{\sqrt{3}}{2}$ D) $-\frac{\sqrt{3}}{3}$ E) $\frac{\sqrt{2}}{2}$

24. (98-10-76) $\vartheta(t)=t^2-t+1$ $\frac{m}{sek}$ tezlik bilan to'g'ri chiziq bo'ylab harakatlanayotgan moddiy nuqta dastlabki 6 sek vaqt oralig'ida qancha masofani bosib o'tadi?
A) 54 B) 64 C) 56 D) 62 E) 60

25. (98-11-41) Hisoblang.

$$\int_{0}^{ln3}(e^{2t}-e^{-\frac{1}{2}})dt$$

A) $2+\frac{2}{\sqrt{3}}$ B)$2-\frac{2}{\sqrt{3}}$ C) $\frac{2}{\sqrt{3}}-2$
D) $2+\frac{1}{\sqrt{3}}$ E) $2-\frac{1}{\sqrt{3}}$

26. (98-12-40) Hisoblang.

$$\int_{0}^{2}(|x|+1)dx$$

A) 4 B) 2 C) 3 D) 8 E) 1

27. (98-12-106) Tengsizlikni qanoatlantiruvchi sonlar nechta?

$$\int_{1}^{a}(a-4x)dx\geq 6-5a \quad (a>1)$$

A) 1 B) 2 C) 3 D) $\emptyset$ E) 4

28. (99-1-27) Hisoblang.

$$\int_{0}^{2}x^3dx$$

A) 4 B) -4 C) $\frac{16}{3}$ D) 2 E) $\frac{8}{3}$

29. (99-2-44) Hisoblang.

$$\int_{\frac{5\pi}{3}}^{\frac{4\pi}{3}}|sinx|dx$$

A) 1,5 B) -2 C) 1 D) $-1,5$ E) -1

30. (99-4-34) Hisoblang.

$$\int_{\frac{\pi}{3}}^{\frac{\pi}{2}}\frac{3dx}{2cos^2\frac{x}{2}}$$

A)$\frac{3-\sqrt{3}}{2}$ B)$3-\sqrt{3}$ C)$\frac{3-\sqrt{3}}{4}$ D) $3-3\sqrt{3}$
E)$-\sqrt{3}$

31. (99-5-36) Hisoblang.

$$\int_{0}^{\pi}cos^4 5xdx$$

A) $\frac{\pi}{5}$ B) $\frac{2\pi}{5}$ C) $\frac{3\pi}{8}$ D) $\frac{3\pi}{5}$ E) $\frac{\pi}{2}$

32. (99-6-24) Hisoblang.

$$\int_{\frac{2\pi}{3}}^{2\pi}cos(0,25x)dx$$

A) -2 B) 1 C) -1 D) 2 E) 3

33. (00-2-29) Hisoblang.

$$\int_{0}^{2\pi}cos2x\cdot cos7xdx$$

A) 0,5 B) 1 C) 2 D) 1,5 E) 0

34. (00-2-44) b ning qanday qiymatida

$$\int_{-1}^{1}(4x+b)dx$$

integralning qiymati 1 ga teng bo'ladi?
A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{1}{3}$ D) 2 E) 4

35. (00-3-68) Integralni hisoblang.

$$\int_{-3}^{6}x|x|dx$$

A) 81 B) 63 C) 60 D) 84 E) 80

36. (00-3-71) Integralni hisoblang.

$$\int_{-\pi/2}^{-\pi/4}\frac{dx}{cos^2(\frac{\pi}{2}+x)}$$

A) $\sqrt{3}$ B) $\sqrt{3}-1$ C) 0 D) 1 E) $\sqrt{3}/3$

37. (00-4-54) Hisoblang.

$$\frac{1}{16}\int_{0}^{\pi}\frac{dx}{cos^2\frac{x}{4}}$$

A) 1 B) 0,5 C) 0,25 D) 2 E) 4

38. (00-5-50) Hisoblang.

$$\int_{0}^{6}|x-3|dx$$

A) 4,5 B) 18 C) 3 D) 12 E) 9

39. (00-6-29) a va b ning qanday qiymatlarida

$$f(x)=acos\frac{\pi x}{2}+b$$

funksiya uchun $f'(1)=1,5$ va $\int_0^2 f(x)dx=3$ tengliklar o'rinli bo'ladi?
A) $a=3;\quad b=1,5$ B) $a=-3;\quad b=1,5$
C) $a=-\frac{3}{\pi};\quad b=1,5$ D) $a=\frac{3\pi}{2};\quad b=1$
E) $a=\frac{3}{\pi};\quad b=-1,5$

40. (00-7-40) Hisoblang.

$$\int_{\frac{1}{2}}^{2} |x-1|dx$$

A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{8}$ D) $\frac{1}{4}$ E) $\frac{3}{2}$

41. (00-9-2) Hisoblang.

$$\int_{0}^{2} |x^2-1|dx$$

A) 8 B) $3\frac{2}{3}$ C) $2\frac{2}{3}$ D) $6\frac{2}{3}$ E) 2

42. (00-9-42) Hisoblang.

$$\int_{0}^{2\pi} sin^4 7x dx$$

A) $\frac{3\pi}{8}$ B) $\frac{\pi}{4}$ C) $\frac{3\pi}{4}$ D) $\frac{\pi}{8}$ E) $\frac{3\pi}{2}$

43. (00-10-36) Integralni hisoblang.

$$\int_{0}^{1} \frac{e^x + e^{-1}}{e^{x-1}} dx$$

A) $\frac{e^2-e+1}{e}$ B) $\frac{e^2-e-1}{e}$ C) $\frac{-e^2+e-1}{e}$
D) $\frac{-e^2-e+1}{e}$ E) $\frac{e^2+e-1}{e}$

44. (01-1-38) Integralni hisoblang.

$$\int_{-4}^{4} x|x|dx$$

A) 0 B) $\frac{1}{2}$ C) $-\frac{1}{2}$ D) $\frac{1}{4}$ E) $-\frac{1}{4}$

45. (01-4-20) Integralni hisoblang.

$$\int_{-1}^{0} |5^x - 5^{-x}|dx$$

A) $\frac{10}{ln5}$ B) $\frac{8}{5ln5}$ C) $\frac{4}{ln5}$ D) $\frac{2}{ln5}$ E) $\frac{16}{5ln5}$

46. (01-7-52) Hisoblang.

$$\int_{0}^{\pi/2} sinxcosxdx$$

A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) 1 D) $\frac{1}{8}$ E) 2

47. (01-9-6) Integralni hisoblang.

$$\int_{2}^{8} \frac{dx}{xln2}$$

A) 2 B) 1 C) -2 D) -1 E) 4

48. (01-9-11) Integralni hisoblang.

$$\int_{0}^{\pi/18} (cosxcos2x - sinxsin2x)dx$$

A) $\frac{1}{6}$ B) $\frac{1}{3}$ C) 1,6 D) $\frac{2}{3}$ E) $\frac{1}{2}$

49. (01-10-48) Hisoblang.

$$\int_{-\pi/24}^{\pi/24} \frac{dx}{(cos^4 3x - sin^4 3x)^2}$$

A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $\frac{1}{3}$ D) 1 E) $\frac{1}{6}$

50. (01-10-50) a ning qanday eng katta manfiy butun qiymatida

$$\int_{a}^{0} (3^{-2x} - 2 \cdot 3^{-x})dx \geq 0$$

tengsizlik o'rinli bo'ladi?
A) -1 B) -2 C) -3 D) -4 E) -5

51. (01-11-42) Hisoblang.

$$\int_{\pi/6}^{5\pi/6} |cosx|dx$$

A) $\frac{1}{2}$ B) 1 C) 0 D) 1,5 E) -1

52. (01-12-52) Hisoblang.

$$\int_{1}^{3} |x-2|dx$$

A) 2 B) 1 C) -2 D) 0 E) -1

53. (02-2-33)

$$\int_{0}^{\frac{\pi}{4}} 6cos3xdx$$

ni hisoblang.
A) $\sqrt{2}$ B) $\frac{\sqrt{2}}{2}$ C) $2\sqrt{2}$ D) $-\sqrt{2}$ E) $-2\sqrt{2}$

54. (02-2-35)

$$\int_{0}^{a} xdx \leq a+4$$

tengsizlikni qanoatlantiruvchi a ning qiymatlari oralig'i uzunligini toping.
A) 6 B) 5 C) 4 D) 8 E) 7

55. (02-3-81)

$$\int_{-1}^{3} \frac{1}{\sqrt{2x+3}} dx$$

ni hisoblang.
A) 2 B) 4 C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) 3

56. (02-5-45)

$$\int_{-1}^{1} x(1+|x|)dx$$

ni hisoblang.
A) $\frac{5}{6}$ B) $\frac{5}{3}$ C) $\frac{4}{3}$ D) $\frac{8}{3}$ E) 0

57. (02-7-38)

$$\int_{0}^{\frac{\pi}{2}} (cosx - sinx)^2 dx$$

ni hisoblang.
A) $\frac{\pi}{2}-1$ B) $1-\frac{\pi}{2}$ C) $\frac{\pi}{2}+1$ D) $\pi-1$ E) $1-\pi$

58. (02-10-66)

$$\int_{0}^{2e} \frac{dx}{0,5x+1}$$

ni hisoblang.
A) $2ln(e+1)$ B) 2 C) $ln(e+2)$
D) $2ln\frac{e+1}{2}$ E) 1

59. (02-11-55)

$$\int_1^9 \Big(3\sqrt{x}+\frac{1}{\sqrt{x}}\Big)dx$$

ni hisoblang.
A) 45 B) 52 C) 54 D) 56 E) 60

60. (02-12-56)

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} (1+ctg^2x)dx$$

ni hisoblang.
A) $1+\sqrt{3}$ B) $1-\sqrt{3}$ C) $\sqrt{3}-1$
D) $\frac{\sqrt{3}}{3}-1$ E) $1-\frac{\sqrt{3}}{3}$

61. (03-1-52)

$$\int_1^2 \frac{x}{x+1}dx$$

ni hisoblang.
A) $2+ln\frac{1}{2}$ B) $1+ln\frac{2}{3}$ C) $3-ln\frac{2}{3}$
D) $1-ln\frac{2}{3}$ E) $2-ln\frac{2}{3}$

62. (03-1-53)

$$\int_3^4 \frac{dx}{x^2-1}$$

ni hisoblang.
A) $ln\sqrt{\frac{2}{3}}$ B) $ln\sqrt{\frac{3}{4}}$ C) $ln\sqrt{\frac{5}{6}}$
D) $ln\sqrt{\frac{7}{8}}$ E) $ln\sqrt{\frac{6}{5}}$

63. (03-3-55)

$$\int_4^9 \Big(\frac{2x}{5}-\frac{1}{2\sqrt{x}}\Big)dx$$

ni hisoblang.
A) 7 B) 8 C) 10 D) 12 E) 15

64. (03-4-45) Ikki jism to'g'ri chiziq bo'ylab bir vaqtning o'zida bitta nuqtadan bir yunalishda $V_1(t)=3t^2-5(m/s)$ va $V_2(t)=3t^2+2t+1(m/s)$ qonuniyatlarga ko'ra harakatlana boshladi. Harakat boshlangandan 4 sekund. o'tgach, bu jismlar orasidagi masofa (m) qanchaga teng bo'ladi?
A) 38 B) 42 C) 40 D) 36 E) 44

65. (03-5-48)

$$f(x)=\int_0^x cos^2tdt$$

funksiyaning hosilasini toping.
A) cos^2x B) $\frac{1}{2}cos2x$ C) $cos2x-1$
D) $1+cos2x$ E) $1-cos2x$

66. (03-5-49) Agar

$$a=\int_1^4 \frac{dx}{\sqrt{x}} \quad va \quad b=\int_1^8 \frac{dx}{\sqrt[3]{x}}$$

bo'lsa, ab ko'paytma nechaga teng?
A) 9 B) 3 C) 6 D) 8 E) 12

67. (03-6-25)

$$\int_0^1 \sqrt{x\sqrt{x\sqrt{x}}}dx$$

ni hisoblang.
A) $\frac{1}{8}$ B) $\frac{8}{15}$ C) $\frac{17}{24}$ D) $\frac{24}{41}$ E) $\frac{12}{29}$

68. (03-7-33)

$$\int_0^1 \sqrt{x\sqrt[3]{x\sqrt[4]{x}}}dx$$

ni hisoblang.
A) $\frac{1}{8}$ B) $\frac{8}{15}$ C) $\frac{17}{24}$ D) $\frac{24}{41}$ E) $\frac{12}{29}$

69. (03-9-49)

$$\int_4^9 \Big(\frac{2x}{5}+\frac{1}{2\sqrt{x}}\Big)dx$$

ni hisoblang.
A) 5 B) 8 C) 10 D) 12 E) 14

70. (03-11-21)

$$\int_0^9 \sqrt[3]{x\sqrt{x}}dx$$

ni hisoblang.
A) 18 B) 9 C) 27 D) $6\sqrt{3}$ E) $9\sqrt{3}$

71. (03-12-28)

$$\int_0^4 \frac{dx}{0,5x+1}$$

ni hisoblang.
A) 2 B) $ln16$ C) $ln9$ D) $ln12$ E) $ln18$

2.2.14 Egri chiziqli trapetsiyaning yuzi.

(97-9-92) $y=x^2$ va $y=2x$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) $1\frac{1}{3}$ B) 1 C) $1\frac{1}{4}$ D) $1\frac{1}{2}$ E) $\frac{2}{3}$

Yechish: $y=x^2$, $y=2x$ funksiyalar grafiklarining kesishgan nuqtalarining abssissalarini topamiz. Buning uchun $x^2=2x$ tenglamani yechamiz. Uning ildizlari $x_1=0$, $x_2=2$. Suning uchun berilgan chiziqlar bilan chegaralangan yuza

$$S=\int_0^2 (2x-x^2)dx=\Big(x^2-\frac{x^3}{3}\Big)\Big|_0^2=$$

$$=4-\frac{8}{3}=\frac{12-8}{3}=\frac{4}{3}=1\frac{1}{3}$$

ga teng.
Javob: $1\frac{1}{3}$ (A).

1. (96-3-32) $y=x^2$, $y=0$, $x=0$ va $x=2$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) $\frac{1}{2}$ B) 2 C) 4 D) 8 E) $2\frac{2}{3}$

2. (96-3-85) Uchi $(3;4)$ nuqtada bo'lgan va OX o'qini $(1;0)$ va $(5;0)$ nuqtalardan kesib o'tuvchi parabola hamda $y=0$, $x=4$ chiziqlar chiziqlar bilan chegaralangan $(x\le 4)$ figuraning yuzini toping.
A) 9 B) 8 C) 7 D) $\frac{28}{3}$ E) $\frac{31}{3}$

3. (96-11-33) $y=x^2$, $y=0$ va $x=-2$ chiziqlar bilan chegaralangan figuraning yuzini toping.
A) $2\frac{2}{3}$ B) $2\frac{1}{3}$ C) $2\frac{5}{6}$ D) 2 E) $2\frac{3}{4}$

4. (96-12-33) $y=x^3$, $y=0$ va $x=2$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) 8 B) 4 C) $\frac{1}{2}$ D) $2\frac{2}{3}$ E) 16

5. (97-4-32) $y=\sqrt{x}$, $y=0$ va $x=4$ ciziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) $5\frac{1}{3}$ B) $5\frac{2}{3}$ C) 5 D) $6\frac{1}{4}$ E) $6\frac{3}{4}$

6. (97-5-36) Quyidagi chiziqlar bilan chegaralangan figuraning yuzini toping.

$$y=\frac{1}{\sqrt{x}},\quad y=0,\quad x=1,\quad x=4$$

A) 5 B) 2 C) 3 D) 1 E) 4

7. (97-9-36) Ushbu $y=\frac{3}{\sqrt{x}}$, $y=0$ $x=2$ va $x=4$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) 6 B) 7 C) 5 D) 4 E) 2

8. (98-3-28) Ushbu $y=0$, $x=1$ va $x=4$ to'g'ri chiziqlar hamda $A(1;-3)$, $B(3;-2)$ va $C(5;-3)$ nuqtalardan o'tuvchi parabola bilan chegaralangan figuraning yuzini toping.
A) 7 B) 7,25 C) 6,75 D) 6,5 E) 6,85

9. (98-10-75) $y=0$, $x=1$ va $x=3$ to'g'ri chiziqlar hamda $A(2;1)$, $B(1;3)$ va $C(3;3)$ nuqtalardan o'tuvchi parabola bilan chegaralangan sohaning yuzini toping.
A) $3\frac{2}{3}$ B) $3\frac{1}{3}$ C) $3\frac{3}{4}$ D) $3\frac{1}{4}$ E) $3\frac{3}{5}$

10. (98-11-48) a ning qanday musbat qiymatida $y=4x$, $y=2x$ va $x=a$ to'g'ri chiziqlar bilan chegaralangan figuraning yuzi 4 ga teng bo'ladi?
A) 8 B) 1 C) 3 D) 4 E) 2

11. (99-8-42) $y=-2x$, $y=0$ va $x=4$ chiziqlar bilan chegaralangan yuzani hisoblang.
A) 8 B) 12 C) 16 D) 20 E) 24

12. (99-8-75) Chiziqlar bilan chegaralangan figurani yuzini hisoblang.

$$y=sin2x,\quad y=0,\quad x=0\quad \text{va}\quad x=\frac{\pi}{2}$$

A) 1 B) $\frac{1}{2}$ C) 2 D) $\frac{3}{2}$ E) $\sqrt{2}$

13. (99-10-46) t ning qanday qiymatlarida $y=x^2$, $x=0$ va $x=t$ chiziqlar bilan chegaralangan figuraning yuzi 9 ga teng bo'ladi?
A) 6 B) 4 C) 5 D) 2 E) 3

14. (00-3-69) $[0;\pi]$ oraliqda $y=sinx$ va $y=\frac{1}{2}$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) $\sqrt{3}-\frac{\pi}{3}$ B) 2 C) $\frac{2+\pi}{4}$ D) $\frac{4-\pi}{2}$ E) $\frac{4-\pi}{4}$

15. (00-10-44) Quyidagi chiziqlar bilan chegaralangan yuzani hisoblang.

$$y=-\frac{x}{3},\quad y=0,\quad va\quad x=3$$

A) 2,5 B) 2 C) 1,5 D) $\frac{4}{3}$ E) $\frac{5}{3}$

16. (00-10-67) Ushbu $y=2-|x|$ va $y=x^2$ funksiya grafiklari bilan chegaralangan figuraning yuzini toping.(yuza birliklarida)
A) $\frac{7}{3}$ B) 2 C) 2,5 D) 4 E) 5

17. (01-1-39) Ushbu $y=e^x$, $y=e$ va $x=0$ chiziqlar bilan chegaralangan shaklning yuzini hisoblang.
A) $e-1$ B) $e+1$ C) e D) 1 E) 2e

18. (01-4-22) Ushbu $y=-x^2$, $y=0$, $x=1$ va $x=2$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) $\frac{7}{3}$ B) $\frac{3}{7}$ C) $\frac{3}{2}$ D) $\frac{5}{2}$ E) $-\frac{7}{3}$

19. (01-4-29) Ushbu $y=\frac{x^2}{2}$ va $y=\frac{x^3}{2}$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) $\frac{1}{12}$ B) $\frac{1}{24}$ C) $\frac{1}{6}$ D) $\frac{1}{13}$ E) $\frac{1}{4}$

20. (01-9-53) Ushbu $y=2x^2$, $y=\frac{2}{x}$, $y=0$ va $x=e$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) 2 B) $2\frac{1}{3}$ C) 1,5 D) $2\frac{2}{3}$ E) 2,5

21. (02-2-34) Ushbu $y=2x^2$, $y=0$ va $x=3$ chiziqlar bilan chegaralangan figuraning yuzi necha kvadrat birlik bo'ladi?
A) 18 B) 27 C) 54 D) 36 E) 9

22. (02-3-52) Ushbu $2x-3y+2=0$, $y=0$, $x=2$ va $x=5$ chiziqlar bilan chegaralangan figuraning yuzini hisoblang.
A) 9 B) 7 C) 11 D) 10 E) 8

23. (02-6-55) $y=x^3$ va $y=\sqrt{x}$ chiziqlar bilan chegaralangan shaklning yuzini hisoblang.
A) $\frac{2}{5}$ B) $\frac{3}{7}$ C) $\frac{7}{12}$ D) $\frac{4}{9}$ E) $\frac{5}{12}$

24. (02-8-22) a ning qanday musbat qiymatida $y=x^2$ va $y=ax$ chiziqlar bilan chegaralangan figuraning yuzi 36 ga teng bo'ladi?
A) 6 B) 7 C) 8 D) 4 E) 9

25. (02-10-33) $y=2x^2$, $y=x+1$ chiziqlar bilan chegaralangan sohaning yuzini aniqlang.
A) $\frac{9}{8}$ B) 1 C) 1,25 D) 2,4 E) $\frac{8}{9}$

26. (02-11-56) $y=2-2x$, $y=1-x^2$ va $x=0$ chiziqlar bilan chegaralangan shaklning yuzini toping.
A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{5}{6}$ E) 1

27. (03-1-54) $y=sinx$, $y=cosx$ va $x=0$ $(x\in[0;\frac{\pi}{4}])$ chiziqlar bilan chegaralangan shaklning yuzini hisoblang.
A) $3-\sqrt{2}$ B) $2-\sqrt{2}$ C) $2-\sqrt{3}$
D) $\sqrt{3}-1$ E) $\sqrt{2}-1$

28. (03-2-62) $y=x$; $y=\frac{1}{x}$; $y=0$ va $x=e$ chiziqlar bilan chegaralangan figuraning yuzini toping.
A) 1 B) 1,5 C) 2 D) 2,5 E) 3

29. (03-6-23) $x=0$, $y=9-x^2$ va $y=x^2+1$ chiziqlar bilan chegaralangan sohaning yuzini toping.
A) $10\frac{1}{3}$ B) $10\frac{2}{3}$ C) $13\frac{2}{3}$ D) $18\frac{1}{3}$ E) $21\frac{1}{3}$

30. (03-6-24) $x=1$, $y=1-|x-1|$ va $y=-1+|x-1|$ chiziqlar bilan chegaralangan sohaning yuzini toping.
A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) 1 D) $\frac{3}{2}$ E) 2

31. (03-6-70) $x \in [0;\pi]$ da $y = sinx$ funksiyaning grafigi va x o'qi bilan chegaralangan yuzani toping.
A) 1 B) 1,5 C) 2 D) 2,5 E) 3

32. (03-7-31) $y = 9 - x^2$ va $y = x^2 + 1$ chiziqlar bilan chegaralangan sohaning yuzini toping.
A) $10\frac{1}{3}$ B) $10\frac{2}{3}$ C) $13\frac{2}{3}$ D) $18\frac{1}{3}$ E) $21\frac{1}{3}$

33. (03-7-32) $y = 1 - |x-1|$ va $y = -1 + |x-1|$ chiziqlar bilan chegaralangan sohaning yuzini toping.
A) $\frac{1}{2}$ B) $\frac{2}{3}$ C) 1 D) $\frac{3}{2}$ E) 2

34. (03-7-69) $y = \sqrt{x}$, $y = x - 6$ va $y = 0$ chiziqlar bilan chegaralangan shaklning yuzini toping.
A) 18,5 B) 36 C) 4,5 D) 18 E) 13,5

35. (03-9-50) $y = 4 - x^2$, $y = -4x + 8$ chiziqlar va OY o'qi bilan chegaralangan shaklning yuzini toping.
A) 1,5 B) 2 C) $2\frac{2}{3}$ D) 3 E) $3\frac{1}{3}$

36. (03-11-20) $y = 3 - |x-3|$ funksiya grafiga va OX o'qi bilan chegaralangan figuraning yuzini toping.
A) 9 B) 8 C) 12 D) 6 E) 10

37. (03-12-29) $y = |cosx|$; $y = 0$; $x = \frac{\pi}{2}$ va $x = \frac{2\pi}{3}$ chiziqlar bilan chegaralangan sohaning yuzini toping.
A) 1 B) $\frac{1}{2}$ C) $\frac{\sqrt{3}-1}{2}$ D) $\frac{2-\sqrt{3}}{2}$ E) $\frac{2\sqrt{3}-3}{2}$

2.3 Maxsus yo'l bilan yechiladigan masalalar.

1. Agar $A + B + C = 0$ va $A \geq 0, \quad B \geq 0, \quad C \geq 0$ bo'lsa, u holda $A = 0, \quad B = 0, \quad C = 0$ tengliklar bir vaqtda bajariladi.

2. Agar A soni uchun $f(x) \leq A, \quad g(x) \geq A$ bo'lsa, $f(x) = g(x)$ tenglama $\begin{cases} f(x) = A \\ g(x) = A \end{cases}$ sistemaga teng kuchli.

3. $P(x)$ ko'phad koeffisientlari yig'indisi $P(1)$ ga, x ning juft darajalari oldidagi koeffisientlari yig'indisi $\frac{1}{2}(P(1) + P(-1))$ ga; x ning toq darajalari oldidagi koeffisientlari yig'indisi $\frac{1}{2}(P(1) - P(-1))$ga teng.

4. $x^3 + ax^2 + bx + c = 0$ tenglamaning ildizlari x_1, x_2, x_3 bo'lsin. U holda $x_1 + x_2 + x_3 = -a$, $x_1x_2 + x_2x_3 + x_3x_1 = b, \quad x_1x_2x_3 = -c$.

5. Ifodalarning eng katta yoki eng kichik qiymatlarini topishda quyidagi tengsizliklardan foydaliniladi:
1) $a + b \geq 2\sqrt{ab}, \quad a, b \geq 0$;
2) $p^2 + q^2 + r^2 \geq pq + qr + pr, \quad$ p, q, r-ixtiyoriy sonlar.

6. $P(x)$ ko'phadni $x - a$ ga bo'lgandagi qoldiq $P(a)$ ga teng.

7. $n! = 2^m \cdot 3^n ... p^k$ ko'paytmada $k = [\frac{n}{p}] + [\frac{n}{p^2}] + [\frac{n}{p^3}] + ...$, bu yerda $[a]$ orqali a sonining butun qismi belgilangan.

(99-5-16) Tenglamaning ildizlari nechta?

$$cos(lg(2 - 3^{x^2})) = 3^{x^2}$$

A) $\emptyset$ B) cheksiz ko'p C) 1 D) 2 E) 3

Yechish: $-1 \leq cosx \leq 1$ bo'lgani uchun tenglama chap qismining eng katta qiymati 1 ga teng. $3^{x^2} \geq 3^0 = 1$ bo'lgani uchun tenglama o'ng qismining eng kichik qiymati 1 ga teng. Tenglik bajarilishi uchun

$$\begin{cases} cos(lg(2 - 3^{x^2})) = 1 \\ 3^{x^2} = 1 \end{cases}$$

bo'lishi kerak ekan. Ikkinchi tenglamadan $x^2 = 0$, ya'ni $x = 0$ ni topamiz. $x = 0$ son 1-tenglamani ham qanoatlantiradi. Shuning uchun berilgan tenglama yagona $x = 0$ yechimga ega ekan.
Javob: 1 (C).

1. (97-12-10) Agar $(a - |b|)^2 + (a - 2)^2 = 0$ bo'lsa, $2a - 3b$ ning qiymatini toping.
A) -2 B) 10 C) 2 va 10
D) -2 va 10 E) -10

2. (98-11-61) Agar x va y sonlari

$$x^2 + y^2 + (y-1)^2 = 2xy$$

tenglikni qanoatlantirsa, $x+y$ qanchaga teng bo'ladi?
A) 4 B) 1 C) 3 D) 2 E) 5

3. (98-12-80) Agar

$$x^2 + y^2 + 2(2x - 3y) + |z - xy| + 13 = 0$$

bo'lsa, $x + y + z$ ni toping.
A) 8 B) 11 C) -5 D) -7 E) aniqlab bo'lmaydi.

4. (99-5-10) $m, n, k \in N$. $m^2 + 2n^2 + 2nk = 25$, $2mn - k^2 = 25$ bo'lsa, $\frac{(m+n)^2}{2k}$ ni hisoblang.
A) 1 B) 2 C) 5 D) 10 E) 15

5. (99-5-33) Agar

$$8(x^4 + y^4) - 4(x^2 + y^2) + 1 = 0$$

bo'lsa, $|x| + |y|$ ning qiymatini toping.
A) 1 B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) 2 E) $\frac{1}{16}$

6. (99-9-8) Agar $n - m = (a-2)^2, \quad p - n = (b-3)^2$ va $m - p = (c-4)^2$ bo'lsa, $a + b + c$ yig'indi nechaga teng?
A) 8 B) 10 C) 11 D) 7 E) 9

7. (99-10-8) Agar $m - n = (2x + y)^2, \quad n - m = (4x - y - 12)^2$ bo'lsa, xy ni toping.
A) -6 B) 6 C) -8 D) 8 E) 9

8. (99-10-18) Nuqtaning koordinatalari

$$x^2 - 4x + y^2 - 6y + 13 = 0$$

tenglamani qanoatlantiradi. Nechta nuqta shu tenglamani qanoatlantiradi.
A) 2 B) 3 C) 1 D) 4 E) birorta ham nuqta qanoatlantirmaydi.

9. (00-2-7) Agar $4a^2+9b^2+16c^2-4a-6b-8c+3=0$ bo'lsa, abc ko'paytmaga teskari sonni toping.
A) $\frac{1}{24}$ B) 12 C) 48 D) 24 E) $\frac{1}{12}$

10. (00-6-14) Tenglamalar sistemasi nechta yechimga ega?
$$\begin{cases} y=x^2+7x+11 \\ y=y^2+3x+15 \end{cases}$$
A) 4 B) 3 C) 2 D) 1 E) $\emptyset$

11. (00-9-39)
$$9(x^4+y^4)-6(x^2+y^2)+2=0$$
ekanligini bilgan holda, x^2+y^2 ning qiymatini hisoblang.
A) $\frac{1}{3}$ B) 1 C) $\frac{2}{3}$ D) $\frac{4}{3}$ E) 3

12. (00-10-80) Ushbu
$$(|x_1|-1)^2+(|x_2|-2)^2+...+(|x_n|-n)^2+...=0$$
tenglikni qanoatlantiradigan (x_n) arifmetik progressiyalar nechta?
A) 2 B) 1 C) n D) 2n E) $n-1$

13. (98-4-20) Agar x va z orasida
$$x^2+z^2+x+z+\frac{1}{2}=0$$
munosabat o'rinli bo'lsa, xz ning qiymati qancha bo'ladi?
A) 0,25 B) 0,4 C) 0,5 D) 1 E) $-0,8$

14. (99-5-42) Agar $x,y,z\in[-\frac{\pi}{2};\frac{\pi}{2}]$ va
$$\sqrt{2-tgx-ctgx}+\sqrt[4]{siny-1}+\sqrt[6]{cos2z-1}=0$$
bo'lsa, $\frac{3y}{2x+5z}$ ning qiymatini toping.
A) $\frac{1}{2}$ B) 1 C) 2 D) 3 E) $\frac{3}{7}$

15. (02-9-8) Agar
$$16a^2+9b^2+4c^2+3=8a+6b+4c$$
bo'lsa, $a+b+c$ ga teskari sonni toping.
A) $-1\frac{1}{12}$ B) $\frac{12}{13}$ C) $\frac{12}{11}$ D) $-\frac{11}{12}$ E) $-\frac{12}{13}$

16. (01-9-44) Tenglamani yeching.
$$log_7^2(x^2+5x-13)+log_{1/7}^2(x^2-8x+13)=0$$
A) 3 B) 2 C) 5 D) 1 E) $\emptyset$

17. (03-5-42)
$$cos^2(\frac{\pi x}{3})+\sqrt{2x^2-5x-3}=0$$
tenglamani yeching.
A) 3 B) $\frac{3}{2}$ C) $-\frac{1}{2}$ D) -3 E) $\frac{1}{2}$

18. (99-5-31) Tenglama $[-3\pi;3\pi]$ oraliqda nechta yechimga ega?
$$sin(\frac{\pi\sqrt{5}}{20}\cdot x)=21-4\sqrt{5}x+x^2$$
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

19. (99-4-54) Ushbu
$$1+tg^4x=cos^22x$$
tenglamaning $[-2\pi;2\pi]$ kesmada nechta ildizi bor?
A) 6 B) 5 C) 4 D) 2 E) 1

20. (00-5-42) Tenglamani yeching.
$$sin5x-3\cdot cos2x=4$$
A) $-\frac{\pi}{2}+2\pi n,\quad n\in Z$ B) $\frac{\pi}{2}+\pi n,\quad n\in Z$
C) $\pi+\pi n,\quad n\in Z$ D) $\frac{\pi}{2}+2\pi n,\quad n\in Z$
E) $2\pi n,\quad n\in Z$

21. (00-6-55) Ushbu
$$cosxcos2xcos4x=1$$
tenglama $[-2\pi;2\pi]$ kesmada nechta ildizi bor?
A) 1 B) 2 C) 3 D) 4 E) $\emptyset$

22. (00-9-37) Ushbu
$$cos(\frac{\sqrt{3}\pi}{12}x)=13+4\sqrt{3}x+x^2$$
tenglama $[-2\pi;2\pi]$ kesmada nechta ildizi bor?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

23. (00-9-46) $\alpha\in\left(0;\frac{\pi}{2}\right)$ va $\beta,\gamma\in[0;\pi]$ miqdorlar
$$2cos\gamma+3sin2\beta+\frac{4}{tg^2\alpha+ctg^2\alpha}=7$$
tenglikni qanoatlantiradi. $\frac{3\alpha-\gamma}{5\gamma+6\beta}$ ning qiymatini hisoblang.
A) $\frac{3}{8}$ B) $\frac{1}{4}$ C) $\frac{2}{5}$ D) $\frac{1}{2}$ E) $\frac{4}{11}$

24. (98-4-22) k ning qanday qiymatida
$$|ln(x+15)|=-(x+k)^2$$
tenglama yechimga ega bo'ladi?
A) -15 B) 14 C) 15 D) 10 E) $-e$

25. (99-5-51) Ushbu
$$7^{x^2+|x|}=5^{-x^4}$$
munosabat x ning nechta qiymatida o'rinli?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

26. (99-4-53) Tengsizlikni yeching.
$$cos^2(x+1)\cdot log_4(3-2x-x^2)\geq 1$$
A) $[-1;0)$ B) $[-2;-1]$ C) $-2;-1$
D) -1 E) $(-3;0)\cup(0;1)$

27. (00-9-24) Tenglamaning ildizi nechta?
$$log_3x+log_x3=2cos(6\pi x^2)$$
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

28. (01-2-31) Tengsizlikni yeching.
$$cos^2(x+1)\cdot lg(9-2x-x^2)\geq 1$$
A) $(-\infty;-1]$ B) $\{-1\}$ C) $[-1;0)$
D) $(0;\infty)$ E) $[-1;1)$

29. (01-2-67) Tenglamaning nechta ildizi bor?

$$\sqrt{3x^2+6x+7}+\sqrt{5x^2+10x+14}=4-2x-x^2$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

30. (01-8-34) Ushbu

$$3-4x-4x^2=2^{4x^2+4x+3}$$

tenglamaning ildizlari yig'indisini toping.
A) 2 B) $-0,5$ C) 6 D) 4,5 E) $-6,5$

31. (01-8-55) Tenglamani yeching.

$$tg^4x-cos^2 2x=cos\frac{\pi}{7}\cdot cos\frac{2\pi}{7}\cdot cos\frac{4\pi}{7}-\frac{7}{8}$$

A) $\frac{\pi k}{2}, \quad k\in Z$ B) $\pi k, \quad k\in Z$
C) $2\pi k, \quad k\in Z$ D) $\frac{\pi}{4}+\pi k, \quad k\in Z$ E) $\emptyset$

32. (01-10-52) Ushbu

$$2|x-3|+x-1+2sin\frac{\pi x}{2}=0$$

tenglama nechta ildizga ega?
A) $\emptyset$ B) 1 C) 2 D) 4 E) cheksiz ko'p

33. (01-12-22) Ushbu

$$cos^2\frac{x}{2}-sin^2\Big(\frac{\sqrt{3}x}{2}\Big)=1$$

tenglamaning $[-\pi;\pi]$ oraliqda nechta yechimini bor?
A) 1 B) 2 C) 3 D) yechimi yo'q E) 4

34. (02-1-6)

$$2cos\frac{x}{20}=2^x+2^{-x}$$

tenglama nechta yechimga ega?
A) 1 B) 2 C) cheksiz ko'p D) $\emptyset$ E) 5

35. (02-2-58)

$$5^x+7^x=12^x$$

tenglama nechta ildizga ega?
A) 1 B) 2 C) 3 D) cheksiz ko'p
E) yechimi yo'q

36. (03-1-13)

$$\sqrt{5^x}+\sqrt{12^x}=\sqrt{13^x}$$

tenglama nechta ildizga ega?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

37. (03-1-62) Rustam, Qodir va Azim pul yig'ishib, 2625 so'mga koptok sotib olishdi. Agar ulardan har biri qolgan ikkitasi qo'shgan pulning yarmidan ko'p bo'lmagan pul qo'shgan bo'lsa, Rustam qancha pul qo'shgan?
A) aniqlab bo'lmaydi
B) 950 C) 825 D) 875 E) 975

38. (03-2-19)

$$6x-x^2-5=2^{x^2-6x+11}$$

tenglamaning ildizlari yig'indisini toping.
A) -5 B) -3 C) 6 D) 4 E) 3

39. (03-9-15)

$$\sqrt{25-x^2}+\sqrt{9-x^2}=9x^4+8$$

tenglamaning ildizlari quyida keltirilgan oraliqlarning qaysi biriga tegishli?
A)$[-3;-1]$ B)$(-2;0)$ C)$[0;2]$ D)$(0;2)$ E)$(1;3)$

40. (03-12-60)

$$sin^3x+cos^3x+sin^2x=2$$

tenglama $[-2\pi;2\pi]$ kesmada nechta ildizga ega?
A) ildizi yo'q
B) 1 ta C) 2 ta D) 3 ta E) 4 ta

41. (98-6-19) Agar $(x-1)^2\cdot(x+1)^3+3x-1$ ifoda standart shakldagi ko'phad ko'rinishida yozilsa, koeffisientlarning yig'indisi nechaga teng bo'ladi?
A) 10 B) 4 C) 2 D) 3 E) 1

42. (98-11-68) Agar $(x^3-x+1)^3+x$ ifoda standart shakldagi ko'phad ko'rinishida yozilsa, x ning toq darajalari oldidagi koeffisientlarning yig'indisi nechaga teng bo'ladi?
A) 1 B) 7 C) 4 D) 5 E) 3

43. (99-10-6) Ushbu

$$x^3-px^2-qx+4=0$$

tenglamaning ildizlaridan biri 1 ga teng. Shu tenglama barcha koeffisientlari yig'indisini toping.
A) -1 B) 0 C) 1 D) 1,5 E) 2

44. (03-3-26) $f(x)=(x^3+2x^2-1)^2-3x^2$ ko'phadning juft darajali hadlari koeffisientlarining yig'indisini toping.
A) -6 B) -2 C) 3 D) -3 E) -1

45. (97-1-12) Tenglamaning ildizlari yig'indisini toping.

$$x^3+2x^2-9x-18=0$$

A) 9 B) -2 C) 6 D) -18 E) 2

46. (97-6-12) Tenglamaning ildizlari ko'paytmasini toping.

$$x^3-3x^2-4x+12=0$$

A) 6 B) -4 C) 12 D) -12 E) 24

47. (97-11-12) Tenglamaning ildizlari ko'paytmasini toping.

$$x^3+5x^2-4x-20=0$$

A) -10 B) 20 C) -4 D) -20 E) 16

48. (00-8-12) Tenglamaning ildizlari yig'indisini toping.

$$x^3+3x^2-4x-12=0$$

A) -3 B) -7 C) 4 D) 12 E) 0

49. (02-11-22)

$$x^3-3x^2-2x+6=0$$

tenglamaning ildizlari ko'paytmasini toping.
A) 3 B) -6 C) 6 D) -3 E) 1

50. (02-11-24)
$$x^3 - 7x - 6 = 0$$
tenglamaning barcha haqiqiy ildizlari o'rta geometrigini toping.
A) $\sqrt{6}$ B) $\sqrt[3]{6}$ C) $-\sqrt[3]{6}$ D) $2\sqrt{2}$ E) -2

51. (03-3-21)
$$x^3 - 5x^2 - 2x + 10 = 0$$
tenglama ildizlarining ko'paytmasini toping.
A) 10 B) -10 C) 20 D) 5 E) -5

52. (03-3-22)
$$x^3 - 13x + 12 = 0$$
tenglama haqiqiy ildizlarining o'rta arifmetigini toping.
A) $2\frac{2}{3}$ B) $1\frac{1}{3}$ C) 0 D) $-\frac{1}{2}$ E) $-1\frac{1}{3}$

53. (99-5-12) Ifodaning eng kichik qiymatini toping.
$$5a^8 + 10a^{-4}b^{-4} + 5b^8$$
A) 10 B) 20 C) 100 D) 25 E) 50

54. (99-8-22) Ko'phadning eng kichik qiymatini aniqlang.
$$x^2 - 2x + 2y^2 + 8y + 9$$
A) 0 B) 8 C) 1 D) 9 E) -1

55. (00-1-17) Ushbu
$$2x^2 + 2xy + 2y^2 + 2x - 2y + 3$$
ko'phad eng kichik qiymatga erishganda, xy ning qiymati qanday bo'ladi?
A) 1 B) -2 C) 2 D) 1,5 E) -1

56. (97-7-63) 30 ta gugurt chupidan ularni sindirmay eng katta yuzali to'g'ri to'rtburchak yasalgan. Shu to'g'ri to'rtburchakning yuzini toping.
A) 64 B) 62 C) 56 D) 52 E) 49

57. (97-9-56) 18 ta gugurt chupidan ularni sindirmay eng katta yuzali to'g'ri to'rtburchak yasalgan. Shu to'rtburchakning yuzini toping.
A) 16 B) 20 C) 24 D) 28 E) 30

58. (99-5-2) Agar $A^2 + B^2 + C^2 = AB + AC + BC$ bo'lsa, $\frac{A+B}{C} + \frac{B+C}{A}$ ning qiymati nechaga teng bo'ladi?
A) aniqlab bo'lmaydi
B) 1 C) 2 D) 3 E) 4

59. (99-8-29) Agar $x^2 + \left(\frac{x}{x-1}\right)^2 = 8$ bo'lsa, $\frac{x^2}{x-1}$ ifodaning eng katta qiymatini toping.
A) 4 B) 8 C) 2 D) 16 E) 1/4

60. (00-9-11) Agar $A(A-B)+B(B-C)+C(C-A) = 0$ va $A \cdot B \cdot C \neq 0$ bo'lsa,
$$\frac{A^3 + B^3 + C^3}{A(B+C)^2 B(A+C)^2 + C(A+B)^2}$$
ning qiymati nechaga teng bo'ladi?
A) 0,25 B) 0,5 C) 0,75 D) 1 E) 1,25

61. (00-3-20) Ifodalarni taqqoslang.
$$p = a^2 + b^2 + c^2, \quad q = ab + ac + bc$$
A) $p < q$ B) $p = q$ C) $p > q$
D) $p \leq q$ E) $p \geq q$

62. (98-4-18) Ushbu $tg^{100}x + ctg^{100}x$ yig'indining eng kichik qiymatini toping.
A) 4 B) 0 C) 2 D) 1 E) 100

63. (98-6-15) ($x(x \in [0;\pi]$) ning qanday qiymatlarida $sin^2x + cosx$ funksiya o'zining eng katta qiymatiga erishadi?
A) 0 B) $\frac{\pi}{3}$ C) $\frac{\pi}{6}$ D) $\frac{\pi}{4}$ E) $\frac{\pi}{12}$

64. (98-11-64) Agar $|a| \leq 1, \quad |b| \leq 1$ bo'lsa, $arccosa - 4arcsinb$ ifodaning eng katta qiymati qanchaga teng bo'ladi?
A) 2π B) 1 C) 3π D) 5π E) 4π

65. (98-12-77) Ushbu
$$\frac{10}{x^2 + 8x + 41} + cos5y$$
ifodaning eng katta qiymati nechaga teng bo'lishi mumkin?
A) 1,8 B) 1,5 C) 1,4 D) 2 E) 2,5

66. (99-5-30) Ifodaning eng katta qiymatini toping.
$$\frac{8cos2\alpha - 5cos3\beta}{7 + 2cos4\gamma}$$
A) 2,2 B) 2,3 C) 2,4 D) 2,5 E) 2,6

67. (00-9-35) Ifodaning eng katta qiymatini toping.
$$\frac{5}{tg^2\alpha + ctg^2\alpha} + \frac{5sin2\alpha - cos\gamma}{5 + cos3t}$$
A) 5 B) 2 C) 3 D) 6 E) 4

68. (99-10-28) Ifodaning eng kichik qiymatini toping.
$$(1 + cos^2 2\alpha) \cdot (1 + tg^2\alpha) + 4sin^2\alpha$$
A) 2,5 B) 1,5 C) 2 D) 3 E) 3,5

69. (01-10-38) Ushbu
$$\frac{3sin\alpha + 2}{5 + cos\beta} + \frac{7}{tg^2\gamma + ctg^2\gamma}$$
ifodaning eng katta qiymatini toping.
A) 6,25 B) 4,75 C) 3,45 D) 2,75
E) aniqlab bo'lmaydi

70. (02-3-27) $a_n = -3n^2 + 18n + 1 \quad (n \in N)$ formula bilan berilgan ketma-ketlikning nechanchi hadi eng katta qiymatga ega bo'ladi?
A) 3 B) 2 C) 6 D) 8 E) 5

71. (02-6-39)
$$\frac{2sin\alpha - 1}{5 - 2sin\beta} + \frac{tg^2\gamma + ctg^2\gamma}{2}$$
ning eng kichik qiymatini toping.
A) 0 B) 1 C) -1 D) $\frac{4}{7}$
E) aniqlab bo'lmaydi

72. (02-7-21) $2^x + 2^{\frac{2-x-y}{2}} + 2^y$ ning eng kichik qiymatini aniqlang.
A) 4 B) 2 C) 3 D) 5 E) 6

73. (02-9-17)
$$2a^2 - 2ab + b^2 - 2a + 2$$
ning eng kichik qiymatini toping.
A) -2 B) 1 C) 2 D) 4 E) 8

74. (00-5-67) a ning qanday eng kichik qiymatida istalgan ABC uchburchak uchun
$$cosA + cosB + cosC \le a$$
tengsizlik hamisha o'rinli bo'ladi?
A) 1 B) 2 C) $\frac{3}{2}$ D) $\frac{5}{2}$ E) 3

75. (98-4-11) Agar x natural son bo'lsa, quyidagi sonlardan qaysi biri albatta juft son bo'ladi?
A) $\frac{x(x+1)(x+2)}{2}$ B) $\frac{x(x+1)(x+2)}{3}$ C) $\frac{x}{2}$
D) $\frac{x(x+1)(x+2)}{4}$ E) $\frac{x(x+1)(x+2)}{6}$

76. (00-9-19) Agar x, y, z va t ketma-ket keladigan natural sonlar bo'lsa, quyidagilarning qaysi biri albatta juft son bo'ladi?
A) $\frac{x+y+z}{2}$ B) $\frac{xyzt}{24}$ C) $\frac{xyz}{6}$ D) $\frac{x(x^2-1)}{3}$ E) $\frac{y(y^2-1)}{2}$

77. (98-7-27) Qisqartiring.
$$\frac{x^4+1}{x^2+x\sqrt{2}+1}$$
A) x^2+1 B) $x^2-x\sqrt{2}-1$ C) $x^2-2\sqrt{2}x+1$
D) x^2-1 E) $x^2-x\sqrt{2}+1$

78. (98-12-26) Qisqartiring.
$$\frac{x^2-x+1}{x^4+x^2+1}$$
A) $\frac{1}{x^2+x+1}$ B) $\frac{1}{x^2-2x-1}$ C) $\frac{1}{x^2-x+1}$
D) $\frac{1}{x^2-x-1}$ E) $\frac{1}{x^2-2x+1}$

79. (98-4-3) Ifodaning qiymatini hisoblang.
$$\frac{1}{\sqrt{1}+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + ...+$$
$$+\frac{1}{\sqrt{1599}+\sqrt{1600}}$$
A) 52 B) 41 C) 39 D) 34 E) 28

80. (99-9-22) Hisoblang.
$$\frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + \frac{1}{\sqrt{4}+\sqrt{3}} + ...+$$
$$+\frac{1}{\sqrt{9}+\sqrt{8}}$$
A) 2 B) 3 C) 4 D) 1 E) 5

81. (00-2-23) Yig'indini hisoblang.
$$\frac{1}{\sqrt{1}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{7}} + ...+$$
$$+\frac{1}{\sqrt{79}+\sqrt{81}}$$
A) 6 B) 5 C) 3 D) 2 E) 4

82. (00-10-54) Ifodaning qiymatini hisoblang.
$$\sqrt{2^3\sqrt{5^3\sqrt{2^3\sqrt{5^3...}}}}$$
A) 17 B) 12 C) 14 D) 41 E) 20

83. (97-5-15) Tenglamaning natural sonlardagi echimida z nimaga teng.
$$x + \frac{1}{y+\frac{1}{z}} = \frac{10}{7}$$
A) 3 B) 4 C) 1 D) 2 E) 7

84. (97-5-18) Tenglamani eching.
$$[x^2] = 9$$
A) 3 B) -3 C) $(-\sqrt{10}; -3) \cup (3; \sqrt{10})$
D) $[-\sqrt{10}; -3] \cup [3; \sqrt{10}]$
E) $(-\sqrt{10}; -3] \cup [3; \sqrt{10})$

85. (99-3-12) n ning qanday qiymatlarida
$$4x^2 - 3nx + 36 = 0$$
tenglama ikkita manfiy ildizga ega bo'ladi?
A) $|n| \ge 8$ B) $n \le -8$ C) $n < 8$
D) $n < -8$ E) $n > 8$

86. (99-9-6) t ning qanday qiymatlarida
$$x^2 + (t-2) \cdot x + 0,25 = 0$$
tenglama ikkala ildizi ham manfiy bo'ladi?
A) $t < 2$ B) $t < 1$ C) $t > 2$
D) $t \le 1$ E) $t > 3$

87. (00-8-4) $5n^3 - 5n$ ifoda istalgan natural n ga quyidagi sonlardan qaysi biriga qoldiqsiz bo'linadi?
A) 30 B) 22 C) 25 D) 45 E) 60

88. (97-9-15) Tenglamaning natural sonlardagi echimida y nimaga teng.
$$x + \frac{1}{y+\frac{1}{z}} = \frac{17}{15}$$
A) 4 B) 3 C) 2 D) 7 E) 6

89. (97-9-18) $[x^2] = 36$ tenglamani yeching.
A) 6 B) -6 C) $(-\sqrt{37}; -6] \cup [6; \sqrt{37})$
D) $[-37; -6) \cup (6; \sqrt{37})$ E) $[-37; -6] \cup [6; 37]$

90. (97-9-85) Agar
$$\begin{cases} x^3 - 3x^2y = y^3 + 20 \\ 3xy^2 = 7 \end{cases}$$
bo'lsa, $\frac{x-y}{3}$ ni hisoblang.
A) 3 B) 2 C) 1 D) 0 E) 6

91. (97-5-30) Hisoblang.

$$arcsin(sin10)$$

A) $\pi - 10$ B) $2\pi - 10$ C) $3\pi - 10$
D) $\frac{3\pi}{2} - 10$ E) $\frac{2\pi}{3} - 10$

92. (98-3-60) $sin^2x - \frac{1}{2}sin2x - 2cos^2x \geq 0$ ($x \in [0; 2\pi]$) tengsizlik x ning qanday qiymatlarida o'rinli?
A) $[arctg2; \frac{3\pi}{4}] \cup [\pi + arctg2; \frac{7\pi}{4}]$ B) $[arctg2; \frac{3\pi}{4}]$
C) $[\pi + arctg2; \frac{7\pi}{4}]$ D) $[\frac{3\pi}{4}; \pi + arctg2]$
E) $[\frac{7\pi}{4}; 2\pi]$

93. (98-6-21) Ushbu $x^2+ax-2=0$ va $x^3+ax^2-2=0$ tenglamalar umumiy ildizga ega bo'lsa, a ni toping.
A) 1 B) 2 C) 1,5 D) 3 E) -1

94. (98-10-45) Quyidagi mulohazalardan qaysi biri to'gri?
A) $6x^4 + 3x^3 + 8 = 0$ tenglamaning ildizi $x = 3$ bo'lishi mumkin
B) $3x^6 + 4x = -9$ tenglama musbat ildizga ega
C) $12x^3 + 7x = 2$ tenglama manfiy ildizga ega
D) $x^2 - 2x - 8 = 0$ tenglama ildizlari qarama-qarshi ishorali
E) $p \neq 0$ da $x^2 - px + p^2 = 0$ tenglama 2 ta musbat ildizga ega

95. (98-12-18) a ning qanday qiymatida $\frac{a^3}{a^2-1}$ kasrning qiymati $\frac{27}{8}$ ga teng bo'ladi.
A) 3 B) 2 C) 27 D) 8 E) 9

96. (98-12-96) Tenglama nechta manfiy ildizga ega?

$$2x + 5x^3 = x^8 - 4x^4 + 4$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

97. (99-6-42) Agar

$$\begin{cases} x^3 + y^3 = 10 \\ 3xy^2 + 3x^2y = 17 \end{cases}$$

bo'lsa, $x + y$ ni toping.
A) 3 B) 2 C) $\sqrt{3}$ D) $3\sqrt{3}$ E) 9

98. (99-8-13) Nechta $(x; y)$ butun sonlar jufti

$$(x + 1)(y - 2) = 2$$

tenglikni qanoatlantiradi.
A) 4 B) 2 C) 1 D) 3 E) 5

99. (99-2-15) Ushbu $x^4 = 3x^2 - 2x$ tenglamaning eng katta va eng kichik ildizlari
yig'indisini toping.
A) 3 B) -3 C) 1 D) -1 E) -2

100. (99-4-22) Tenglamaning nechta butun echimi bor?

$$(x + 2)^2 = -\frac{3}{x}$$

A) 4 B) 2 C) 1 D) 3 E) ildizi yo'q

101. (00-4-36) Agar $\frac{ab}{a+b} = 1$; $\frac{ac}{a+c} = 2$ va $\frac{bc}{b+c} = 3$ bo'lsa, $\frac{ab}{c}$ ning qiymatini toping.
A) $\frac{6}{25}$ B) $-\frac{15}{56}$ C) $\frac{21}{40}$ D) $-\frac{12}{35}$ E) $\frac{18}{65}$

102. (00-7-10) Agar $a^2 + 3ab + b^2 = 44$ va $a^2 + ab + b^2 = 28$ ga teng bo'lsa, $a^2 - ab + b^2$ ning qiymati nechaga teng bo'ladi?
A) 14 B) 18 C) 12 D) 19 E) 16

103. (00-10-49) m ning qanday qiymatida

$$x(x + a)(x + b)(x + a + b) + 4m^2$$

ifoda to'la kvadrat bo'ladi?
A) $\frac{a^2b^2}{4}$ B) $\pm\frac{ab}{4}$ C) $\pm\frac{a+b}{4}$ D) $\frac{ab^2}{4}$
E) Bunday qiymat mavjud emas

104. (00-10-68) a parametrning qanday qiymatlarida

$$ax^2 + 2(a + 3)x + a + 2 = 0$$

tenglamaning ildizlari nomanfiy bo'ladi?
A) $[-2,25; -2]$ B) $[-2,1; -1]$ C) $[1; 2]$
D) $(-\infty; -2]$ E) Bunday qiymatlar yo'q

105. (00-10-75) Agar $\{a_n\}$ ketma-ketlik uchun $a_1 = 0$, $a_2 = 1$,...,a_{n+2}=$a_{n+1} - a_n$ ekani ma'lum bo'lsa, a_{885} ni toping.
A) 1 B) 0 C) -1 D) 2 E) 3

106. (98-5-13) k ning qanday qiymatida

$$y = \sqrt{kx^2 + 2x - 1}$$

funksiya $(-1; \frac{1}{3})$ oraliqda aniqlanmagan?
A) 4 B) 5 C) 3 D) -3 E) -4

107. (97-12-43) k ning qanday qiymatlarida $f(x) = kx - sinx$ funksiya o'zining aniqlanish sohasida kamayadi?
A) $k \leq -1$ B) $k > -1$ C) $k < 0$
D) $k > 0$ E) $0 < k < 1$

108. (98-12-92) Ushbu $y = \sqrt{sinx} + \sqrt{16 - x^2}$ funksiyaning aniqlanish sohasiga tegishli x ning butun qiymatlari nechta?
A) 3 B) 4 C) 5 D) 2 E) 1

109. (99-5-27) Tenglama $[-\pi; 2\pi]$ oraliqda nechta ildizga ega.

$$5sin2x + 8cosx = 13$$

A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

110. (99-5-29) Tenglama ildizga ega bo'ladigan a ning barcha qiymatlarini ko'rsating.

$$sin^4x + cos^4x = asinx \cdot cosx$$

A) $[1; \infty)$ B) $[-1; 1]$ C) $[1; 5]$
D) $(-\infty; -1] \cup [1; \infty)$ E) $[-3; -1] \cup [1; 3]$

111. (99-5-57) $[-10; 10]$ oraliqdagi nechta butun son

$$y = 2^{cosx} \cdot \sqrt{x^3 \cdot sin^2(\frac{\pi x}{3}) \cdot e^{-x}}$$

funksiyaning aniqlanish sohasiga tegishli?
A) 10 B) 11 C) 12 D) 13 E) 14

112. (99-4-52) Hisoblang.

$$cos\frac{\pi}{7}\cdot cos\frac{3\pi}{7}\cdot cos\frac{5\pi}{7}$$

A) $\frac{1}{8}$ B) $-\frac{1}{16}$ C) $-\frac{\sqrt{3}}{8}$ D) $\frac{1}{16}$ E) $-\frac{1}{8}$

113. (99-4-56) Tengsizlikni eching.

$$cos4\cdot cosx\geq\sqrt{\frac{cosx}{1+ctg^2x}}$$

A) $(\pi n;\frac{\pi}{2}+\pi n],\quad n\in Z$ B) $[0;\frac{\pi}{2}]$
C) $\frac{\pi}{2}+\pi n,\quad n\in Z$ D) $\pi n,\quad n\in Z$
E) $[-\frac{\pi}{2}+2\pi n;\frac{\pi}{2}+2\pi n],\quad n\in Z$

114. (00-4-44) Agar $0\leq\beta\leq\frac{\pi}{4}$ bo'lsa,

$$tg\beta=\Big|\frac{a^2-5a+4}{a^2-4}\Big|$$

o'rinli bo'ladigan a ning barcha qiymatlarini toping.
A) $[2,5;\infty)$ B) $[0;\infty)$ C) $[0;1,6]\cup[2,5;\infty)$
D) $[0;1,5]\cup[3,6;\infty)$ E) $[-3;1,6)\cup[2,5;\infty)$

115. (00-5-30) Hisoblang.

$$cos\frac{2\pi}{7}+cos\frac{4\pi}{7}+cos\frac{6\pi}{7}$$

A) $-\frac{1}{2}$ B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $\frac{1}{8}$ E) $-\frac{1}{4}$

116. (00-5-43) $y=sin|x|$ funksiyaning eng kichik davrini ko'rsating.
A) 2π B) π C) davriy emas D) $\frac{\pi}{2}$ E) 3π

117. (00-6-52) Hisoblang.

$$cos\frac{\pi}{5}-cos\frac{2\pi}{5}$$

A) $\frac{\sqrt{2}-1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{\sqrt{3}}$ D) $\frac{\sqrt{3}-1}{2}$ E) $\frac{1}{2}$

118. (00-10-52) Hisoblang.

$$cos24^0-cos84^0-cos12^0+sin42^0$$

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{\sqrt{5}-1}{4}$ D) $\frac{\sqrt{3}}{2}$ E) $\frac{1}{\sqrt{3}}$

119. (00-10-65) Tengsizlikni yeching.

$$x^2-4xarccos(x^2-4x+5)<0$$

A) $\{2\}$ B) $(1;5)$ C) $(-2;3)$
D) $(arccos1;10)$ E)yechimi yo'q

120. (98-5-30) Ushbu

$$\Big(\frac{4}{5}\Big)^x=4$$

tenglamaning yechimi qaysi oraliqqa tegishli?
A) $(-\infty;-1)$ B) $(0;1)$ C) $[2;\infty)$
D) $(-1;0)$ E) $(1;2)$

121. (98-6-17) Ushbu $y=2^{x+\frac{1}{x}}$ funksiyaning qiymatlar sohasini toping.
A) $(-\infty;\infty)$ B) $(0;\infty)$ C) $[2;\infty)$
D) $[4;\infty)$ E) $(0;\frac{1}{2}]\cup[4;\infty)$

122. (98-12-81) k ning qanday qiymatida $f(x)=|log_5(k-x)|$ va $g(x)=-|x-7|$ funksiyalarning grafiklari OX o'qida yotgan nuqtada kesishadi?
A) 1 B) 4 C) 5 D) -1 E) 8

123. (98-12-85) Tengsizlikni qanoatlantiruvchi manfiy sonlar nechta?

$$(x-2-x^2)\cdot(2x+\frac{1}{e})^4\cdot log_{x^2+2x+2}\Big(1-\frac{x^2}{\pi}\Big)\geq 0$$

A) cheksiz ko'p B) 1 C) $\emptyset$ D) 2
E) aniqlab bo'lmaydi.

124. (99-5-20) x va z

$$7^{2x}-2\cdot7^x\cdot cos\frac{z}{2}+1=0$$

tengsizlikni qanoatlantirsa, $|z+3|^x$ ning qiymatini toping.
A) 9 B) 0 C) 3 D) 1 E) 27

125. (99-7-31) Tenglamaning yechimi qaysi oraliqqa tegishli?

$$\Big(\frac{2}{3}\Big)^x=2$$

A) $(-\infty;-2)$ B) $(-1;0)$ C) $(1;\infty)$
D) $(-2;-1)$ E) $(0;1)$

126. (99-5-41) Ushbu $y=log_3(x^2-8x+7)$ funksiya grafigining ikkala koordinatasi ham butun sonlardan iborat bo'lgan nechta nuqtasi bor.
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

127. (00-5-45) $y=x+|x|$ funksiyaning hosilasini toping.
A) 0 B) 2 C) $\begin{cases}0, & \text{agar}\quad x<0\\ 2, & \text{agar}\quad x\geq 0\end{cases}$
D) $\begin{cases}0, & \text{agar}\quad x<0\\ \text{mavjud emas}, & \text{agar}\quad x=0\\ 2, & \text{agar}\quad x>0\end{cases}$
E) hosila mavjud emas

128. (98-6-16) Agar $f(x)$ funksiya uchun $x\in(-\infty;\infty)$ da $f(x+3)=-\frac{1}{f(x+1)}$ tenglik bajarilsa, $\frac{f(4)}{f(0)}$ ni toping.
A) 1 B) 2 C) 3 D) 4 E) 5

129. (98-11-65) Agar

$$(x-2)f(x-2)+f(2x)+f(x+2)=x+6$$

bo'lsa, $f(4)$ qanchaga teng bo'ladi?
A) 13 B) 2 C) 3 D) 4 E) 41

130. (99-1-14) Agar

$$f(\frac{ax-b}{bx-a})=x^{50}+x^{49}+x^{48}+...+x^2+x+1$$

$(|a|\neq|b|)$ bo'lsa, $f(1)$ ni toping.
A) 1 B) 2 C) 51 D) 4 E) 5

131. (99-5-38) Agar $f(x)=x^2$ va $\varphi(x)=2x-1$ bo'lsa, x ning nechta qiymatida $f(\varphi(x))=\varphi(f(x))$ bo'ladi?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

132. (00-10-61) Medianalari 9; 12 va 15 ga teng uchburchakning yuzini toping.
A) 50 B) 48 C) 75 D) 49 E) 72

133. (01-4-1) Ushbu
$$sinx = x^2 - x + 0,75$$
tenglamaning ildizlari qaysi kesmaga tegishli?
A) $[0;\pi]$ B) $[-\pi;0]$ C) $[\pi;2\pi]$
D) $[\frac{3}{2}\pi;2\pi]$ E) ildizi yo'q

134. (01-12-10) Ushbu
$$2^x + 0,5 = |sinx|$$
tenglamaning manfiy yechimlari nechta?
A) 2 B) 14 C) $\emptyset$ D) 15 E) cheksiz ko'p

135. (01-12-44) Ushbu
$$|x| \cdot (x^2 - 4) = -1$$
tenglama nechta ildizga ega?
A) 1 B) 2 C) 3 D) 4 E) $\emptyset$

136. (02-1-12)
$$arcsin\frac{x}{2} + 2arccosx = \pi$$
tenglama nechta ildizga ega?
A) 1 B) 2 C) yechimi yo'q
D) 3 E) cheksiz ko'p yechimga ega

137. (02-1-22) m ning qanday qiymatlarida $x^2+mx+8 = 0$ va $x^2 + x + m = 0$ tenglamalar umumiy ildizga ega bo'ladi?
A) -6 B) -7 C) 9 D) -5 E) 5

138. (02-1-43) Agar $x-y = xy$ va $xy \neq 0$ bo'lsa, $\frac{1}{x} - \frac{1}{y}$ ni toping.
A) $\frac{1}{xy}$ B) $\frac{1}{x-y}$ C) $y - x$ D) -1 E) 0

139. (02-1-57)
$$1 + x - x^2 = |x^3|$$
tenglama nechta haqiqiy yechimga ega?
A) 1 B) 2 C) 3 D) 4 E) yechimga ega emas

140. (02-3-2)
$$125^6 \cdot 15^4 \cdot 2048^2$$
ko'paytmaning qiymati necha xonali son bo'ladi?
A) 24 B) 26 C) 22 D) 23 E) 25

141. (02-3-78) $cos^2x + 6sinx = 4a^2 - 2$ tenglama a ning qanday qiymatlarida yechimga ega bo'ladi?
A) $[-\sqrt{2};\sqrt{2}]$ B) $[0;\sqrt{2}]$ C) $[0;2)$
D) $(-2;2)$ E) $[1;0)$

142. (02-4-44)
$$\sqrt{1+x} \leq arccos(x+2)$$
tengsizlikning eng katta butun yechimini toping.
A) -2 B) -1 C) 0 D) 1 E) 2

143. (02-6-4)
$$xy^2 - xy - y^2 + y = 94$$
tenglamaning natural sonlari juftini toping.
A) $(48;2)$ B) $(48;3)$ C) $(49;1)$
D) $(49;2)$ E) $(48;1)$

144. (02-6-14) Nechta natural (x,y) sonlar jufti $x^2 - y^2 = 53$ tenglikni qanoatlantiradi?
A) $\emptyset$ B) 1 C) 2 D) 3 E) 4

145. (02-8-4) $x^{2001} + 3x^{2000} + 3x + 13$ ko'phadni $x+3$ ga bo'lganda qoldiq necha bo'ladi?
A) 4 B) 3 C) 5 D) 2 E) 1

146. (02-8-5) $x^6 + x^4 - 3x^2 + 5$ ko'phadni $x^2 - \sqrt{3}$ ga bo'lganda qoldiq necha bo'ladi?
A) 8 B) 7 C) 6 D) 9 E) 5

147. (02-9-16) Agar $a+b+c = 12$; $ab+bc+ac = -15$ bo'lsa, $a^2 + b^2 + c^2$ ning qiymatini toping.
A) 84 B) 114 C) 144 D) 174 E) 204

148. (02-10-18) $a^4 + 4b^4$ ni rasional ko'paytuvchilarga ajrating.
A) $(a^2 - 2ab + 2b^2)(a^2 + 2ab + 2b^2)$
B) $(a^2 - 2b^2)^2$ C) $(a^2 + 2b^2)^2$
D) $(a^2 - 2b^2)(a^2 + 2b^2)$
E) $(a^2 + b^2)(a^2 - 4b^2)$

149. (02-12-22) 20 dan katta bo'lmagan barcha natural sonlarning ko'paytmasi $n(n \in N)$ ning qanday eng katta qiymatida 2^n ga qoldiqsiz bo'linadi?
A) 10 B) 18 C) 20 D) 16 E) 14

150. (00-10-48) Kasrni qisqartiring.
$$\frac{x^3 - 1}{x^4 + x^2 + 1}$$
A) $\frac{x-1}{x^2-x+1}$ B) $\frac{x}{x+2}$ C) $\frac{x+1}{x^2-x+1}$
D) $\frac{x-2}{x^2-x-1}$ E) $\frac{x+2}{x^2-x-1}$

151. (01-5-3) Hisoblang.
$$\sqrt[3]{5\sqrt{2}+7} - \sqrt[3]{5\sqrt{2}-7}$$
A) 2 B) 1 C) 3 D) 4 E) 5

152. (02-10-5)
$$\sqrt[3]{9+2\sqrt{20}} + \sqrt[3]{9-2\sqrt{20}}$$
ning qiymatini toping.
A) 3 B) 1 C) 4 D) 2 E) $2\sqrt[3]{2}$

153. (00-4-14) Agar a, b, c va d turli raqamlar bo'lib, $a+b+c = 7$, $(a+b)^2 = d$ va $abc \neq 0$ bo'lsa, $\frac{c^2-c}{a+b}$ ning qiymatini toping.
A) aniqlab bo'lmaydi
B) 1 C) 2 D) 3 E) 4

154. (03-1-18) $sinx < 1 + \frac{x^2}{4}$ tengsizlikni yeching.
A) $\emptyset$ B) $\left(-\frac{\pi}{2} + 2\pi n; \frac{\pi}{2} + 2\pi n\right)$, $n \in Z$
C) $[-\pi;\pi]$ D) $\left[-\frac{\pi}{6} + 2\pi n; \frac{\pi}{6} + 2\pi n\right]$, $n \in Z$
E) $(-\infty;\infty)$

155. (03-1-23)

$$| x^2+3x+2 |=| x^2+2x+5 | + | x-3 |$$

tenglamani yeching.
A) $3;5$ B) $4;6$ C) $[3;\infty)$ D) $[0;3]$ E) $[3;10]$
(ko'rsatma: $| a+b |=| a | + | b | \Leftrightarrow ab \geq 0$.)

156. (03-1-36)

$$\frac{5^{x^2}-5}{3sinx+4cosx-2\pi} \geq 0$$

tengsizlikni yeching.
A) $[-1;1]$ B) $\left[1;\frac{\pi}{2}\right]$ C) $[-1;\pi]$
D) $[0;\pi]$ E) $[1;\pi]$

157. (03-1-38) $\frac{3}{x} = x^2-6x+7$ tenglamaning nechta ildizi bor?
A) 0 B) 1 C) 2 D) 3 E) 4

158. (03-2-2) Agar $m^2+n^2=p^2+q^2=1$ va $mp+nq=0$ bo'lsa , $mn+pq$ ning qiymatini toping.
A) 1 B) 0 C) 2 D) 4 E) 0,5

159. (03-2-59) $sinx = log_2 x$ tenglamani nechta ildizi bor?
A) ildizi yo'q B) 1 C) 2 D) 4
E) cheksiz ko'q

160. (03-2-1) a ning qanday haqiqiy qiymatlarida

$$x^4+a=x^2+a^2$$

tenglama uchta turli haqiqiy ildizlarga ega bo'ladi?
A) $(0;4)$ B) 2 C) 0 va 1 D) $[0;1]$ E) 0

161. (03-5-9) $mn^2=18$ va $m^2k=20$ bo'lib, m, n va k natural sonlar bo'lsa, n ni toping.
A) 3 B) 2 C) 5 D) 4 E) 6

162. (03-12-56)

$$x^2 7^x + 1 > 7^x + x$$

tengsizlikni yeching.
A) $(1;\infty)$ B) $(-1;0)$ C) $(-1;1)$
D) $(-\infty;0)\bigcup(1;\infty)$ E) $(-1;1)\bigcup(1;\infty)$

3 -Bob PLANIMETRIYA

3.1 Burchaklar. Masofalar

1. Qo'shni burchaklar yig'indisi 180^0 ga teng
2. Vertikal burchaklar teng.

(96-3-37) Ikki to'g'ri chiziqning kesishishidan hosil bo'lgan qo'shni burchaklarning gradus o'lchovlari 2 : 3 nisbatda bo'lsa, shu burchaklarni toping.
A) $72^0;108^0$ B) $60^0;120^0$ C) $30^0;150^0$ D) $50^0;130^0$

E) $62^0;118^0$ **Yechish:** Masalaning shartida keltirilgan qo'shni burchaklar α va β bo'lsin. U holda

$$\begin{cases} \frac{\alpha}{\beta}=\frac{2}{3}, \\ \alpha+\beta=180^0. \end{cases}$$

tenglamalar sistemasini hosil qilamiz. Birinchi tenglamadan α ni topamiz.

$$\begin{cases} \alpha=\frac{2}{3}\beta, \\ \frac{2}{3}\beta+\beta=180^0. \end{cases}$$

Uni ikkinchi tenglamaga qo'yamiz va hosil bo'lgan tenglamani yechamiz.

$$\frac{5}{3}\beta=180^0, \rightarrow \beta=108^0$$
$\alpha=180^0-\beta=72^0$ bo'ladi. J:$72^0;108^0(A)$

1. (96-3-36) Qo'shni burchaklardan biri ikkinchisidan 16^0 katta. Shu qo'shni burchaklarni toping.
A) $16^0;164^0$ B) $80^0;96^0$ C) $148^0;32^0$
D) $82^0;98^0$ E) $62^0;118^0$

2. (96-1-37) Ikkita to'g'ri chiziqning kesishishidan hosil bo'lgan uchta burchakning yig'indisi 315^0 ga teng. Shu burchaklardan kichigini toping.
A) 60^0 B) 45^0 C) 10^0 D) 85^0 E) 50^0

3. (96-10-40) Ikki to'g'ri chiziqning kesishishidan hosil bo'lgan burchaklarning ayirmasi 40^0 ga teng. Kichik burchakni toping.
A) 60^0 B) 40^0 C) 50^0 D) 70^0 E) 45^0

4. (96-9-88) Ikki to'g'ri chiziqning kesishishidan hosil bo'lgan uchta burchak yig'indisi 265^0 ga teng. Shu burchaklardan kattasini toping.
A) 110^0 B) 95^0 C) 105^0 D) 150^0 E) 120^0

5. (96-11-37) Qo'shni burchaklardan biri ikkinchisidan 20^0 ga katta. Shu qo'shni burchaklarni toping.
A) $160^0;20^0$ B) $28^0;152^0$ C) $20^0;160^0$
D) $140^0;40^0$ E) $80^0;100^0$

6. (96-11-38) Ikki to'g'ri chiziqning kesishishidan hosil bo'lgan qo'shni burchaklar 5 : 7 nisbatda bo'lsa, shu burchaklarni toping.
A) $36^0;144^0$ B) $75^0;105^0$ C) $42^0;138^0$
D) $38^0;142^0$ E) $85^0;95^0$

7. (96-12-38) Qo'shni burchaklardan biri ikkinchisidan 18^0 katta. Shu qo'shni burchaklarni toping.
A) $82^0;98^0$ B) $81^0;99^0$ C) $80^0;100^0$ D) $162^0;18^0$ E) $98^0;82^0$

8. (96-12-39) Ikki to'g'ri chiziqning kesishishidan hosil bo'lgan qo'shni burchaklarning gradus o'lchovlari $3:7$ nisbatda bo'lsa, shu burchaklarni toping.
A) $60^0; 120^0$ B) $30^0; 150^0$ C) $54^0; 126^0$
D) $62^0; 118^0$ E) $40^0; 140^0$

9. (97-1-27) Ikki qo'shni burchakning ayirmasi 24^0 ga teng. Shu burchaklardan kichigini toping.
A) 72^0 B) 68^0 C) 82^0 D) 76^0 E) 78^0

10. (97-4-43) Qo'shni burchaklardan biri ikkinchisidan 4 marta kichik bo'lsa, shu burchaklardan kattasini toping.
A) 125^0 B) 130^0 C) 140^0 D) 144^0 E) 120^0

11. (97-5-3) Soatning minut mili 9 minutda necha gradusga buriladi?
A) 15^0 B) 30^0 C) 25^0 D) 54^0 E) 60^0

12. (97-5-41) Burchakning bissektrisasi uning tomoni bilan 15^0 li burchak tashkil etsa, burchakning o'zini toping.
A) 45^0 B) 30^0 C) 60^0 D) 90^0 E) $7,5^0$

13. (97-6-27) Ikki to'g'ri chiziqning kesishishidan hosil bo'lgan burchaklarning kattaliklari nisbati $7:3$ ga teng. Shu burchaklardan kichigini toping.
A) 63^0 B) 51^0 C) 57^0 D) 48^0 E) 54^0

14. (97-9-3) Soatning minut mili 6 minutda necha gradusga buriladi?
A) 20^0 B) 24^0 C) 36^0 D) 40^0 E) 60^0

15. (97-9-41) Burchakning bissektrisasi uning tomoni bilan 45^0 li burchak tashkil etsa, burchakning o'zini toping.
A) $22,5^0$ B) 90^0 C) 60^0 D) 15^0 E) 35^0

16. (97-11-27) Qo'shni burchaklardan biri ikkinchisidan 32^0 ga katta. Shu burchaklardan kattasini toping.
A) 106^0 B) 118^0 C) 116^0 D) 114^0 E) 108^0

17. (98-4-26) A va B nuqtalar orasidagi masofa 500 metrga, B va C nuqtalar orasidagi masofa esa 300 metrga teng. A va C nuqtalar orasidagi masofa qanchaga teng?
A) 1300 B) 800 C) 200 D) 700
E) aniqlab bo'lmaydi

18. (98-6-32) Bir nuqtadan uchta to'g'ri chiziq o'tkazilgan. Hosil bo'lgan 6 ta burchakning o'zaro vertikal bo'lmagan uchtasi α, β, γ ga teng. $\alpha+\beta+\gamma$ ni toping.
A) 270^0 B) 180^0 C) 135^0 D) 100^0 E) 90^0

19. (98-6-33) Qo'shni burchaklar bissektrisalari orasidagi burchakni toping.
A) 90^0 B) 80^0 C) 100^0 D) 70^0 E) 60^0

20. (98-11-80) Ikki to'g'ri chiziqning kesishishidan hosil bo'lgan burchaklarning biri 30^0 ga teng. Qolgan burchaklarni toping.
A) $150^0, 150^0, 30^0$ B) $110^0, 110^0, 110^0$
C) $60^0, 60^0, 30^0$ D) $120^0, 120^0, 90^0$
E) $130^0, 130^0, 70^0$

21. (99-3-44) AB va CD to'g'ri chiziqlar O nuqtada kesishadi. AOD va COB burchaklarning yig'indisi 230^0 ga teng. AOC burchakni toping.
A) 70^0 B) 120^0 C) 65^0 D) 95^0 E) 85^0

22. (99-4-36) O'ziga qo'shni bo'lgan burchakning $\frac{3}{7}$ qismiga teng burchakni toping.
A) 54^0 B) 66^0 C) 72^0 D) 42^0 E) 63^0

23. (99-8-12) O'ziga qo'shni burchakning 44% iga teng bo'lgan burchakning kattaligini aniqlang.
A) 55^0 B) 80^0 C) 60^0 D) 52^0 E) 78^0

24. (00-3-72) Berilgan burchak va unga qo'shni bo'lgan ikkita burchaklar yig'indisi $\frac{19\pi}{16}$ ga teng. Berilgan burchakning kattaligini toping.
A) $\frac{11\pi}{16}$ B) $\frac{5\pi}{8}$ C) $\frac{3\pi}{4}$ D) $\frac{7\pi}{8}$ E) $\frac{13\pi}{16}$

25. (00-5-51) α va β qo'shni burchaklar. Agar $\frac{\alpha}{\beta}=\frac{2}{7}$ bo'lsa, β va α burchaklar ayirmasini toping.
A) 70^0 B) 60^0 C) 100^0 D) 90^0 E) 80^0

26. (01-1-64) Uzunligi $4,2$ ga teng kesmani $3:4$ kabi nisbatda bo'ling.
A) $1,2$ va 3 B) $1,3$ va $2,9$ C) $1,4$ va $2,8$
D) $1,8$ va $2,4$ E) 2 va $2,2$

27. (01-2-38) α va β qo'shni burchaklar. Agar $\alpha = 0,8\beta$ bo'lsa, β va α burchaklar ayirmasini toping.
A) 80^0 B) 20^0 C) 60^0 D) 40^0 E) 30^0

28. (01-12-5) Ikkita to'g'ri chiziqning kesishishidan hosil bo'lgan burchaklardan 3 tasining yig'indisi 200^0. Ularning kattasi kichigidan necha foiz ortiq?
A) 140% B) 80% C) 800% D) 700%
E) to'g'ri javob berilmagan

29. (03-6-71) Ikki to'g'ri chiziqning kesishishidan hosil bo'lgan burchaklarning nisbati $5:4$ ga teng. Shu burchaklardan kichigini toping.
A) 70^0 B) 80^0 C) 60^0 D) 65^0 E) 50^0

30. (03-7-37) O'tkir burchakning sinusi $\frac{3}{5}$ ga teng. Shu burchakka qo'shni burchakning kosinusini toping.
A) $-\frac{4}{5}$ B) $-\frac{3}{4}$ C) $\frac{4}{5}$ D) $\frac{3}{4}$ E) $-\frac{2}{3}$

3.2 Parallel to'g'ri chiziqlar.

1. Ichki bir tomonli burchaklar yig'indisi 180^0 ga teng.

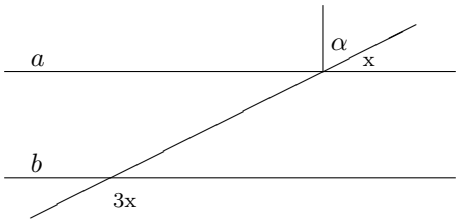
2. Ichki almashinuvchi burchaklar teng.

(98-1-39) Ikki parallel to'g'ri chiziqni uchunchi to'g'ri chiziq kesib o'tganda, hosil bo'lgan ichki bir tomonli burchaklardan biri ikkinchisidan 60^0 ga kichik. Shu burchaklardan kattasini toping.
A) 120^0 B) 110^0 C) 118^0 D) 130^0 E) 100^0
Yechish: Ichki bir tomonli burchaklarning biri x ga teng bo'lsin. U holda masalaning shartiga ko'ra ularning ikkinchisi $60^0 - x$ ga teng bo'ladi. Ma'lumki ichki bir tomonli burchaklarning yig'indisi 180^0 ga teng. Shuning uchun

$$x + x - 60^0 = 180^0$$

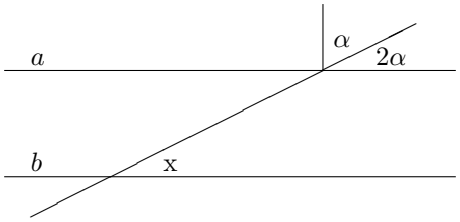
tenglamani hosil qilamiz. Bu yerdan $x = 120^0$ ekani kelib chiqadi. J: 120^0 (A)

1. (96-3-91) $a \| b$. α ni toping.



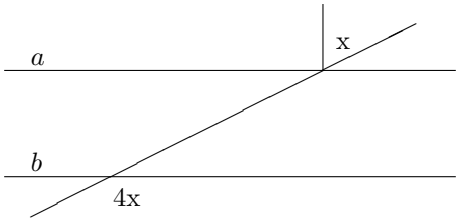
A) 30^0 B) 60^0 C) 45^0 D) 40^0 E) 50^0

2. (98-10-81) $a \| b$. x ni toping.



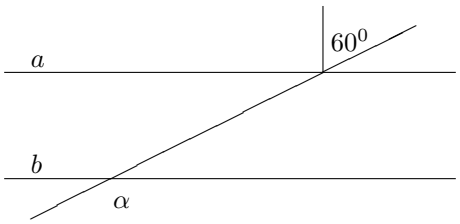
A) 50^0 B) 60^0 C) 45^0 D) 55^0 E) 65^0

3. (96-9-26) $a \| b$. x ni toping.



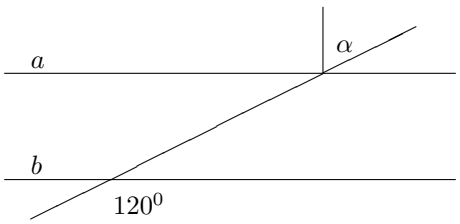
A) 45^0 B) 40^0 C) 35^0 D) 30^0 E) 36^0

4. (96-12-92) $a \| b$. α ni toping.



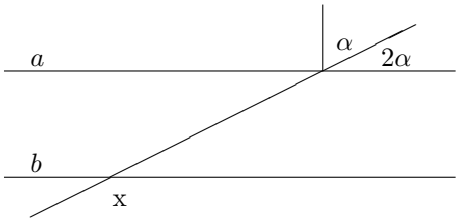
A) 120^0 B) 110^0 C) 140^0 D) 160^0 E) 150^0

5. (96-13-32) $a \| b$. α ni toping.



A) 60^0 B) 45^0 C) 30^0 D) 50^0 E) 35^0

6. (98-3-34) $a \| b$. x ni toping.



A) 130^0 B) 135^0 C) 140^0 D) 125^0 E) 120^0

7. (98-8-39) Ikki parallel to'g'ri chiziqni uchinchi to'g'ri chiziq kesib o'tganda hosil bo'lgan ichki bir tomonli burchaklardan biri ikkinchisidan 17 marta kichik. Shu burchaklardan kichigini toping.
A) 20^0 B) 24^0 C) 15^0 D) 10^0 E) 18^0

3.3 Uchburchaklar.

3.3.1 Perimetri, medianasi, bissektrisasi va balandligi. Uchburchakning o'rta chizig'i.

1. $p = a+b+c$ - perimetri. Uzunliklari a, b, c bo'lgan kesmalardan $a < b + c, b < a + c, c < a + b$ bo'lgandagina uchburchak yasash mumkin.

2. Uchburchakning o'rta chizig'i asosiga parallel va uning yarmiga teng.

(97-7-37) Uchburchakning asosiga tushirilgan medianasi uni perimetrlari 18 va 24 ga teng bo'lgan ikki uchburchakka ajratadi. Berilgan uchburchakning kichik yon tomoni 6 ga teng. Uning katta yon tomonini toping.
A) 10 B) 12 C) 14 D) 9 E) 15
Yechish: Uchburchakning katta yon tomoni a ga, asosi esa c ga, asosiga tushirilgan medianasi m ga teng bo'lsin. U holda hosil bo'lgan uchburchaklarning perimetrlari uchun quyidagi tengliklarni yozishimiz mumkin.

$$\begin{cases} a + m + \frac{c}{2} = 24, \\ 6 + m + \frac{c}{2} = 18. \end{cases}$$

Birinchi tenglikdan ikkinchisini ayiramiz. $a - 6 = 6$, $\longrightarrow a = 12$. J:12 (B)

1. (96-3-17) Uchburchakning birinchi tomoni $x (x > 5)$ sm, ikkinchi tomoni undan 3 sm qisqa, uchunchi tomoni esa birinchisidan 2 sm uzun. Shu uchburchakning perimetrini toping.
A) $(3x + 1)$ sm B) $(3x + 5)$ sm
C) $(3x - 1)$ sm D) $(3x + 2)$ sm
E) $(3x - 3)$sm

2. (96-3-97) a $(-1 < a < \frac{1}{2})$ ning qanday qiymatlarida uzunliklari mos ravishda $1 + a, 1 - 2a$ va 2 ga teng bo'lgan kesmalardan uchburchak yasash mumkin?
A) $(-1; 0)$ B) $(0; \frac{1}{2})$ C) $(-\frac{1}{3}; 0)$ D) $(-\frac{1}{3}; \frac{1}{3})$
E) $(-\frac{2}{3}; 0)$

3. (96-7-37) Perometri 24 bo'lgan uchburchakning balandligi uni perimetrlari 14 va 18 bo'lgan ikkita uchburchakka ajratadi. Berilgan uchburchakning balandligini toping.
A) 10 B) 8 C) 6 D) 4 E) 3

4. (96-9-33) a ning qanday qiymatlarida uzunliklari mos ravishda $1+2a, 1-a$ va 2 ga teng bo'lgan kesmalardan uchburchak yasash mumkin?
A) $\emptyset$ B) $(-\frac{2}{3};0)$ C) $(0;\frac{2}{3})$ D) $(-\frac{1}{2};0)$
E) $(-\frac{1}{2};1)$

5. (96-11-18) Uchburchakning birinchi tomoni $x(x>7)$ sm, ikkinchi tomoni undan 4 sm qisqa, uchunchi tomoni esa birinchisidan 3 sm uzun. Shu uchburchakning perimetrini toping.
A) $3x-1$ B) $3x+4$ C) $3x-3$
D) $3x+7$ E) $3x-4$

6. (96-12-18) Uchburchakning birinchi tomoni $x(x>5)$ sm, ikkinchi tomoni undan 2 sm qisqa, uchunchi tomoni esa birinchisidan 3 sm uzun. Shu uchburchakning perimetrini toping.
A) $(3x-1)$ sm B) $(3x+2)$ sm C) $(3x-2)$ sm
D) $(3x+3)$ sm E) $(3x+1)$sm

7. (96-12-99) a parametrining qanday qiymatlarida uzunliklari mos ravishda $1+4a, 1-a$ va $2a$ ga teng bo'lgan kesmalardan uchburchak yasash mumkin?
A) $(-\frac{1}{2};0)$ B) $(0;1)$ C) $\emptyset$
D) $(-\frac{1}{2};0)$ E) $(-\frac{2}{3};0)$

8. (96-13-39) a ning qanday qiymatlarida uzunliklari mos ravishda $1+a, 1-a$ va $1,5$ bo'lgan kesmalardan uchburchak yasash mumkin?
A) $(-0,75;0,75)$ B) $(-0,5;0,5)$ C) $\emptyset$
D) $(-0,7;0,7)$ E) $(-0,4;0,4)$

9. (97-3-37) Perimetri 30 bo'lgan uchburchakning bissektrisasi uni perimetrlari 16 va 24 bo'lgan ikkita uchburchakka ajratadi. Berilgan uchburchakning bissektrisasini toping.
A) 6 B) 8 C) 10 D) 7 E) 5

10. (97-10-37) Uchburchakning 5 ga teng bo'lgan balandligi uni perometrlari 18 va 26 bo'lgan ikkita uchburchakka ajratadi. Berilgan uchburchakning perimetrini toping.
A) 29 B) 31 C) 34 D) 36 E) 39

11. (98-7-45) Uchburchakning tomonlari o'rtalarini tutashtirib, perimetri 65 ga teng bo'lgan uchburchak hosil qilindi. Berilgan uchburchakning perimetrini toping.
A) $32,5$ B) 260 C) 75 D) 195 E) 130

12. (00-8-66) Agar uchburchakning tomonlari turli butun sonlar bo'lib, uning perimetri 15 ga teng bo'lsa, tomonlarini aniqlang.
A) $3;5;7$ B) $4;4;7$ C) $4;5;6$ D) $3,4,8$ E) $3;5;7$ yoki $4;5;6$

13. (00-8-23) Teng yonli uchburchakning perimetri 10 ga teng, y on tomoni asosidan 12 marta uzun. Uchburchakning asosi qanchaga teng?
A) $0,4$ B) $0,8$ C) $0,5$ D) $0,6$ E) $0,7$

14. (01-2-42) ABC teng yonli uchburchakda $AB=BC$, $AB-AC=3$dm, perimetri 18 dm. $AB+AC$ necha dm bo'ladi?
A) 15 B) 7 C) 13 D) 9 E) 11

15. (99-4-35) ABC uchburchakning BC tomoniga AD to'g'ri chiziq shunday tushirilganki, $\angle CAD=\angle ACD$. ABC va ABD uchburchaklarning perimetrlari mos ravishda 37 va 24 ga teng. AC tomonning uzunligini toping.
A) $6,5$ B) 13 C) 10 D) 7 E) 5

16. (97-7-64) Uchburchakning ikkita tomoni $0,8$ va $1,9$ ga teng. Uchinchi tomonning uzunligi butun son ekanligini bilgan holda shu tomonni toping.
A) 1 B) 2 C) 3 D) 4 E) bunday tomon mavjud emas

17. (97-9-57) Uchburchakning ikkita tomoni $0,5$ va $7,9$ ga teng. Uchinchi tomonning uzunligi butun son ekanligini bilgan holda shu tomonini toping.
A) 8 B) 7 C) 6 D) 5 E) 4

18. (98-4-42) Uzunligi $1;3;5;7;9$ ga teng bo'lgan kesmalar berilgan. Bu kesmalardan tomonlari har xil bo'lgan nechta turli uchburchak yasash mumkin?
A) 4 B) 3 C) 5 D) 2 E) 6

19. (00-5-54) Teng yonli ABC uchburchakda A va C burchaklar teng. $AB:AC=5:3$ va $AB-AC=3$ ga teng. Uchburchakning perimetrini toping.
A) $19,5$ B) $18,5$ C) $17,5$ D) 16 E) 15

20. (03-5-25) Uchburchakning tomonlari $9;15$ va x ga teng. Uchburchakning yarim perimetri qaysi oraliqqa tegishli bo'ladi?
A) $(15;24)$ B) $(6;28)$ C) $(9;15)$ D) $30;48$
E) $(18;30)$

21. (03-6-75) Uchburchakning balandligi 4 ga teng. Bu balandlik uchburchakni perimetrlari mos ravishda 16 va 23 ga teng bo'lgan ikkita uchburchakka ajratadi. Berilgan uchburchakning perimetrini toping.
A) 31 B) 30 C) 28 D) 32 E) 34

22. (03-10-57) Tomonlari $20,20$ va 30 m bo'lgan uchburchak shaklidagi maydonning atrofini o'rash uchun ustunlar o'rnatildi. Agar ustunlar orasidagi masofa 5 m dan bo'lsa, nechta ustun kerak bo'ladi?
A) 15 B) 14 C) 16 D) 13 E) 18

3.3.2 Uchburchak burchaklari.

1. Uchburchak burchaklarining yig'indisi 180^0 ga teng.

(99-6-3) Uchburchak burchaklarining kattaliklari $2;3$ va 10 sonlariga proporsional. Uchburchakning burchaklarini toping.
A) $24^0;36^0;120^0$ B) $20^0;46^0;120^0$ C) $10^0;50^0;120^0$
D) $30^0;40^0;110^0$ E) $60^0;90^0;10^0$

Yechish: Uchburchak burchaklari $2;3$ va 10 sonlariga proporsional bo'lgani uchun bu burchaklarni $2x, 3x$, $10x$ ko'rinishda yozish mumkin. Uchburchak ichki burchaklar yig'indisi 180^0 ga teng bo'lgani uchun $2x+3x+10x=180^0$ bo'ladi. Bu yerdan $15x=180^0$ va $x=12^0$ ekani kelib chiqadi. Uchburchakning burchaklari $2x=24^0$, $3x=36^0$, $10x=120^0$ ekan. J: (A).

1. (96-3-55) Uchburchak ikkita burchagi yig'indisining kosinusi $\frac{1}{3}$ ga teng. Uchinchi burchagining kosinusini toping.
A) $\frac{2}{3}$ B) $\frac{1}{3}$ C) $\frac{\pi}{3}$ D) $-\frac{2}{3}$ E) $-\frac{1}{3}$

2. (96-6-18) ABC uchburchakda A uchdagi tashqi burchagi 120^0 ga, C uchidagi ichki burchak 80^0 ga teng. B uchdagi tashqi burchakni toping.
A) 160^0 B) 150^0 C) 130^0 D) 120^0 E) 140^0

3. (96-7-36) Uchburchakning ikkita burchagi qiymatlarining nisbati $1:2$ kabi. Uchinchi burchagi shu burchaklarning kichigidan 40^0 ga katta. Uchburchakning katta burchagini toping.
A) 102^0 B) 93^0 C) 75^0 D) 80^0 E) 105^0

4. (96-11-57) Uchburchak ikkita burchagi yig'indisining kosinusi $\frac{1}{4}$ ga teng. Uchinchi burchagining kosinusini toping.
A) $-\frac{1}{4}$ B) $\frac{1}{4}$ C) $\frac{\pi}{4}$ D) $-\frac{2}{3}$ E) $-\frac{1}{3}$

5. (96-12-35) Uchburchak ikkita burchagi yig'indisining kosinusi $\frac{1}{2}$ ga teng. Uchinchi burchagining kosinusini toping.
A) $\frac{2}{3}$ B) $\frac{1}{3}$ C) $-\frac{1}{2}$ D) $\frac{1}{2}$ E) $-\frac{1}{3}$

6. (97-3-36) Uchburchak ikkita burchagining qiymatlari nisbati $3:4$ kabi, uchinchisiniki esa shu burchaklarning kattasidan 4^0 ga katta. Uchburchakning katta burchagini toping.
A) 84^0 B) 68^0 C) 96^0 D) 64^0 E) 72^0

7. (97-4-46) Uchburchak ikki burchagi yig'indisining sinusi $\frac{1}{3}$ bo'lsa, uchinchi burchagining sinusi qanchaga teng bo'ladi?
A) $\frac{2}{3}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{3}{4}$ E) $\frac{1}{2}$

8. (97-5-43) Agar uchburchakning A, B va C burchaklari $1; 2$ va 3 sonlariga proporsional bo'lsa, B burchakni toping.
A) 30^0 B) 60^0 C) 90^0 D) 45^0 E) 120^0

9. (97-7-36) Uchburchak ikkita burchagining qiymatlari nisbati $5:9$ kabi, uchinchi burchagi shu burchaklarning kichigidan 10^0 ga kichik. Uchburchakning eng kichik burchagini toping.
A) 30^0 B) 40^0 C) 45^0 D) 50^0 E) 20^0

10. (97-9-43) Agar uchburchakning burchaklari $5; 6$ va 7 sonlariga proporsional bo'lsa, uchburchakning katta burchagini toping.
A) 75^0 B) 80^0 C) 50^0 D) 40^0 E) 70^0

11. (97-9-106) Uchburchak ikki burchagi yig'indisining kotangensi $\frac{1}{6}$ bo'lsa, uchinchi burchagining kotangensini toping.
A) $\frac{1}{6}$ B) $\frac{1}{4}$ C) $\frac{1}{5}$ D) $-\frac{1}{6}$ E) $-\frac{1}{4}$

12. (97-10-36) Uchburchak ikkita burchagining kattaliklari nisbati $3:2$ ga teng. Uchinchi burchagi shu burchaklarning kattasidan 60^0 ga kichik. Uchburchakning kichik burchagini toping.
A) 50^0 B) 45^0 C) 40^0 D) 30^0 E) 15^0

13. (98-2-45) Uchburchakning ikkita tashqi burchagi yig'indisi 240^0 ga teng. Uning shu burchaklarga qo'shni bo'lmagan ichki burchagini toping.
A) 30^0 B) 45^0 C) 90^0 D) 75^0 E) 60^0

14. (99-4-38) ABC uchburchakning B burchagi to'g'ri burchak; N nuqta esa A va C burchaklar bissektrisalarining kesishish nuqtasi. ANC burchakning qiymatini toping.
A) 120^0 B) 150^0 C) 110^0 D) 135^0 E) 145^0

15. (00-2-39) ABC uchburchakda $\angle A = 60^0$ va $AB > BC$ bo'lsa, $\angle B$ ning mumkin bo'lgan x qiymatlari qaysi javobda ko'rsatilgan?
A) $0^0 < x < 60^0$ B) $30^0 < x < 60^0$
C) $0^0 < x < 30^0$ D) $60^0 < x < 120^0$
E) $60^0 < x < 90^0$

16. (00-3-73) Uchburchakning 108^0 li tashqi burchagiga qo'shni bo'lmagan ichki burchaklarining nisbati $5:4$ kabi. Shu ichki burchaklarning kichigini toping.
A) 45^0 B) 40^0 C) 72^0 D) 48^0 E) 30^0

17. (00-6-34) Uchburchakning ikkita tashqi burchaklari 120^0 va 160^0 ga teng. Uning uchinchi tashqi burchagini toping.
A) 100^0 B) 80^0 C) 90^0 D) 70^0 E) 60^0

18. (00-8-62) Agar A, B va C lar uchburchakning burchaklari bo'lsa, $\sin\frac{A+B}{2}$ nimaga teng?
A) $\sin\frac{C}{2}$ B) $\cos\frac{C}{2}$ C) - $\sin\frac{C}{2}$
D) $\sin C$ E) $\cos C$

19. (97-1-28) Teng yonli uchburchakning yon tomoniga tushirilgan balandligi bilan ikkinchi yon tomon orasidagi burchak 20^0 ga teng. Teng yonli uchburchakning asosidagi burchagini toping.
A) 50^0 B) 48^0 C) 55^0 D) 58^0 E) 65^0

20. (97-2-18) Teng yonli uchburchakning uchidagi tashqi burchagi o'sha uchdagi ichki burchagidan 4 marta katta. Uchburchakning asosidagi tashqi burchagi necha gradus?
A) 100^0 B) 102^0 C) 96^0 D) 108^0 E) 104^0

21. (97-6-28) Teng yonli uchburchakning uchidagi burchagi 94^0. Asosidagi burchaklarining bissektrisalari kesishishidan hosil bo'lgan o'tkir burchakni toping.
A) 37^0 B) 43^0 C) 48^0
D) 47^0 E) aniqlab bo'lmaydi

22. (97-8-18) Teng yonli uchburchakning uchidagi burchagi 80^0 ga teng. Yon tomoniga o'tkazilgan balandlik va asosi orasidagi burchakni toping.
A) 35^0 B) 45^0 C) 30^0 D) 40^0 E) 50^0

23. (98-11-81) Teng yonli uchburchakning asosidagi burchagi 40^0 ga teng. Bu uchburchakning yon tomonlari orasidagi burchakka qo'shni bo'lgan tashqi burchagining qiymatini toping.
A) 90^0 B) 100^0 C) 140^0 D) 50^0 E) 80^0

24. (99-4-37) Teng yonli uchburchakning uchidagi burchagi 30^0ga teng. Uning yon tomoniga tushirilgan balandligi bilan asosi orasidagi burchakni toping.
A) 75^0 B) 15^0 C) 20^0 D) 45^0 E) 65^0

25. (00-6-36) Teng yonli uchburchakning asosidagi burchagi 30^0 ga teng. Shu uchburchakning yon tomoni va ikkinchi yon tomoniga tushirilgan balandligi orasidagi burchakni toping.
A) 75^0 B) 60^0 C) 45^0 D) 40^0 E) 30^0

26. (00-6-37) Teng yonli ABC uchburchakda AC-asos, CD - C burchakning bissektrisasi va $\angle ADC = 150^0$ ga teng bo'lsa, burchak B ning kattaligini toping.
A) 140^0 B) 120^0 C) 110^0 D) 80^0 E) 60^0

27. (00-5-52) Uchburchak o'tkir burchakli bo'lishi uchun uning $\alpha; \beta$ va γ burchaklari orasida qanday munosabatlar o'rinli bo'lishi kerak?
A) $\gamma \geq \alpha + \beta$ B) $\gamma \leq \alpha + \beta$ C) $\beta < \alpha + \gamma$
D) $\gamma < \alpha + \beta$ E) $\alpha < \beta + \gamma, \quad \beta < \alpha + \gamma, \gamma < \beta + \alpha$

28. (01-2-39) Uchburchakning burchaklari arifmetik prograssiyani tashkil etadi. Agar uchburchakning eng kichik burchagi 20^0 bo'lsa, eng katta burchagini toping.
A) 90^0 B) 95^0 C) 100^0 D) 105^0 E) 110^0

29. (01-6-52) Teng yonli uchburchakning asosidagi tashqi burchagi, unga qo'shni burchakdan 40^0 ga katta. Teng yonli uchburchakning uchidagi burchagini toping.
A) 30^0 B) 40^0 C) 42^0 D) 36^0 E) 38^0

30. (01-7-54) Teng yonli uchburchakning ichki burchaklari va uchidagi tashqi burchagi yig'indisi $\frac{21}{16}\pi$ ga teng. Uchburchakning teng burchaklari yig'indisini toping.
A) $\frac{11}{16}\pi$ B) $\frac{9}{16}\pi$ C) $\frac{\pi}{3}\pi$ D) $\frac{3}{8}\pi$ E) $\frac{5}{16}\pi$

31. (01-8-36) Uchburchakning tashqi burchaklaridan biri 120^0 shu burchakka qo'shni bo'lmagan ichki burchaklarining ayirmasi 30^0 ga teng. Uchburchakning ichki burchaklaridan kattasini toping.
A) 75^0 B) 70^0 C) 90^0 D) 85^0 E) 80^0

32. (01-8-38) ABC uchburchakning B va C burchaklari bissektrisalari 128^0 burchak ostida kesishadi. A burchakning qiymatini toping.
A) 104^0 B) 76^0 C) 72^0 D) 66^0 E) 52^0

33. (02-4-45) Teng yonli uchburchakning asosidagi burchak uning uchidagi burchakning 75% iga teng. Uchburchakning uchidagi burchagini toping.
A) 90^0 B) 120^0 C) 135^0 D) 72^0
E) To'g'ri javob keltirilmagan

34. (02-5-48) Teng yonli uchburchakning uchidagi burchagi 40^0 ga teng. Asosidagi burchakning bissektrisasi va shu burchakka qarama-qarshi tomon orasidagi burchakni toping.
A) 60^0 B) 75^0 C) 85^0 D) 65^0 E) 50^0

35. (02-8-23) ABC uchburchakda A va B burchaklari bissektrisalari kesishishidan hosil bo'lgan kichik burchak 40^0 ga teng. Uchburchakning C burchagini toping.
A) 100^0 B) 90^0 C) 80^0 D) 120^0 E) 70^0

36. (02-9-48) AN ABC uchburchakning bissektrisasi. Agar $AB = AN$ va $\angle C = 30^0$ bo'lsa, B burchak necha garadusga teng?
A) 40^0 B) 50^0 C) 60^0 D) 70^0 E) 80^0

37. (03-2-45) Uchburchakning ikkita burchagi yig'indisi 70^0 ga teng. Shu burchaklarning bissektrisalari kesishishidan hosil bo'lgan burchaklardan kichigi necha gradusga teng.
A) 50^0 B) 45^0 C) 40^0 D) 35^0 E) 25^0

38. (03-3-56) Teng yonli uchburchakning asosidagi burchagi 30^0 ga teng. Shu uchburchakning yon tomonlaridan biri va ikkinchi yon tomonga tushirilgan balandligi orasidagi burchakni toping.
A) 50^0 B) 120^0 C) 60^0 D) 45^0 E) 30^0

39. (03-6-72) Teng yonli uchburchakning uchidagi tashqi burchagi o'sha uchidagi ichki burchagidan 4 marta katta. Uchburchakning asosidagi tashqi burchagi necha gradus?
A) 108^0 B) 110^0 C) 98^0 D) 102^0 E) 112^0

3.3.3 To'g'ri burchakli uchburchak.

Pifagor teoremasi.
c-gipotenuza, a,b-katetlar bo'lsin.

1. $c^2 = a^2 + b^2$ ga teng.

2. Gipotenuzaga tushirilgan mediana uning yarmiga teng. $m_c = \frac{c}{2}$

1. (96-10-43) To'g'ri burchakli uchburchak katetlaridan biri 12 sm, gipotenuza esa ikkinchi katetdan 6 sm uzun. Gipotenuzaning uzunligini toping.
A) 15 B) 25 C) 26 D) 18 E) 32

2. (96-1-40) To'g'ri burchakli uchburchakning gipotenuzasi 25 sm, katetlari esa o'zaro 3 : 4 nisbatda. Shu uchburchakning kichik katetini toping.
A) 10 B) 12 C) 9 D) 15 E) 20

3. (96-9-91) To'g'ri burchakli uchburchak katetlaridan biri 12 sm, ikkinchisi esa gipotenuzadan 8 sm qisqa. Shu uchburchak gipotenuzasini toping.
A) 15 B) 16 C) 25 D) 13 E) 29

4. (97-1-33) Uchburchak burchaklarining kattaliklari nisbati 1 : 1 : 2 kabi, katta tomonining uzunligi esa 13 ga teng. Uchburchakning katta tomoniga tushirilgan balandligini toping.
A) $6,5$ B) 12 C) 8 D) 5 E) 10

5. (97-4-45) To'g'ri burchakli uchburchak gipotenuzasining shu gipotenuzaga tushirilgan medianaga nisbatini toping.
A) 3 B) 4 C) 2,5 D) 2 E) 1,5

6. (00-1-55) Agar $m > n > 0$ bo'lib, $a = m^2 + n^2$; $b = m^2 - n^2$ va $c = 2mn$ uchburchak tomonlarining uzunliklari bo'lsa, quyidagi tasdiqlardan qaysi biri to'g'ri?
   A) uchburchak o'tkir burchakli
   B) uchburchak o'tmas burchakli
   C) uchburchak to'g'ri burchakli
   D) asosidagi burchaklari 45^0 ga teng bo'lmagan teng yonli uchburchak
   E) muntazam uchburchak

7. (97-11-33) Burchaklarining kattaliklari nisbati 9 : 5 : 4 kabi bo'lgan uchburchakning katta tomoniga tushirilgan medianasi $12,5$ ga teng. Uchburchakning katta tomonini toping.
   A) 20 B) 16 C) 25 D) 32 E) 26

8. (00-7-42) ABC uchburchakning C uchidagi tashqi burchagi 90^0 ga teng. Agar $CA = 12$ va $CB = 5$ bo'lsa, AB tomonga tushirilgan CD mediananing uzunligini toping.
   A) 6 B) $6,5$ C) 5 D) $5,5$ E) 7

9. (96-6-30) Tomonlari 10; 8 va 6 bo'lgan uchburchakning katta tomoniga o'tkazilgan medianasini toping.
   A) 7 B) 6 C) 3 D) 4 E) 5

10. (02-4-49) Uchburchakning burchaklari 1 : 2 : 3 kabi nisbatda. Uchburchak katta tomonining kichik tomoniga nisbatini toping.
    A) 1 B) 2 C) 3 D) 4 E) 5

11. (02-8-31) ABC to'g'ri burchakli uchburchakda AB gipotenuza. AM va BN bissektrisalar. Agar $AB = 12$ va $AM^2 + BN^2 = 169$ bo'lsa, MN ning uzunligini toping.
    A) 5 B) $2,5$ C) $\sqrt{28}$ D) 6 E) 4

12. (03-11-33) To'g'ri burchakli uchburchakda o'tkir burchaklarining medianalari uzunliklari 15 va $6\sqrt{5}$ ga teng. Gipotenuza uzunligini toping.
    A) 18 B) 16 C) 20 D) 21 E) 19

Katetlarning gipotenuzadagi proyeksiyalari.

1. $a^2 = xc$ (x kesma $-a$ katetning c dagi proyeksiyasi).
   $b^2 = yc$ (y kesma $-b$ katetning c dagi proyeksiyasi).
   Shuning uchun $\frac{x}{y} = \frac{a^2}{b^2}$

2. $h^2 = xy$;

(97-6-32) To'g'ri burchakli uchburchakning kateti 7 ga, uning gipotenuzaga proyeksiyasi $1,96$ ga teng. Ikkinchi katetning uzunligini toping.
A) 12 B) 16 C) 24 D) 15 E) 26
Yechish: a katetning c gipotenuzadagi proyeksiyasi x ga teng bo'lsa. $c \cdot x = a^2$ formula o'rinli. Shuning uchun $c \cdot 1,96 = 7^2$, ya'ni $c = \frac{49}{1,96} = 25$. U holda ikkinchi katet $b = \sqrt{25^2 - 7^2} = 24$ ga teng. J: 24 (C).

1. (96-7-45) To'g'ri burchakli uchburchakning katetlari 5 : 6 kabi nisbatda, gipotenuzasi esa 122 ga teng. Gipotenuzaning balandlik ajratgan kesmalarini toping.
   A) 45 va 77 B) 42 va 80 C) 50 va 72
   D) 32 va 90 E) 60 va 62

2. (96-9-34) To'g'ri burchakli uchburchakning bir kateti 10 sm ga, gipotenuzaga tushirilgan balandligi 6 sm ga teng. Uning ikkinchi katetini toping.
   A) 9 B) 7 C) $6,5$ D) $7,5$ E) 8

3. (96-12-94) To'g'ri burchakli uchburchakning bir kateti 5 ga, gipotenuzaga tushirilgan balandligi 3 ga teng. Uning ikkinchi katetini toping.
   A) $3,5$ B) $3,75$ C) 4 D) $3,8$ E) $3,9$

4. (97-1-32) To'g'ri burchakli uchburchakning katetlari 15 va 20 ga teng. Katta katetning gipotenuzadagi proyeksiyasini toping.
   A) 12 B) $14,5$ C) 16 D) $16,5$ E) 18

5. (97-2-26) To'g'ri burchakli uchburchakning gipotenuzasi 10 ga teng, bir kateti 6 ga teng. Bu katetning gipotenuzadagi proyeksiyasini toping.
   A) 4 B) $3,6$ C) $4,2$ D) $3,4$ E) $3,8$

6. (97-3-45) Katetlarining nisbati 3 : 2 kabi bo'lgan to'g'ri burchakli uchburchakning balandligi gipotenuzasini uzunliklaridan biri ikkinchisidan 6 ga ko'p bo'lgan ikki qismga ajratadi. Berilgan uchburchakning gipotenuzasini toping.
   A) $5,2$ B) $4,8$ C) 6 D) 8 E) $7,6$

7. (97-7-45) Gipotenuzasi 50 ga teng bo'lgan to'g'ri burchakli uchburchakning katetlari nisbati 4 : 3 ga teng. Gipotenuzaga tushirilgan balandlik uni qanday kesmalarga ajratadi?
   A) 20 va 30 B) 15 va 35 C) 18 va 32
   D) 12 va 38 E) 14 va 36

8. (97-10-45) Katetlarining nisbati 2 : 3 bo'lgan to'g'ri burchakli uchburchak balandligi gipotenuzasini uzunliklaridan biri ikkinchisidan 2 ga kam bo'lgan bo'laklarga ajratadi. Gipotenuzaning bo'laklarini toping.
   A) 2 va 4 B) 5 va 3 C) $0,9$ va $3,9$
   D) $1,6$ va $3,6$ E) $2,8$ va $4,8$

9. (97-11-32) To'g'ri burchakli uchburchakning katetlari 24 va 7 ga teng. Kichik katetning gipotenuzadagi proyeksiyasini toping.
   A) $3\frac{2}{7}$ B) 5 C) $2\frac{4}{25}$ D) $1\frac{24}{25}$ E) 3

10. (98-1-38) To'g'ri burchakli uchburchakning gipotenuzasi 25 ga, katetlaridan biri 10 ga teng. Ikkinchi katetning gipotenuzadagi proyeksiyasini toping.
    A) 14 B) $15,5$ C) 18 D) $20,4$ E) 21

11. (98-3-36) To'g'ri burchakli uchburchakning gipotenuzasi 5 ga, bir katetning gipotenuzadagi proyeksiyasi $1,6$ ga teng. Ikkinchi katetning kvadratini toping.
    A) 14 B) 16 C) 17 D) 18 E) 15

12. (98-5-34) To'g'ri burchakli uchburchakning gipotenuzasi 6 ga, katetlaridan biri 4 ga teng. Shu katetning gipotenuzadagi proyeksiyasini toping.
A) 3 B) $2\frac{1}{3}$ C) $2\frac{2}{5}$ D) $2\frac{2}{3}$ E) $2,5$

13. (98-6-34) To'g'ri burchakli uchburchakning balandligi gepotenuzani2 va 18 ga teng bo'lgan kesmalarga ajratadi. Shu balandlikni toping.
A) 4 B) 5 C) 12 D) $6\sqrt{2}$ E) 6

14. (98-7-46) To'g'ri burchakli uchburchakning gipotenuzasi 13 ga, katetlaridan biri $\sqrt{52}$ ga teng. Gipotenuzaga tushirilgan balandlikning uzunligini toping.
A) 5 B) 6 C) 7 D) 4 E) 9

15. (98-8-38) To'g'ri burchakli uchburchakning katetlari 9 va 12 ga teng. Kichik katetning gipotenuzadagi proyeksiyasini toping.
A) 6 B) $5\frac{2}{3}$ C) $5,4$ D) $4,8$ E) $6\frac{1}{3}$

16. (98-10-83) To'g'ri burchakli uchburchakning gipotenuzasiga tushirilgan balandligi undan 3 va 12 ga teng kesmalar ajratadi. Bu balandlikni toping.
A) $5,5$ B) $5\frac{5}{6}$ C) $5\frac{1}{6}$ D) 6 E) $6\frac{1}{6}$

17. (98-12-46) To'g'ri burchakli uchburchakning gipotenuzasi 13 ga, gipotenuzaga tushirilgan balandligi 6 ga teng. Katta katetning gipotenuzadagi proyeksiyasini toping.
A) 9 B) 4 C) 5 D) 25 E) 7

18. (99-7-34) To'g'ri burchakli uchburchakning gipotenuzasi 8 ga, katetlaridan biri 4 ga teng. Ikkinchi katetning gipotenuzadagi proyeksiyasini toping.
A) 4 B) 3 C) 5 D) 7 E) 6

19. (02-3-53) To'g'ri burchakli uchburchakda to'g'ri burchak uchidan gipotenuzaga tushirilgan balandlik ham, katetlarning gipotenuzadagi proyeksiyalari ayirmasi ham 6 ga teng. Gipotenuzaning uzunligini toping.
A) $6\sqrt{5}$ B) $10\sqrt{3}$ C) $2\sqrt{10}$ D) $3\sqrt{10}$ E) 12

Burchak sinusi, kosinusi, tangensi va kotangensi.

1. $\sin\alpha = \frac{\text{qarshisidagi katet}}{\text{gipotenuza}}$

2. $\cos\alpha = \frac{\text{yonidagi katet}}{\text{gipotenuza}}$

3. $tg\alpha = \frac{\text{qarshisidagi katet}}{\text{yonidagi katet}}$

4. $ctg\alpha = \frac{\text{yonidagi katet}}{\text{qarshisidagi katet}}$

1. (97-5-49) To'g'ri burchakli uchburchakning kateti 2 ga bu katet qarshisidagi burchak 60^0 ga teng. Shu uchburchakning gipotenuzasini toping.
A) 4 B) $\frac{4\sqrt{3}}{3}$ C) $2\sqrt{3}$ D) $\sqrt{3}$ E) $\frac{\sqrt{3}}{2}$

2. (97-9-49) To'g'ri burchakli uchburchakning bitta kateti 2 ga, bu katet qarshisidagi burchak 60^0 ga teng. Ikkinchi katetni toping.
A) $\sqrt{3}$ B) $2\sqrt{2}$ C) $2\frac{\sqrt{3}}{2}$ D) $\frac{\sqrt{2}}{2}$ E) $\frac{\sqrt{3}}{2}$

3. (97-1-69) Kichik tomoni $2\sqrt{3}$ ga teng bo'lgan uchburchakning burchaklari $1:2:3$ kabi nisbatda bo'lsa, uchburchakning perimetrini toping.
A) $8+3\sqrt{3}$ B) $3(2+\sqrt{3})$ C) $11\sqrt{3}$
D) $9+4\sqrt{3}$ E) $6+6\sqrt{3}$

4. (97-6-33) Uchburchak burchaklarining kattaliklari nisbati $2:3:1$ kabi, kichik tomonining uzunligi esa 5 ga teng. Uchburchakning katta tomoni uzunligini toping.
A) 13 B) 25 C) 10 D) $5\sqrt{2}$ E) $12\sqrt{3}$

5. (97-6-73) Uchburchakning burchaklari qiymatlari $1:2:3$ kabi nisbatda, katta tomoni $4\sqrt{3}$ ga teng. Uchburchakning perimetrini toping.
A) $8+3\sqrt{3}$ B) $3(2+\sqrt{3})$ C) $11\sqrt{3}$
D) $9+4\sqrt{3}$ E) $6+6\sqrt{3}$

6. (98-11-82) To'g'ri burchakli uchburchakning o'tkir burchagi 60^0 ga, gipotenuzasiga tushirilgan balandligi 9 ga teng. Berilgan uchburchakning gipotenuzasini toping.
A) $12\sqrt{3}$ B) $12\sqrt{2}$ C) 12 D) $9\sqrt{3}$ E) $6\sqrt{3}$

7. (99-1-31) Uchburchak ABC da B burchak 90^0 ga, C burchak 60^0 ga, BB_1 balandlik 2 ga teng. AB ni toping.
A) 4 B) 2 C) $2\sqrt{3}$ D) $2\sqrt{2}$ E) $4:\sqrt{3}$

8. (97-4-47) ABC uchburchakda AD mediana AB va AC tomonlar bilan mos ravishda 30^0 va 60^0 li burchak hosil qiladi. Agar $AB=\sqrt{3}$ bo'lsa, AC ni toping.
A) 1 B) $\sqrt{3}/2$ C) $\sqrt{3}/3$ D) $1\frac{1}{2}$ E) $1\frac{1}{3}$

9. (98-10-28) To'g'ri burchakli uchburchakning burchaklaridan biri 60^0 ga, gipotenuzaga tushirilgan medianasi 15 ga teng. Kichik katetning uzunligini toping.
A) $7,5$ B) $10,5$ C) 15 D) 12 E) 20

10. (03-5-53) ABC to'g'ri burchakli uchburchakda gipotenuzaga CD balandlik o'tkazilgan. Agar $\angle B = 60^0$ va $BD=2$ bo'lsa, gipotenuzaning uzunligini toping.
A) 8 B) 9 C) 6 D) 7 E) 10

3.3.4 Kosinuslar va sinuslar teoremalari.

1. $a^2 = b^2 + c^2 - 2bccos\alpha$;

2. $\frac{a}{sin\alpha} = \frac{b}{sin\beta} = \frac{c}{sin\gamma}$

(98-5-33) Uchburchakning tomonlari 3; 5 va 6 ga teng. 5 ga teng bo'lgan tomon qarshisidagi burchakning kosinusini toping.
A) $-\frac{1}{2}$ B) $\frac{5}{18}$ C) $\frac{5}{9}$ D) $\frac{1}{2}$ E) $\frac{4}{9}$

Yechish: Uchburchakning tomonlari a, b, c ga, a tomon qarshisidagi burchagi α ga teng bo'lsa, kosinuslar teoremasiga ko'ra

$$a^2 = b^2 + c^2 - 2bccos\alpha$$

bo'ladi. Berilgan uchburchak uchun bu tenglik $5^2 = 3^2 + 6^2 - 2 \cdot 3 \cdot 6 \cdot cos\alpha$ ko'rinishda bo'ladi. Bu yerdan $36cos\alpha = 20$ tenglikni hosil qilamiz. Bu tenglikdan $cos\alpha = \frac{20}{36} = \frac{5}{9}$ ekanini topamiz. J:$\frac{5}{9}$ (C)

1. (99-7-33) ABC uchburchakda $AB = 3$, $CB = 4$ va $cosB = \frac{2}{3}$ bo'lsa, AC ning qiymatini toping.
A) 2 B) 4 C) 3 D) 6 E) 1

2. (96-6-40) Uchburchakning tomonlari a, b va c ga teng. Bu uchburchakning tomonlari orasida $a^2 = b^2 + c^2 + bc$ munosabat o'rinli bo'lsa, uzunligi a ga teng tomon qarshisidagi burchakni toping.
A) 60^0 B) 150^0 C) 120^0 D) 90^0 E) 135^0

3. (97-2-40) Uchburchak tomonlarining uzunliklari m, n va k, $m^2 = n^2 + k^2 + \sqrt{2}nk$ tenglikni qanoatlantiradi. Uzunligi m ga teng tomon qarshisidagi burchakni toping.
A) 45^0 B) 150^0 C) 120^0 D) 90^0 E) 135^0

4. (97-4-48) ABC muntazam uchburchakning perimetri 3 ga teng. AB va AC tomonlarining davomida $AB_1 = 2AB$ va $AC_1 = 2AC$ shartlarni qanoatlantiruvchi B_1 va C_1 nuqtalar olingan. AB_1C_1 uchburchakning perimetrini toping.
A) 5 B) 6 C) 7 D) 8 E) 9

5. (97-8-39) Uchburchakning a, b va c tomonlari $a^2 = b^2 + c^2 + \sqrt{3} \cdot bc$ tenglikni qanoatlantiradi. Uzunligi a ga teng tomon qarshisidagi burchakni toping.
A) 135^0 B) 140^0 C) 125^0 D) 150^0 E) 120^0

6. (97-12-39) Uchburchakning a, b va c tomonlari orasida $a^2 = b^2 + c^2 - \sqrt{3} \cdot bc$ bog'lanish mavjud. Uzunligi a ga teng bo'lgan tomon qarshisidagi burchakni toping.
A) 60^0 B) 45^0 C) 150^0 D) 135^0 E) 30^0

7. (01-12-29) ABC uchburchakda $\angle A = 105^0$, $\angle C = 45^0$, $BC = \sqrt{2 + \sqrt{3}}$ bo'lsa, AB tomonning uzunligini toping.
A) $\sqrt{3}$ B) 1 C) 2 D) $\sqrt{2}$ E) 3

8. (98-5-35) ABC uchburchakning DE o'rta chizig'i o'tkazilgan. Agar $\angle DEB = 60^0$, $BE = 3$ va $DE = 2$ bo'lsa, AB ni toping.
A) $3\sqrt{7}$ B) 5 C) $2\sqrt{6}$ D) $4\sqrt{2}$ E) $2\sqrt{7}$

9. (98-9-50) Uchburchakning b va c teng tomonlari orasidagi burchagi 30^0 ga teng. Uchburchakning uchunchi tomoni 12 ga teng bo'lsa hamda uning tomonlari $c^2 = b^2 + 12b + 144$ shartni qanoatlantirsa, c ning qiymatini toping.
A) $12\sqrt{2}$ B) $16\sqrt{3}$ C) $16\sqrt{2}$ D) $12\sqrt{3}$ E) $15\sqrt{3}$

10. (98-10-27) Uchburchakning a, b va c tomonlari orasida $a^2 = b^2 + c^2 + bc$ munosabat o'rinli. Uzunligi a ga teng bo'lgan tomon qarshisida yotgan burchakni aniqlang.
A) 60^0 B) 120^0 C) 30^0 D) 150^0 E) 45^0

11. (96-12-95) Uchburchakning tomonlari 2, 3 va 4 ga teng. 3 ga teng tomon qarshisidagi burchakning tangensini toping.
A) $\frac{\sqrt{137}}{11}$ B) $1,1$ C) 2 D) $\frac{\sqrt{135}}{11}$ E) $\frac{\sqrt{15}}{11}$

12. (96-3-95) Uchburchakning tomonlari 2; 3; 4 ga teng. 3 ga teng tomon qarshisidagi burchak sinusini toping.
A) $\frac{\sqrt{135}}{16}$ B) $-\frac{\sqrt{135}}{16}$ C) $\frac{\sqrt{53}}{8}$ D) $-\frac{\sqrt{53}}{8}$ E) $\frac{\sqrt{47}}{8}$

13. (96-13-36) Uchburchakning ikki burchagi 30^0 va 45^0. Agar 30^0 li burchak qarshisidagi tomon $\sqrt{2}$ ga teng bo'lsa, 45^0 li burchak qarshsidagi tomonni toping.
A) $\sqrt{3}$ B) $2,5$ C) 2 D) $\sqrt{5}$ E) $2,6$

14. (98-10-48) ABC uchburchakda $\angle BAC = 45^0$, $\angle ACB = 30^0$, $BC = 14\sqrt{2}$ga teng. AB tomonning uzunligini toping.
A) 12 B) 15 C) 14 D) $12\sqrt{2}$ E) $12\sqrt{3}$

15. (02-11-57) ABC uchburchakda $AB = 4$, $cosB = \frac{1}{3}$ va $sinC = \frac{2}{3}$ bo'lsa, AC tomonning uzunligini toping.
A) $3\sqrt{2}$ B) $4\sqrt{2}$ C) $2\sqrt{3}$ D) $3\sqrt{3}$ E) $4\sqrt{3}$

16. (02-11-58) ABC uchburchakda $AB = 6$, $BC = 7$ va $CA = 8$ bo'lsa, B burchakning sinusini toping.
A) $\frac{2\sqrt{3}}{4}$ B) $\frac{\sqrt{11}}{4}$ C) $\frac{\sqrt{13}}{4}$ D) $\frac{\sqrt{14}}{4}$ E) $\frac{\sqrt{15}}{4}$

17. (03-9-53) ABC uchburchakda $AB = 13$, $BC = 2$ va $sinB = \frac{5}{13}$. Agar B burchak o'tmas burchak bo'lsa, AC tomonning uzunligini toping.
A) $5\sqrt{5}$ B) $\sqrt{193}$ C) $\sqrt{153}$ D) 15 E) $\sqrt{221}$

18. (03-12-81) ABC uchburchakda $AB = 2$, $BC = 3$ va $AC = 4$ bo'lsa, C burchakning sinusini toping.
A) $\frac{\sqrt{13}}{8}$ B) $\frac{\sqrt{15}}{8}$ C) $\frac{\sqrt{14}}{8}$ D) $\frac{\sqrt{19}}{8}$ E) $\frac{\sqrt{17}}{8}$

19. (03-12-82) ABC uchburchakning AK medianasi AC tomon bilan 30^0 burchak tashkil qiladi. Agar $AK = \frac{13\sqrt{2}}{4}$ va $\angle BCA = 45^0$ bo'lsa, BC tomonining uzunligini toping.
A) $4\sqrt{3}$ B) $5\sqrt{2}$ C) $5,5$ D) $\frac{11\sqrt{2}}{3}$ E) $6,5$

3.3.5 Uchburchak balandligining xossalari

1. Uchburchakning balandliklari bir nuqtada kesishadi.

2. Teng yonli uchburchakning asosiga tushirilgan medianasi ham bissektrisa, ham balandlik bo'ladi.

3. Teng tomonli uchburchakning ichidagi ixtiyoriy nuqtadan uning tomonlariga tushirilgan perpendikulyarlar yig'indisi shu uchburchakning balandligiga teng.

1. (96-3-39) Uchburchakning tomonlari 4; 5 va 6 sm. 4 sm li tomonning 6 sm li tomondagi proyeksiyasi necha sm?
A) $1\frac{1}{4}$ B) $1\frac{1}{2}$ C) $2\frac{1}{4}$ D) $2\frac{1}{2}$ E) $3\frac{1}{2}$

2. (96-11-40) Uchburchakning tomonlari 7; 5 va 6 m. 5 m li tomonning 7 m li tomondagi proyeksiyasi necha m?
A) $2\frac{5}{7}$ B) $2\frac{5}{6}$ C) $2\frac{4}{7}$ D) $2\frac{2}{5}$ E) $2\frac{1}{5}$

3. (96-12-41) Uchburchakning tomonlari 4; 5 va 6 m. 5 m li tomonning 6 m li tomondagi proyeksiyasi necha m?
A) $2\frac{1}{5}$ B) $2\frac{1}{3}$ C) $3\frac{1}{2}$ D) $3\frac{3}{4}$ E) $3\frac{1}{4}$

4. (97-5-45) Teng yonli uchburchakning balandligi 4 ga, asosi 6 ga teng. Uning yon tomonini toping.
A) $5,5$ B) 7 C) 5 D) 9 E) $4,5$

5. (97-6-29) Balandligi 6 ga teng bo'lgan, teng yonli uchburchakning asosi yon tomonidan 6 ga ortiq. Uchburchakning asosini toping.
A) 16 B) 15 C) 18 D) 24 E) 20

6. (97-6-34) Teng yonli uchburchakning uchidagi burchagi β ga, asosiga tushirilgan balandligi m ga teng. Uchburchakning yon tomoniga tushirilgan balandligini aniqlang.
A) $2msin\frac{\beta}{2}$ B) $mcos\frac{\beta}{2}$ C) $2mcos\beta$ D) $mtg\beta$ E) $msin\frac{\beta}{2}$

7. (97-9-45) Teng yonli uchburchakning asosi 48 ga, unga tushirilgan balandligi 7 ga teng. Uchburchakning yon tomonini toping.
A) 25 B) 27 C) 18 D) 19 E) 15

8. (97-11-29) Teng yonli uchburchakning yon tomoni 25 ga teng. Asosiga tushirilgan balandligi asosidan 25 ga kam. Shu uchburchakning asosini toping.
A) 44 B) 30 C) 35 D) 40 E) 48

9. (97-11-34) Teng yonli uchburchakning asosi a ga, uchidagi burchagi α ga teng. Uchburchakning yon tomoniga tushirilgan balandligini toping.
A) $\frac{a}{2sin\frac{\alpha}{2}}$ B) $\frac{a\cdot cos\frac{\alpha}{2}}{2}$ C) $a\cdot sin\frac{\alpha}{2}$
D) $\frac{a\cdot tg\frac{\alpha}{2}}{2}$ E) $a\cdot cos\frac{\alpha}{2}$

10. (97-1-29) Teng yonli uchburchakning balandligi 15 ga teng. Yon tomoni asosidan 15 ga kam. Shu uchburchakning asosini toping.
A) 20 B) 40 C) 30 D) 24 E) 32

11. (97-1-34) Teng yonli uchburchakning uchidagi burchagi β ga, yon tomoniga tushirilgan balandligi h ga teng. Uchburchakning asosini toping.
A) $\frac{h}{sin(\beta/2)}$ B) $\frac{h}{2sin(\beta)}$ C) $\frac{2h}{cos(\beta/2)}$ D) $\frac{h}{tg(\beta)}$ E) $\frac{h}{cos(\beta/2)}$

12. (98-12-86) Tomoni $\sqrt{3}$ ga teng bo'lgan muntazam uchburchakning ichidagi ixtiyoriy nuqtadan uning tomonlarigacha bo'lgan masofalar yig'indisi qanchaga teng bo'ladi?
A) 3 B) $1,5$ C) $\frac{3\sqrt{3}}{2}$ D) $\frac{2\sqrt{3}}{3}$
E) nuqtaning vaziyatiga bog'liq

13. (01-1-53) Teng yonli uchburchakning uchidagi burchagi 120^0 ga, shu uchidan tushirilgan balandlik esa 3 ga teng. Yon tomoni va asosining o'rtasini tutashtiruvchi kesmaning uzunligini toping.
A) $1,5$ B) 2 C) 3 D) 4 E) $4,5$

14. (01-5-31) ABC uchburchakda $\angle A = 60^0$, $\angle C = 45^0$, BD AC ga perpendikulyar va $AD = 3$. BC ning qiymatini toping.
A) $3\sqrt{6}$ B) $3\sqrt{3}$ C) $6\sqrt{3}$ D) $\sqrt{6}$ E) $2\sqrt{3}$

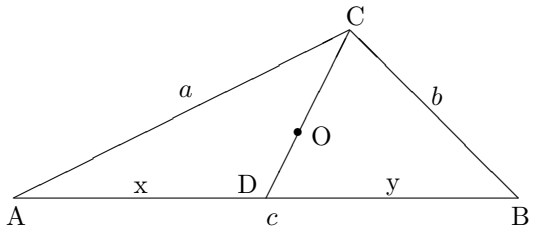
15. (03-5-52) Uchburchakning balandligi 12 ga teng bo'lib, u asosni 5 : 16 nisbatda bo'ladi. Agar asosning uzunligi 21 ga teng bo'lsa, uchburchakning perimetrini toping.
A) 54 B) 52 C) 56 D) 108 E) 48

16. (03-11-42) Teng yonli uchburchakning yon tomoni 5 ga, uchidagi burchakning kosinusi $-\frac{7}{25}$ ga teng bo'lsa, uning yon tomoniga o'tkazilgan balandlikni aniqlang.
A) $4,8$ B) $4,2$ C) 5 D) $4,4$ E) $4,6$

3.3.6 Uchburchak bissektrisasining xossalari.

1. Uchburchakning bissektrisalari bir nuqtada kesishadi.

2. Bissektrisaning c tomondagi kesmalari x, y bo'lsin. U holda $ay = bx$



3. $l_c = \frac{2}{a+b}\sqrt{abp(p-c)}, p = \frac{a+b+c}{2}$

4. $\frac{CO}{OD} = \frac{a+b}{c}$, O-bissektrisalar kesishgan nuqtasi.

1. (97-11-28) Teng yonli uchburchakning yon tomoni $38,6$ ga, asosiga tushirilgan balandligi esa $19,3$ ga teng. Asosidagi burchaklarning bissektrisalari kesishishidan hosil bo'lgan o'tmas burchakni toping.
A) 110^0 B) 120^0 C) 135^0 D) 140^0 E) 150^0

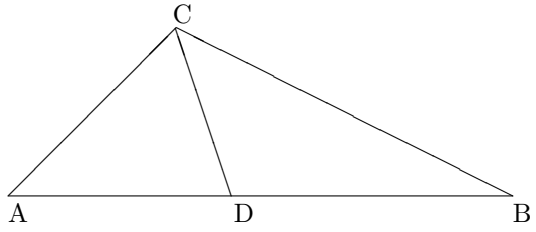
2. (98-3-35) Uchburchakning tomonlari 6, 7 va 8 ga teng. Katta tomoniga bissektrisa o'tkazilgan. Hosil bo'lgan kesmalarning kichigini toping.
A) 3 B) 5 C) $\frac{49}{13}$ D) $\frac{48}{13}$ E) $\frac{47}{13}$

3. (98-10-82) Uchburchakning yon tomonlari 5 va 7 ga teng. Asosiga tushirilgan bissektrisa ajratgan kesmalarning kichigi 3 ga teng bo'lsa, bu kesmalarning kattasini toping.
A) 4 B) $4,1$ C) $4,2$ D) $4,3$ E) $4,4$

4. (99-8-43) Uchburchakning tomonlari 6; 9; 12 ga teng. Eng katta burchak bissektrisasi uchburchakning tomonidan ajratgan kesmalarning kattasini toping.
A) $7,2$ B) $4,8$ C) $6,8$ D) $8,4$ E) $5,6$

5. (00-2-35) Uchburchak ikki tomonining nisbati 2 : 3 kabi. Uchinchi tomonining uzunligi 40 ga teng. Uchinchi tomon qarshisidagi burchak bissektrisasi shu tomondan ajratgan katta qismining uzunligini toping.
A) 25 B) 22 C) 26 D) 28 E) 24

6. (00-10-69) $AC = 5$, $BC = 10$, $BD = 8$ bo'lsa, CD bissektrisani toping.



A) $3\sqrt{2}$ B) $\sqrt{3}$ C) $\sqrt{5}$ D) 2 E) 3

7. (01-1-52) ABC uchburchakning bisektrisasi AC tomonni 28 va 12 ga teng bo'lgan kesmalarga ajratadi. Agar $AB - BC = 18$ bo'lsa, berilgan uchburchakning perimetrini toping.
A) 42 B) 80 C) 85 D) 72 E) 75

8. (01-12-6) Uchburchakning bissektrisasi uning asosini teng ikkiga bo'lsa, yon tomonlar kvadratlari yig'indisi yon tomonlar ko'paytmasidan necha marta ortiq?
A) 1 B) $1,5$ C) 2 D) $2,5$ E) 3

9. (01-4-19) Uchburchakning tomonlari $5; 7$ va 10 ga teng. Katta burchakning bissektrisasi bissektrisalarning kesishgan nuqtasi orqali uchburchakning uchidan boshlab hisoblaganda qanday bisbatda bo'linadi?
A) 2 : 1 B) 3 : 2 C) 4 : 3 D) 6 : 5 E) 5 : 4

10. (02-8-24) Teng yonli to'g'ri burchakli uchburchakning o'tkir burchagi bissektrisasi qarshisidagi katetni to'g'ri burchak uchidan hisoblaganda qanday nisbatda bo'ladi?
A) $\sqrt{2} : 2$ B) 1 : 2 C) 2 : 1 D) $\sqrt{2} : 1$ E) 2 : 3

11. (97-9-54) To'g'ri burchakli uchburchak to'g'ri burchagining bissektrisasi gipotenuzani 1 : 5 nisbatda bo'ladi. Uchburchakning balandligi gipotenuzani qanday nisbatda bo'ladi?
A) 25 : 1 B) 1 : 25 C) 1 : 5 D) 5 : 1 E) 1 : 6

12. (99-8-44) To'g'ri burchakli uchburchakda to'g'ri burchak bissektrisasi gipotenuzani 3 : 2 nisbatda bo'lgan kesmalrga ajratadi. Katetlarning gipotenuzadagi proyeksiyalari nisbatini toping.
A) $\frac{9}{4}$ B) $\frac{3}{2}$ C) $\frac{4}{5}$ D) $\frac{2}{3}$ E) $\frac{5}{6}$

13. (97-5-54) To'g'ri burchakli uchburchak to'g'ri burchagining bissektrisasi gipotenuzani 1 : 2 nisbatda bo'ladi. Uchburchakning balandligi gipotenuzani qanday nisbatda bo'ladi?
A) 2 : 1 B) 1 : 2 C) 3 : 1 D) 1 : 3 E) 1 : 4

14. (01-4-8) Teng yonli uchburchakning asosi 1 ga, yon tomonlari 2 ga teng. Uchburchakning asosidagi burchagidan yon tomoniga tushirilgan mediana va bissektrisaning yon tomon bilan kesishgan nuqtalari orasidagi masofani toping.
A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{1}{5}$ E) $\frac{1}{6}$

15. (03-2-14) To'g'ri burchakli uchburchakning o'tkir burchagining bissektrisasi (qarama-qarshi) katetni uzunliklari 4 va 5 ga teng bo'lgan qismlarga ajratadi. Shu uchburchakning perimetrini toping.
A) 32 B) 40 C) 36 D) 45 E) 42

16. (03-10-56) Gipotenuzasi 10 ga, katetlaridan biri 8 ga teng bo'lgan to'g'ri burchakli uchburchakning kichik burchagi uchidan o'tkazilgan bissektrisaning uzunligini toping.
A) $\frac{3\sqrt{5}}{2}$ B) $\frac{2\sqrt{10}}{3}$ C) $\frac{8\sqrt{10}}{3}$ D) $\frac{5\sqrt{3}}{2}$ E) $\frac{8\sqrt{3}}{5}$

17. (03-11-31) ABC uchburchakning A burchagi bissektrisasi BC tomonni uzunliklari 12 va 9 bo'lgan teng kesmaga ajratadi. Agar $AC - AB = 4$ bo'lsa, ABC uchburchakning perimetrini toping.
A) 49 B) 52 C) 46 D) 50 E) 48

18. (03-12-45) Teng yonli uchburchakning uchidan asosiga tushirilgan balangligi 26 ga teng. Asosining uzunligi yon tomoni uzunligining 60% iga teng. Shu uchburchak bissektrisalarining kesishgan nuqtasi uning uchidan qanday masofada joylashgan?
A) $15,6$ B) 20 C) 18 D) $16,4$ E) $17,6$

3.3.7 Uchburchak medianasining xossalari.

1. Uchburchakning medianalari bir nuqtada kesishadi va bu nuqtada uchburchak uchidan boshlab hisoblaganda 2 : 1 nisbatda bo'linadi.

2. Uchburchakning a tomoniga tushirilgan medianasi $m_a = \frac{1}{2}\sqrt{2b^2 + 2c^2 - a^2}$ ga teng.

1. (98-1-42) Uchburchakning asosi 22 ga, yon tomonlari 13 ga va 19 ga teng. Asosiga tushirilgan medianasini toping.
A) 18 B) 12 C) 16 D) 13 E) 14

2. (98-8-42) Uchburchakning tomonlari 11 va 23 ga, uchinchi tomoniga tushirilgan medianasi 10 ga teng. Uchburchakning uchinchi tomonini toping.
A) 30 B) 15 C) 25 D) 28 E) 26

3. (01-7-55) Uchburchakning tomonlari 7 va 11 ga, uchinchi tomonining medianasi 6 ga teng. Uchburchakning uchinchi tomonini toping.
A) 12 B) 14 C) 15 D) 16 E) 18

4. (02-8-25) Uchburchakda medianalar kvadratlarining yig'indisini tomonlar kvadratlari yig'indisiga nisbati nechaga teng?
A) $\frac{3}{4}$ B) $\frac{2}{3}$ C) $\frac{1}{2}$ D) $\frac{5}{9}$ E) $\frac{1}{3}$

5. (03-4-46) Tomonlari 11, 12 va 13 ga teng bo'lgan uchburchakning katta tomoniga tushirilgan medianasi uzunligini toping.
A) 10 B) 9 C) $8,5$ D) $9,5$ E) 8

6. (03-7-61) Uchburchakning tomonlari 7 va 11 ga, uchinchi tomoniga tushirilgan medianasi 6 ga teng. Uchburchakning uchinchi tomonini toping.
A) 12 B) 8 C) 14 D) 10 E) 13

3.3.8 Aralash bo'lim.

1. c - o'tkir burchakli uchburchakning eng katta tomoni bo'lsin. U holda $a^2 + b^2 > c^2$.

2. c - o'tmas burchakli uchburchakning eng katta tomoni bo'lsin. U holda $a^2 + b^2 < c^2$.

1. (98-12-87) O'tkir burchakli uchburchak tomonlarining uzunliklari natural sonlardan iborat va ular ayirmasi 4 ga teng bo'lgan arifmetik progressiyani tashkil qiladi. Shu uchburchak kichik tomonining eng kichik qiymati nechaga teng bo'lishi mumkin?
A) 8 B) 15 C) 14 D) 12 E) 13

2. (98-4-44) O'tmas burchakli uchburchakning tomonlari butun sonlardan iborat va ular ayirmasi 5 ga teng bo'lgan arifmetik progressiyani tashkil etadi. Shu uchburchak eng kichik tomonining eng katta qiymati nechaga teng bo'lishi mumkin?
A) 5 B) 10 C) 15 D) 14 E) 16

3. (96-6-15) Quyidagi mulohazalardan qaysi biri to'g'ri?
A) ixtiyoriy uchburchakning bissektrisalari kesishish nuqtasida $1:2$ nisbatda bo'linadi.
B) ikkitadan tomon va bittadan burchagi o'zaro teng bo'lgan uchburchaklar tengdir.
C) o'tmas burchakli uchburchakning o'tkir burchagi uchidan tushirilgan perpendikulyar uchburchakning ichida yotadi.
D) asosi va uchidagi burchagi o'zaro teng bo'lgan teng yonli uchburchaklar tengdir.
E) qo'shni burchaklarning yig'indisi 180^0 dan katta.

4. (97-2-15) Quyidagi mulohazalardan qaysi biri to'g'ri?
A) teng tomonli uchburchakning balandliklari kesishish nuqtasida $4:3$ nisbatda bo'linadi.
B) ikkita to'g'ri burchakli uchburchakning gipotenuzalari va bittadan o'tkir burchaklari bir-biriga teng bo'lsa, bunday uchburchaklar tengdir.
C) ikkita parallel to'g'ri chiziqni uchinchi to'g'ri chiziq bilan kesganda hosil bo'lgan ichki bir tomonli burchaklar yig'indisi 180^0 dan kichik.
D) ikkitadan tomoni, bittadan burchagi o'zaro teng bo'lgan uchburchaklar tengdir.
E) teng yonli uchburchakning balandliklari hamda medianalari ham bir nuqtada kesishadi.

5. (97-12-14) Quyidagi mulohazalardan qaysi biri noto'g'ri?
A) Agar ikkita teng tomonli uchburchaklarning balandliklari teng bo'lsa, bu uchburchaklar tengdir.
B) Agar ikkita to'g'ri chiziqni uchinchi to'g'ri chiziq kesib o'tganda bir tomondagi tashqi burchaklar yig'indisi 180^0 ga teng bo'lsa, bu ikki to'g'ri chiziq parallleldir.
C) To'g'ri chiziqdan tashqarida yotgan nuqtadan bu to'g'ri chiziqqa faqat bitta perpendikulyar to'g'ri chiziq o'tkazish mumkin.
D) Uchburchakning barcha tashqi burchaklari yig'indisi 180^0 ga teng.
E) Agar bir uchburchakning uch tomoni ikkinchi uchburchakning uch tomoniga mos ravishda teng bo'lsa, bu uchburchaklar tengdir.

6. (03-1-19) Uchburchak tomonlarining uzunliklari $\sin 30^0$; $\sin 40^0$ va $\sin 60^0$ ga teng. Shu uchburchakning turini aniqlang.
A) o'tkir burchkli B) o'tmas burchakli
C) to'g'ri burchakli D) aniqlab bo'lmaydi
E) bunday uchburchak mavjud emas

7. (03-1-41) Uzunliklari 3; 4; 5; 6 va 7 bo'lgan kesmalardan nechta teng yonli bo'lmagan o'tmas burchakli uchburchaklar yasash mumkin?
A) birorta ham uchburchak yasash mumkin emas
B) 2 C) 3 D) 5 E) 10

8. (03-2-44) Quyidagi sonlardan qaysi uchtasi o'tkir burchakli uchburchakning tomonlarini ifodalaydi?
A) $2;3;4$ B) $4;5;7$ C) $5;6;7$
D) $8;15;17$ E) $5;7;13$

3.3.9 Uchburchakning yuzi.

1. $S=\frac{1}{2}ah$;
To'g'ri burchakli uchburchak uchun
$S=\frac{1}{2}ab$ $a,b-$katetlar;

2. $S=\sqrt{p(p-a)(p-b)(p-c)}$;

3. $S=\frac{1}{2}absin\gamma$;
Teng tomonli uchburchak uchun $S=\frac{\sqrt{3}a^2}{4}$

4. Uchburchakining medianasi uning yuzini teng ikkiga bo'ladi.

5. Uchburchakning barcha medianalari uni yuzalari teng oltita uchburchakka ajratadi.

6. Uchburchak yuzidan tushirilgan kesma uning asosini a_1 va a_2, kesmalarga, yuzini esa S_1 va S_2 yuzalarga bo'lsin. U holda $\frac{S_1}{S_2}=\frac{a_1}{a_2}$

7. Uchburchakning C uchidan l bissektrisa tushirilgan. U holda $l(a+b)sin\frac{\gamma}{2}=absin\gamma$.

1. (96-3-104) Tomonlari $13;14$ va 15 sm bo'lgan uchburchakning eng kichik balandligi necha sm?
A) $11,2$ B) $11,1$ C) 11 D) $11,5$ E) $11,6$

Yechish: Geron formulasiga ko'ra uchburchakning S yuzini uning a,b,c tomonlari va $p=\frac{a+b+c}{2}$ yarim perimetri orqali

$$S=\sqrt{p(p-a)(p-b)(p-c)}$$

formula yordamida topish mumkin.
$p=\frac{13+14+15}{2}=21$ bo'lgani uchun

$$S=\sqrt{21\cdot(21-13)(21-14)(21-15)}=\sqrt{21\cdot 8\cdot 7\cdot 6}=7\cdot 3\cdot 4=84.$$

Uchburchakning eng katta tomoniga tushirilgan balandligi eng kichik bo'lgani uchun uning $a=15$sm li tomoniga tushirilgan h balandligini topamiz. Uchburchak yuzi formulasi $S=\frac{1}{2}ah$ ga $a=15$ va $S=84$ ni qo'yamiz.

$$\frac{15\cdot h}{2}=84$$

va undan $h=\frac{2\cdot 84}{15}=\frac{56}{5}=11,2$ ekanini topamiz.
J: $11,2$ (A)

1. (96-1-38) To'g'ri burchakli uchburchakning kateti 8 sm, uning gipotenuzadagi proyeksiyasi esa $6,4$ sm. Shu uchburchakning yuzasi necha sm^2?
A) $25,6$ B) 48 C) $51,2$ D) 24 E) 18

2. (96-10-41) To'g'ri burchakli uchburchakning gipotenuzasi 10 sm, kichik katetning gipotenuzaga proyeksiyasi $3,6$ sm. Uchburchakning yuzi necha sm^2?
A) 48 B) 24 C) 18 D) 32 E) $20,4$

3. (96-7-38) To'g'ri burchakli uchburchakning katetlaridan biri 12, gipotenuzasi esa ikkinchi katetdan 6 ga ortiq. Uchburchakning yuzini toping.
A) 36 B) 40 C) 42 D) 54 E) 60

4. (96-9-89) To'g'ri burchakli uchburchakning gipotenuzasi 50 sm, katta katetning gipotenuzadagi proyeksiyasi 32 sm. Shu uchburchakning yuzuni toping.
A) 1200 B) 576 C) 300 D) 600 E) 800

5. (96-3-94) Katetlari 3 va 4 ga teng bo'lgan to'g'ri burchakli uchburchakning gipotenuzasiga tushirilgan balandligini toping.
A) 2 B) 3 C) $\frac{7}{5}$ D) $\frac{12}{5}$ E) $2,5$

6. (96-13-35) To'g'ri burchakli uchburchakning katetlari 6 va 8 ga teng. Uning gipotenuzasiga tushirilgan balandligini toping.
A) $4,8$ B) 5 C) $4,5$ D) $4,7$ E) $4,9$

7. (98-6-38) $2x+3y-6=0$ to'g'ri chiziq va koordinata o'qlari bilan chegaralangan uchburcahkning yuzini toping.
A) 3 B) 4 C) 2 D) 6 E) 1

8. (00-6-41) To'g'ri burchakli uchburchakning katetlari 4 va 6 ga teng. Shu uchburchakning to'g'ri burchagidan chiqarilgan bissektrisasining uzunligini toping.
A) $3,6$ B) $4,8\sqrt{2}$ C) $5\sqrt{2}$ D) $4,8$ E) $2,4\sqrt{2}$

9. (96-1-47) Uchburchakning a va b tomonlari orasidagi burchak α ga teng. Uchburchak yuzasi quyidagi ifodalardan qaysi biriga teng?
A) $ab\cdot sin\alpha$ B) $\frac{ab}{2sin\alpha}$ C) $\frac{ab\cdot sin\alpha}{2}$
D) $2abcos\alpha$ E) $\frac{1}{2}abcos\alpha$

10. (96-3-47) ABC uchburchakda $AB=5sm$, $AC=10sm$ va $\angle A=45^0$ ga teng. Shu uchburchakning yuzi necha sm^2?
A) $\frac{5\sqrt{2}}{2}$ B) $10\sqrt{2}$ C) $50\sqrt{2}$ D) $25\sqrt{2}$ E) $\frac{25\sqrt{2}}{2}$

11. (96-11-48) ABC uchburchakda $AB=4sm$, $AC=5sm$ va $\angle A=45^0$ ga teng. Shu uchburchakning yuzi necha sm^2?
A) $3\sqrt{2}$ B) $\frac{3\sqrt{2}}{2}$ C) $4\sqrt{2}$ D) $\frac{5\sqrt{2}}{2}$ E) $5\sqrt{2}$

12. (96-12-50) ABC uchburchakda $AB=3sm$, $AC=6sm$ va A burchak 45^0. Shu uchburchakning yuzi necha sm^2?
A) $\frac{7\sqrt{2}}{2}$ B) $3\sqrt{2}$ C) $\frac{9\sqrt{2}}{2}$ D) $4\sqrt{2}$ E) $5\sqrt{2}$

13. (97-7-38) Katetlaridan biri 8 ga teng bo'lgan to'g'ri burchakli uchburchak gipotenuzasining ikkinchi katetiga nisbati $5:3$ ga teng. Uchburchakning yuzini toping.
A) 12 B) 15 C) 20 D) 24 E) 48

14. (97-10-38) Uchburchakning katetlaridan biri 6 ga teng, ikkinchisi gipotenuzadan 2 ga kam. Uchburchakning yuzini toping.
A) 24 B) 18 C) 15 D) 12 E) 30

15. (97-3-38) Katetlarining nisbati $2:3$ kabi bo'lgan to'g'ri burchakli uchburchakning gipotenuzasi 13 ga teng. Uchburchakning yuzini toping.
A) $5\sqrt{13}$ B) 24 C) 39 D) 36 E) $6\sqrt{13}$

16. (97-4-55) Agar uchburchakning asosi 20% uzaytirilib, balandligi 20% qisqartirilsa, uning yuzi qanday o'zgaradi?
A) o'zgarmaydi B) 4% kamayadi
C) 4% ortadi D) 6% kamayadi E) 6% ortadi

17. (97-12-37) Uchburchakning yuzi 6 ga teng. Shu uchburchakning 3 va 8 ga teng tomonlar orasidagi burchakni toping.
A) 30^0 B) 45^0 C) 60^0
D) 60^0 yoki 120^0 E) 30^0 yoki 150^0

18. (98-1-40) Teng yonli uchburchakning perimetri 14 ga teng. Asosi yon tomonidan 3 marta kichik. Uchburchakning yuzini toping.
A) $4\sqrt{2}$ B) $8\sqrt{2}$ C) $\sqrt{35}$ D) 12 E) $2\sqrt{35}$

19. (98-2-48) Muntazam uchburchakning yuzi $25\sqrt{3}$ ga teng. Uning tomonini toping.
A) 15 B) 20 C) 10 D) 12 E) 8

20. (98-3-38) ABC uchburchakda $A=30^0$, $AB=\sqrt{3}$, $AC=4$. A uchidan tushirilgan balandlik uzunligini toping.
A) $\frac{3\sqrt{21}}{7}$ B) $\frac{2\sqrt{21}}{7}$ C) $\frac{4\sqrt{21}}{7}$ D) $\frac{\sqrt{21}}{7}$ E) $\frac{\sqrt{21}}{2}$

21. (98-4-28) Muntazam uchburchakning ichidagi ixtiyoriy nuqtadan uning tomonlarigacha bo'lgan masofalar yig'indisi $\sqrt{3}$ ga teng. Uchburchakning yuzini toping.
A) 4 B) 3 C) $\sqrt{3}$ D) $\frac{3\sqrt{3}}{4}$
E) aniqlab bo'lmaydi

22. (98-4-38)* Ushbu $y=ln^2x-lnx$ funksiyaning OX o'qi bilan kesishish nuqtalaridan hamda funksiya grafigining eng quyi nuqtasini tutashtirishdan hosil bo'lgan uchburchakning yuzini hisoblang.
A) $\frac{e^2-1}{2}$ B) $\frac{e-1}{4}$ C) $\frac{e-1}{8}$ D) $\frac{e}{4}$ E) $\frac{e+1}{2}$

23. (98-8-40) Teng yonli uchburchakning asosi 18 ga, yuzi 108 ga teng. Shu uchburchakning yon tomonini toping.
A) 15 B) 16 C) $12,5$ D) 21 E) 25

24. (98-9-11) Ushbu $y=(x+3)(x-1)$ parabolaning grafigi OX o'qini A va B nuqtalarda, OY o'qini C nuqtada kesib o'tadi. Uchburchak ABC ning yuzini toping.
A) 8 B) 12 C) 10 D) 6 E) 9

25. (98-10-22) ABC uchburchakning AB va BC tomonlari orasidagi burchagi 30^0 ga teng. Agar AB va BC tomonlar orasidagi burchak 120^0 ga orttirilsa, ABC uchburchakning yuzi qanday o'zgaradi?
A) 4 marta ortadi B) 4 marta kamayadi

C) o'zgarmaydi D) $\sqrt{3}$ marta ortadi
E) $\sqrt{3}$ marta kamayadi

26. (98-10-85) ABC uchburchakda $\angle A = 30^0$, $AB = \sqrt{3}$, $AC = 6$ ga teng. A uchidan tushirilgan balandlikning uzunligini toping.
A) $\frac{\sqrt{7}}{7}$ B) $\frac{2}{7}\sqrt{7}$ C) $\frac{3}{7}\sqrt{7}$ D) $\frac{4}{7}\sqrt{7}$ E) $\frac{5}{7}\sqrt{7}$

27. (98-11-36) Agar teng yonli to'g'ri burchakli uchburchakning yuzasi 18 ga teng bo'lsa, gipotenuzaning uzunligi qanchaga teng bo'ladi?
A) 6 B) $2\sqrt{6}$ C) 2 D) $6\sqrt{2}$ E) $6\sqrt{6}$

28. (98-11-87) Ushbu $y = -x - 1$, $y = x - 1$ to'g'ri chiziqlar va Ox o'qi bilan chegaralangan uchburchakning yuzini toping.
A) 2 B) 1 C) $\frac{1}{2}$ D) $\frac{\sqrt{2}}{2}$ E) $\sqrt{2}$

29. (98-12-91) Ikki tomonining yig'indisi 4 ga va ular orasidagi burchagi 120^0 ga teng bo'lgan uchburchakning yuzi eng ko'pi bilan nechaga teng bo'lishi mumkin?
A) $\sqrt{3}$ B) 2 C) $\frac{3\sqrt{3}}{2}$ D) 1 E) $\frac{2\sqrt{3}}{3}$

30. (99-9-38)* ABC uchburchakning BA va BC tomonlarida `BM:MA=3:5` va `BN:NC=4:2` shartlarni qanoatlantiruvchi M va N nuqtalar olingan. ABC uchburchakning yuzining MBN uchburchak yuziga nisbatini toping.
A) 4 : 1 B) 6 : 1 C) 3 : 2 D) 10 : 3 E) 9 : 4

31. (00-3-76)* ABC uchburchakning AB, BC va CA tomonlarida olingan M, N va P nuqtalar shu tomonlarni 1 : 2 nisbatda bo'ladi. Agar ABC uchburchakning yuzi S ga teng bo'lsa, MNP uchburchakning yuzini toping.
A) $\frac{1}{2}S$ B) $\frac{1}{3}S$ C) $\frac{2}{5}S$ D) $\frac{2}{3}S$ E) $\frac{2}{9}S$

32. (99-3-46) ABC uchburchakning AB va AC tomonlarida shunday K va N nuqtalar olindiki, $AK = \frac{1}{3}AB$ ga va $AN = \frac{2}{3}AC$ ga teng bo'ldi. ABC uchburchakning yuzi 18 ga teng. AKN uchburchakning yuzini toping.
A) 4 B) 6 C) 9 D) 2 E) 3

33. (99-1-49) ABC uchburchakning AB va BC yon tomonlarida D va E nuqtalar olindi. Agar `AD=4`, `DB=5`, `BE=3`, `EC=2`, `DE=4` bo'lsa, ADEC to'rtburchakning yuzini toping.
A) 10 B) 6 C) 12 D) 8 E) 7

34. (99-8-51) To'g'ri burchakli uchburchak katetlarining gipotenuzadagi proyeksiyalari 8 va 2 ga teng. Uchburchakning yuzini toping.
A) 10 B) 20 C) 40 D) 24 E) 16

35. (99-8-59) $3x + y + 12 = 0$ to'g'ri chiziq va koordinata o'qlari bilan chegaralangan uchburchakning yuzini aniqlang.
A) 64 B) 12 C) 48 D) 36 E) 24

36. (99-10-47) ABC uchburchakning AD medianasi 6 ga teng, AC tomoni 8 ga va ular orasidagi burchak 30^0 ga teng. ABC uchburchakning yuzini toping.
A) 28 B) 26 C) 22 D) 30 E) 24

37. (00-8-49) Teng yonli to'g'ri burchakli uchburchakning yuzi 1225 ga teng bo'lsa, uning gipotenuzasini toping.
A) 70 B) 65 C) 72 D) 49 E) 50

38. (00-10-31) Teng yonli to'g'ri burchakli uchburchakning gipotenuzasi $5\sqrt{2}$ ga teng. Uning yuzini hisoblang.
A) 14,5 B) 12,5 C) 10,5 D) 8,5 E) 16,5

39. (00-10-76)* Gipotenuzasi c ga o'tkir burchaklari sinuslarining yig'indisi q ga teng bo'lgan to'g'ri burchakli uchburchakning yuzini toping.
A) $\frac{1}{4}c^2(q^2-1)$ B) $\frac{1}{4}q^2(c^2-1)$ C) $\frac{1}{4}q^2(c^2+1)$
D) $\frac{1}{4}c^2(q^2+1)$ E) $\frac{1}{4}q^2(1-c^2)$

40. (00-1-53) ABC uchburchakda `AB=AC`, BM perpendikulyar AC ga, `BM=9` va `MA=12`. ABC uchburchakning yuzini toping.
A) 63,5 B) 64,5 C) 65,5 D) 67,5 E) 66,5

41. (00-9-51) ABC uchburchakning BD, AE va CF medianalari O nuqtada kesishadi. AOD uchburchakning yuzi 2,8 ga teng. BFC uchburchakning yuzini toping.
A) $\frac{17}{3}$ B) $\frac{36}{5}$ C) $\frac{39}{4}$ D) $\frac{42}{5}$ E) $\frac{48}{5}$

42. (99-8-45) Uchburchakning ikki tomoni uzunliklari 6 va 3 ga teng. Agar bu tomonlarga o'tkazilgan balandliklar uzunliklari yig'indisining yarmi uchunchi tomonga o'tkazilgan balandlikka teng bo'lsa, uchunchi tomon uzunligini aniqlang.
A) 6 B) 5 C) 3 D) 4 E) 7

43. (00-4-48) Muntazam uchburchakning yuzi 64 ga teng. Uning perimetrini toping.
A) $16\sqrt[4]{27}$ B) $\frac{64}{\sqrt[3]{3}}$ C) 64 D) $64\sqrt{3}$ E) $\frac{40\sqrt{3}}{3}$

44. (01-2-40) Uchburchakning ikkita tomoni 3 va 7 ga, ular orasidagi burchak 120^0 ga teng. Uchburchakning shu burchagi uchidan chiqqan bissektrisasini toping.
A) 1,7 B) 1,8 C) 1,9 D) 2,1 E) 2,3

45. (01-3-9) Yuzi 48 ga teng bo'lgan ABC uchburchakning AC tomoni D nuqtada `AD:DC=1:7` kabi nisbatda bo'linadi. ABD uchburchakning yuzini aniqlang.
A) 4 B) 6 C) 5,5 D) 8 E) 12

46. (01-5-30) ABC uchburchakda $\angle C = 135^0$, $AC = 6$ va BD balandlik 2 ga teng. ABD uchburchaknng yuzini toping.
A) 8 B) 6 C) 16 D) 12 E) 10

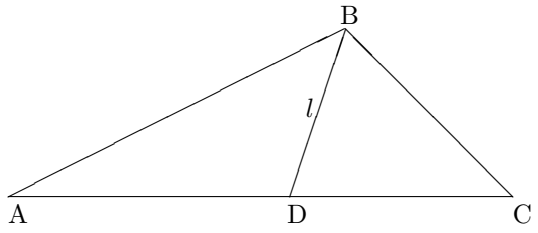
47. (01-5-40) Ushbu $y + x = 0$, $y - x + 6 = 0$ to'g'ri chiziqlar Ox o'qi bilan chegaralangan uchburchaknng yuzini toping.
A) 9 B) 18 C) 4,5 D) 12 E) 16

48. (01-7-50) Yon tomoni a ga teng bo'lgan teng yonli uchburchakning asosi qanday bo'lganda, uning yuzi eng katta bo'ladi?
A) $2a$ B) $a\sqrt{3}$ C) $\frac{\sqrt{3}}{2}$ D) $a\sqrt{2}$ E) $\frac{\sqrt{2}}{2}a$

49. (01-12-23) To'g'ri burchakli uchburchakning katetlari $log_4 9$ va $log_3 16$ ga teng, uning yuzini toping.
A) 3 B) 4 C) 5 D) 10 E) 2

50. (02-3-58) ABC uchburchakda medianalar kesishgan nuqtadan AB tomongacha bo'lgan masofa 1 ga teng. Agar $AB = 8$ bo'lsa, ABC uchburchakning yuzini toping.
A) 12 B) 16 C) 9 D) 13 E) 10

51. (02-7-37) Rasmda $l-$bissektrisa, $AB = 12$, $BC = 9$ va $\angle B = 90^0$, l =?



A) $\frac{36\sqrt{2}}{7}$ B) $\frac{18\sqrt{2}}{7}$ C) $\frac{9\sqrt{2}}{7}$ D) $\frac{3\sqrt{2}}{7}$ E) $\frac{20\sqrt{2}}{7}$

52. (02-8-26) To'g'ri burchakli uchburchakning perimetri 84 ga, gipotenuzasi 37 ga teng. Bu uchburchakning yuzini toping.
A) 210 B) 240 C) 105 D) 420 E) 180

53. (02-8-28) Uchburchakning ikki tomoni va ular orasidagi bissektrisasi uzunligi mos ravishda 60; 40 va 24 ga teng. Uchburchakning yuzini toping.
A) $600\sqrt{3}$ B) $800\sqrt{2}$ C) $100\sqrt{3}$
D) $300\sqrt{3}$ E) $900\sqrt{3}$

54. (02-9-52) ABC uchburchakning yuzi 12 ga teng. Uning B uchidan $BD = 3$ mediana tushirilgan. Agar $\angle ABD = 90^0$ bo'lsa, AC tomonning uzunligini toping.
A) $2\sqrt{73}$ B) $\sqrt{73}$ C) 8 D) 10 E) 12

55. (02-10-34) Uchburchakning yuzi 5 ga, ikkita tomoni 3 va 4 ga teng. Berilgan tomonlar orasidagi bissektrisasi ajratgan uchburchaklarning yuzlarini toping.
A) $\frac{15}{7}; \frac{20}{7}$ B) $\frac{3}{2}; \frac{7}{2}$ C) 2; 3 D) $\frac{9}{4}; \frac{11}{4}$ E) $\frac{7}{3}; \frac{8}{3}$

56. (01-4-9) Uchburchakning ichidagi M nuqtadan uning tomonlarigacha parallel to'g'ri chiziqlar o'tkazildi. Natijada berilgan uchburchakning ichida m nuqtada uchta umumiy uchga ega, yuzalari esa 3; 12 va 27 ga teng bo'lgan uchta uchburchak hosil bo'ldi. Berilgan uchburchakning yuzini toping.
A) 84 B) 72 C) 108 D) 144 E) 96

57. (03-1-40) To'g'ri burchakli ACB uchburchakning katetlari 8 ga va 10 ga teng. Shu uchburchakning C to'g'ri burchagi uchidan CE mediana va CD bissektrisa o'tkazildi. CDE uchburchakning yuzini toping.
A) $2\frac{2}{9}$ B) $2\frac{2}{7}$ C) $2\frac{3}{8}$ D) $3\frac{2}{5}$ E) $3\frac{2}{3}$

58. (03-2-46)* To'g'ri burchakli uchburchakning gipotenuzasi $5\sqrt{2}$ ga teng. Bu uchburchak eng ko'pi bilan qanday yuzaga ega bo'lishi mumkin?
A) 25 B) 20 C) 16,5 D) 15,4 E) 12,5

59. (03-3-53) Teng yonli uchburchakning yon tomoni 2 ga teng. Shu uchburchakning yuzi eng katta bo'lishi uchun, asosi nimaga teng bo'lishi kerak?
A) $2\sqrt{2}$ B) $\sqrt{2}$ C) $2\sqrt{3}$ D) $\sqrt{3}$ E) 1,5

60. (03-6-73) Asosi a va unga yopishgan burchaklari 30^0 va 45^0 bo'lgan uchburchakning yuzini toping.
A) $\frac{a^2(\sqrt{2}-1)}{4}$ B) $\frac{a^2(\sqrt{2}+1)}{4}$ C) $\frac{a^2(\sqrt{3}-1)}{4}$
D) $\frac{a^2(\sqrt{3}+1)}{4}$ E) $\frac{a^2(\sqrt{2})}{8}$

61. (03-9-66) Tomonining uzunligi $4\sqrt[4]{3}$ bo'lgan muntazam uchburchakning yuzini toping.
A) 12 B) 16 C) $24\sqrt{3}$ D) $12\sqrt{3}$ E) $8\sqrt{3}$

62. (03-10-48) To'g'ri burchakli uchburchakning katetlaridan biri boshqasiga qaraganda 2 marta katta. Shu uchburchakning gipotenuzasiga tushirilgan balandligi 12 ga teng. Uchburchakning yuzini toping.
A) 180 B) 84 C) 120 D) 96 E) 108

63. (03-10-51) To'g'ri burchakli uchburchakning katetlaridan biri ikkinchisiga qaraganda 3 birlik uzun, yuzi esa 18 ga teng. Shu uchburchakning gipotenuzasini toping.
A) 15 B) 12 C) 10 D) 9 E) 8

64. (03-10-55) To'g'ri burchakli uchburchakning uzunligi 14 va 18 ga teng katetlariga tushirilgan medianalari uni uchta uchburchakka va to'rtburchakka ajaratadi. To'rtburchakning yuzini toping.
A) 56 B) 64 C) 48 D) 72 E) 42

65. (03-12-44) Teng tomonli uchburchak asosining uzunligi yon tomoni uzunligining 40% iga teng. Asosga tushirilgan balandligi 28 ga teng. Shu uchburchakning yon tomoniga tushirilgan balandligini toping.
A) 13,8 B) 15,4 C) 11,2 D) 10,6 E) 12,2

3.3.10 Uchburchaklarning o'xshashligi.

a, b, c va a_1, b_1, c_1 −ikkita o'xshash uchburchaklarning mos tomonlari, p va p_1 −perimetrlari, S va S_1-yuzalari bo'lsin.

1. $\frac{a}{a_1} = \frac{b}{b_1} = \frac{c}{c_1}$
2. $\frac{p}{p_1} = \frac{a}{a_1}$
3. $\frac{S}{S_1} = \left(\frac{a}{a_1}\right)^2 = \left(\frac{p}{p_1}\right)^2$

(97-3-46) Perimetrlari 24 va 36 bo'lgan ikki o'xshash uchburchakdan birining yuzi ikkinchisinikidan 10 ga ortiq. Kichik uchburchakning yuzini toping.
A) 20 B) 16 C) 8 D) 12 E) 18
Yechish: Kichik yuza x ga teng bo'lsin. U holda ikkinchi uchburchakning yuzi $x + 10$ ga teng bo'ladi. Yuzlari S_1 va S_2 ga hamda perometrlari p_1 va p_2 ga teng bo'lgan o'xshash uchburchaklar uchun $\frac{S_1}{S_2} = \frac{p_1^2}{p_2^2}$ tenglik o'rinli bo'lgani uchun
$\frac{x}{x+10} = \left(\frac{24}{36}\right)^2 = \frac{4}{9}$ tenglamani hosil qilamiz. Uni yechib: $9x = 4x + 40$, $x = 8$. J: 8 (C)

1. (96-3-98) $AB||CD$, CA va DB to'g'ri chiziqlar O nuqtada kesishadi. $OA = 3$, $OB = 4$, $AC = 1,5$ bo'lsa, BD ni toping.
A) 3 B) 2 C) 2,5 D) 2,1 E) 2,6

2. (99-7-35) ABC uchburchakning AB va BC yon tomonlaridan olingan D va E nuqtalar uchun ($AC\|DE$) ekani ma'lum. AC=6, DB=3 va DE=2 bo'lsa, AB tomonni toping.
A) 6 B) 12 C) 8 D) 9 E) 10

3. (96-7-46) Ikkita o'xshash uchburchakning yuzlari 6 va 24, ulardan birining perimetri ikkinchisidan 6 ga ortiq. Katta uchburchakning perimetrini toping.
A) 18 B) 12 C) 20 D) 8 E) 24

4. (96-9-38) $AB\|CD$, CA va DB to'g'ri chiziqlar O nuqtada kesishadi. OA=5sm, OB=4sm, OD=9sm bo'lsa, OC ni toping (1-masaladagi chizma asosida yeching).
A) 10,8 B) 10,5 C) 11,25 D) 11,3 E) 11

5. (96-12-100) $AB\|CD$, CA va DB to'g'ri chiziqlar O nuqtada kesishadi. $OA = 5$, $OB = 6$, $AC = 2$ bo'lsa, BD ni toping.(1-masaladagi chizma asosida yeching)
A) 2,4 B) 2,5 C)2,6 D) 2,3 E) 2,25

6. (96-13-40) $AB\|CD$, CA va DB to'g'ri chiziqlar O nuqtada kesishadi. $OB = 6$, $OB = 2,4$, $AC = 2$ bo'lsa, OA ni toping.(1-masaladagi chizma asosida yeching)
A) 5,5 B) 5,2 C) 4,8 D) 5 E) 4,5

7. (97-2-39) Uchburchak ABC ning tomonlari $MN\|AC$ to'g'ri chiziq bilan kesildi. ABC va MBN uchburchaklarning perimetrlari 3 : 1 kabi nisbatda. ABC uchburchakning yuzi 144 ga teng. MBN uchburchakning yuzini toping.
A) 16 B) 48 C) 32 D) 64 E) 56

8. (97-4-44) Perimetri 1 bo'lgan $A_1B_1C_1$ uchburchak $A_2B_2C_2$ uchburchakning tomonlari o'rtalarini, $A_2B_2C_2$ uchburchak $A_3B_3C_3$ uchburchak tomonlari o'rtalarini, $A_3B_3C_3$ uchburchak $A_4B_4C_4$ uchburchak tomonlari o'rtalarini tutashtirsa, $A_4B_4C_4$ uchburchakning perimetri qancha bo'ladi?
A) 3 B) 5 C) 4 D) 6 E) 8

9. (97-4-54) ABC uchburchakda AB va BC yon tomonlarida $AC\|DE$ shartni qanoatlantiruvchi D va E nuqtalar olingan. `AB=8`, `AD=2` bo'lsa, ABC va DBE uchburchaklar yuzlarining nisbatini toping.
A) 2 B) $2\frac{1}{5}$ C) $1\frac{5}{7}$ D) $1\frac{7}{9}$ E) $1\frac{8}{9}$

10. (97-7-46) Ikkita o'xshash uchburchakning perimetrlari 18 va 36 ga, yuzlarining yig'indisi 30 ga teng. Katta uchburchakning yuzini toping.
A) 20 B) 24 C) 21 D) 18 E) 25

11. (97-10-46) Yuzlari 8 va 32 bo'lgan ikkita o'xshash uchburchak perimetrlarining yig'indisi 48 ga teng. Kichik uchburchakning perimetrini toping.
A) 12 B) 16 C) 20 D) 9,6
E) aniqlab bo'lmaydi

12. (97-12-38) Perimetri 84 sm bo'lgan uchburchakning asosiga parallel qilib o'tkazilgan to'g'ri chiziq undan perimetri 42sm ga, yuzi `27sm`^{2} ga teng uchburchak ajratadi. Berilgan uchburchakning yuzini toping.
A) `54sm`^{2} B) `108sm`^{2} C) `135sm`^{2}
D) `81sm`^{2} E) `162sm`^{2}

13. (98-7-47) ABC uchburchakning tomonlari $A_1B_1C_1$ uchburchakning mos tomonlaridan $2\sqrt{3}$ marta katta. ABC uchburchakning yuzi $A_1B_1C_1$ uchburchakning yuzidan necha marta katta?
A) 12 B) 6 C) $2\sqrt{3}$ D) $4\sqrt{3}$ E) $6\sqrt{3}$

14. (98-10-25) ABC uchburchakning AB tomoni $MN\|AC$ to'g'ri chiziq yordamida `BM=2` va `MA=4` bo'lgan kesmalarga ajratildi. Agar MBN uchburchakning yuzi 16 ga teng bo'lsa, ABC uchburchakning yuzi qanchaga teng bo'ladi?
A) 48 B) 96 C) 80 D) 144 E) 128

15. (98-12-45) Perimetri 48 ga teng bo'lgan uchburchakning har bir tomoni 4 ta teng kesmalarga bo'lindi. Bo'linish nuqtalari tomonlariga parallel kesmalar bilan tutashtirilgan. Shu kesmalar uzunliklarining yig'indisini toping.
A) 72 B) 96 C) 24 D) 144 E) 36

16. (98-12-47) $A_1B_1C_1$ va $A_2B_2C_2$ uchburchaklar o'xshash. $A_2B_2C_2$ uchburchakning yuzi $A_1B_1C_1$ uchburchakning yuzidan 9 marta katta. $A_1B_1C_1$ uchburchakning 3 ga teng bo'lgan tomoniga mos bo'lgan $A_2B_2C_2$ uchburchakning tomonini toping.
A) 9 B) 27 C) 12 D) 6 E) 18

17. (98-12-102) Uchburchakning asosiga parallel to'g'ri chiziq uning yuzini teng ikkiga bo'lsa, asosidan boshlab hisoblaganda, uning yon tomonlarini qanday nisbatda bo'ladi?
A) $(\sqrt{2}-1):1$ B) $1:1$ C) $\frac{1}{2}:1$
D) $(\sqrt{3}-1):1$ E) $(2\sqrt{2}-1):1$

18. (99-4-44) Uchburchakning yon tomoni uchidan boshlab hisoblaganda 2 : 3 : 4 kabi nisbatda bo'lindi va bo'linish nuqtalari orqali asosiga parallel to'g'ri chiziqlar o'tkazildi. Hosil bo'lgan figuralar yuzlarining nisbatini toping.

A) 4 : 9 : 16 B) 2 : 5 : 9 C) 4 : 25 : 49
D) 4 : 21 : 56 E) 4 : 25 : 81

19. (01-8-44) Uchburchakning asosiga parallel to'g'ri chiziq uning yon tomonini uchidan boshlab hisoblaganda 5 : 3 kabi nisbatda, yuzini esa yuzlarining ayirmasi 56 ga teng bo'lgan ikki qismga ajratadi. Berilgan uchburchakning yuzini toping.
A) 144 B) 256 C) 204 D) 196 E) 272

20. (01-8-46) Agar ABC uchburchakda $\angle A = 30^0$ va $\angle B = 50^0$ bo'lsa, uchburchakning tomonlari uchun quyidagi munosabatlardan qaysi biri to'g'ri bo'ladi?
A) $a = \frac{c^2-2b^2}{b}$ B) $a = \frac{c^2-2b^2}{2b}$ C) $a = \frac{c^2-b^2}{4b}$
D) $a = \frac{c^2-b^2}{b}$ E) $a = \frac{2c^2-b^2}{3b}$

21. (02-2-40) Uchburchakning perimetri unga o'xshash uchburchak perimetrining $\frac{11}{13}$ qismini tashkil etadi. Agar katta uchburchakning bir tomoni va kichik uchburchakning unga mos tomoni ayirmasi 1 ga teng bo'lsa, katta uchburchakning shu tomonini toping.
A) $6,5$ B) $5,5$ C) 6 D) 5 E) 7

3.4 To'rtburchaklar.

3.4.1 To'rtburchak, to'g'ri to'rtburchak va kvadrat.

To'rtburchak.

1. Qavariq to'rtburchak burchaklari yig'indisi 360^0 ga teng.

2. Qavariq to'rtburchakning yuzi $S = \frac{1}{2}d_1d_2sin\varphi$ ga teng. (φ - diagonallari orasidagi burchak.)

1. (96-10-44) To'rtburchakning burchaklaridan biri to'g'ri burchak, qolganlari esa o'zaro 4:3:2 nisbatda. To'rtburchakning kichik burchagini toping.
A) 30^0 B) 45^0 C) 50^0 D) 60^0 E) 80^0

2. (96-1-41) To'rtburchakning burchaklari o'zaro 3 : 5 : 4 : 6 nisbatda. To'rtburchakning kichik burchagini toping.
A) 80^0 B) 30^0 C) 60^0 D) 40^0 E) 25^0

3. (98-10-21) Qavariq to'rtburchakning uchta burchagi yig'indisi 240^0 ga teng. To'rtinchi burchagiga qo'shni bo'lgan burchakning qiymatini toping.
A) 30^0 B) 45^0 C) 90^0 D) 120^0 E) 60^0

4. (00-5-55) Qavariq to'rtburchakning diagonallari uni nechta uchburchakka ajratadi?
A) 4 B) 5 C) 6 D) 7 E) 8

5. (00-6-35)To'rtburchakka diagonal o'tkazish natijasida u perimetrlari 25 va 27 ga teng bo'lgan ikkita uchburchakka ajratildi. Agar uchburchakning perimetri 32 ga teng bo'lsa, o'tkazilgan diagonalning uzunligini hisoblang.
A) 6 B) 8 C) 10 D) 11 E) 10,5

6. (01-4-7) Qavariq to'rtburchakning qarama-qarshi tomonlari o'rtalarini tutashtiruvchi kesmalar o'zaro teng. Shu kesmalar orasidagi burchakning sinusini toping.
A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{\sqrt{2}}{2}$ D) aniqlab bo'lmaydi E) 1

7. (02-10-75) Qavariq to'rtburchakning diagonallari 16 va 30 ga teng bo'lib, ular 30^0 li burchak tashkil qiladi. To'rtburchakning yuzini toping.
A) 120 B) 240 C) $120\sqrt{3}$ D) $160\sqrt{2}$ E) 92

Kvadrat.

1. $d = a\sqrt{2}$

2. $S = a^2$

3. $S = \frac{1}{2}d^2$

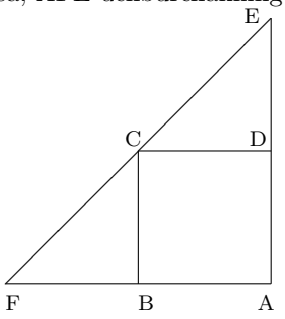
1. (96-9-98) Agar kvadratning tomoni 5 marta qisqartirilsa, uning yuzi necha marta kamayadi?
A) 5 B) 10 C) 20 D) 25 E) $7,5$

2. (96-10-49) Agarda kvadratning diagonali 2 marta kichraytirilsa, uning yuzi necha marta kichrayadi?
A) 2 B) $\sqrt{2}$ C) 4 D) 8 E) $2\sqrt{2}$

3. (97-5-50) Kvadratning tomonini necha marta kamaytirganda yuzi 4 marta kichrayadi?
A) $1,5$ B) 2 C) $2,5$ D) 3 E) $3,5$

4. (97-9-50) Kvadratning tomonini necha marta kamaytirganda yuzi 4 marta kamayadi?
A) 5 B) $2,5$ C) 3 D) 4 E) 2

5. (97-9-108) Rasmdagi ABCD kvadratning A uchidan AE va AF to'g'ri chiziqlar C uchidan esa BD diagonalga parallel bo'lgan CF to'g'ri chiziq o'tkazilgan. Agar kvadratning yuzi 3 ga teng bo'lsa, AFE uchburchakning yuzini toping.



A) 5 B) 6 C) 7 D) 9 E) 8

6. (98-2-46) To'g'ri burchakli uchburchakka kvadrat shunday ichki chizilganki, to'g'ri burchak ular uchun umumiy. Kvadratning bir uchi gipotenuzaning o'rtasida yotadi. Agar gipotenuzaning uzunligi $24\sqrt{2}$ ga teng bo'lsa, kvadratning perimetrini toping.
A) 36 B) 48 C) 42 D) 28 E) 32

7. (01-10-6) Kvadratning perimetri 20%ga uzaytirilsa, uning yuzi necha foizga ko'payadi?
A) 20 B) 25 C) 40 D) 44 E) 42

8. (02-6-13) Agar kvadratning perimetri 10%ga kamaytirilsa, uning yuzi necha foizga kamayadi?
A) 10 B) 11 C) 16 D) 19 E) 8

9. (02-7-14) To'g'ri burchakli uchburchakning katetlari 3 va 6 ga teng bo'lib, bu uchburchakka u bilan umumiy to'g'ri burchakka ega bo'lgan kvadrat ichki chizilgan. Kvadratning perimetrini toping.
A) 8 B) 6 C) 10 D) 7 E) $6,5$

10. (99-5-49) Tomoni 1 ga teng bo'lgan ikkita kvadrat ustma-ust qo'yildi. Shundan so'ng kvadratlardan biri ularning umumiy simmmetriya markaziga nisbatan 45^0 ga burildi. Hosil bo'lgan figuraning yuzini hisoblang.
A) $4-2\sqrt{2}$ B) $1,2$ C) $1,25$
D) $3-\sqrt{2}$ E) $\frac{2\sqrt{2}+1}{2}$

11. (00-9-53) Tomoni 1 ga teng bo'lgan ikkita kvadrat ustma-ust qo'yilganidan keyin, ulardan biri kvadratlarning umumiy simmmetriya markaziga nisbatan 45^0 ga burildi. Hosil bo'lgan figuraning perimetrini toping.
A) $8+\sqrt{2}$ B) $12-2\sqrt{2}$ C) $18-8\sqrt{2}$
D) $4+\sqrt{2}$ E) $16-8\sqrt{2}$

12. (03-4-51) Kvadratga ichki chizilgan to'rtburchakning uchlari kvadrat tomonlarining o'rtalarida yotadi. Agar to'trburchakning yuzi 36 ga teng bo'lsa, kvadratning yuzi qancha bo'ladi?
A) 70 B) 74 C) 77 D) 72 E) 76

13. (03-7-60) Ikkita kvadrat yuzlarining nisbati 25 : 9 kabi. Birinchi kvadratning tomoni ikkinchi kvadratning tomonidan 10 birlik uzun. Kichik kvadrat tomonining uzunligini toping.
A) 25 B) 15 C) 16 D) 12 E) 10

14. (03-12-35) ABCD kvadratning tashqarisida muntazam AFB uchburchak yasalgan. Agar kvadratning tomoni $\sqrt{6}$ ga teng bo'lsa, FC kesmaning uzunligini toping.
A) $2\sqrt{6}$ B) $3\sqrt{3}$ C) $6\sqrt{2}$ D) $3\sqrt{2}$ E) $3+\sqrt{3}$

15. (03-12-43) Muntazam uchburchakning yuzi $9\sqrt{3}$ ga teng. Shu uchburchakdan eng katta yuzaga ega bo'lgan kvadrat qirqib olingan. Shu kvadratning perimetrini toping.
A) $18\sqrt{3}-12$ B) $24-12\sqrt{3}$ C) $64\sqrt{3}-96$
D) $54-16\sqrt{3}$ E) $48\sqrt{3}-72$

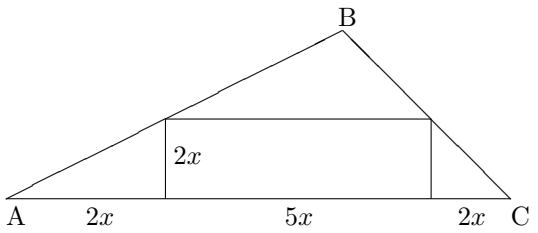
To'g'ri to'rtburchak.

a, b - to'g'ri to'rtburchak tomonlari, d - diagonali.

1. $d^2 = a^2 + b^2$
2. $S = ab$
3. $S = \frac{1}{2}d^2 sin\varphi$

(99-4-40) Teng yonli to'g'ri burchakli uchburchakning gipotenuzasi 45 ga teng. Unga to'g'ri to'rtburchak shunday ichki chizilganki, to'g'ri to'rtburchakning ikki uchi uchburchakning gipotenuzasida, qolgan ikki uchi esa katetlarida yotadi. Agar to'rtburchak tomonlarining nisbati 5 : 2 kabi bo'lsa, uning perimetrini toping.
A) 50 B) 65 C) 70 yoki 105/2 D) 90 E) 75

Yechish: Masalaning shartiga ko'ra to'g'ri to'rtburchakning tomonlarini $2x$ va $5x$ ko'rinishda ifodalash mumkin. To'g'ri burchakli uchburchakning to'g'ri to'rtburchakdan tashqaridagi qismlarida 3 ta uchta uchburchak hosil bo'lyapti. Ularning ikkitadan burchaklari 45^0 ga teng. Shuning uchun ular teng yonli to'g'ri burchakli uchburchaklar bo'ladi. Demak, gipotenuzaning ikki chetidagi kesmalar to'g'ri to'rtburchakning yon tomoniga teng bo'ladi. Ikkita hol bo'lishi mumkin: 1) to'g'ri to'rtburchakning katta tomoni gipotenu-zada yotadi; 2) to'g'ri to'rtburchakning kichik tomoni gipotenuzada yotadi. Avval 1−holni ko'rib chiqamiz.



Bu holda gipotenuza 45 ga tengligidan $2x+5x+2x=45$ ekanini va bu yerdan $x=5$ ni topamiz. U holda to'rtburchakning perimetri $5x+5x+2x+2x=14x=70$ ga teng. Endi 2−holni ko'rib chiqamiz. Bu holda $5x+2x+5x=45$ ekanini va $x=15/4$ ni topamiz. u holda to'rtburchakning perimetri $14x=105/2$ ga teng.
Javob: 70 yoki 105/2 (C).

1. (96-1-46) Agar to'g'ri to'rtburchakning tomonlari 4 marta orttirilsa, uning yuzi necha marta ortadi?
A) 4 B) 8 C) 12 D) 16 E) 32

2. (96-10-48) To'g'ri to'rtburchakning tomonlari 72 va 8 m. Unga tengdosh bo'lgan kvadratning tomonini toping.
A) 36 B) 28 C) 24 D) 18 E) 26

3. (97-5-1) To'g'ri to'rtburchakning eni 7sm, bo'yi undan 3 sm ortiq. To'g'ri to'rtburchakning perimetrini hisoblang.
A) 22 B) 20 C) 34 D) 30 E) 32

4. (97-9-1) To'g'ri to'rtburchakning eni 5 ga teng, bo'yi undan 7 ga ortiq. To'g'ri to'rtburchakning perimetrini hisoblang.
A) 32 B) 34 C) 24 D) 26 E) 30

5. (98-1-44) To'g'ri to'rtburchakning yuzi 400 ga, tomonlarining nisbati 4 : 1 ga teng. To'rtburchakning perimetrini hisoblang.
A) 100 B) $100\sqrt{2}$ C) 200 D) $50\sqrt{2}$ E) 120

6. (98-7-32) To'g'ri to'rtburchakning perimetri 32 ga, qo'shni tomonlarining ayirmasi 2 ga teng. Uning tomonlarini toping.
A) 8 va 6 B) 12 va 10 C) 10 va 8
D) 9 va 7 E) 11 va 9

7. (98-8-44) To'g'ri to'rtburchakning perimetri 60 ga teng, bir tomoni boshqa tomonidan 6 ga ko'p.

To'g'ri to'rtburchakning yuzini toping.
A) 196 B) 216 C) 108 D) 144 E) 180

8. (98-9-46) To'g'ri to'rtburchakning katta tomoni 12 ga, diagonallarining kesishgan nuqtasidan katta tomonigacha bo'lgan masofa 3 ga teng. To'g'ri to'rtburchakning yuzini toping.
A) 96 B) 54 C) 48 D) 72 E) 64

9. (98-10-20) ABCD to'g'ri to'rtburchakning A burchagi bissektrisasi BC tomonni uzunliklari $BM =$ 16 sm va $MC = 14$ sm bo'lgan ikki qismga ajratadi. To'g'ri to'rtburchakning yuzini toping.
A) 500 sm^2 B) 420 sm^2 C) 480 sm^2
D) 510 sm^2 E) 460 sm^2

10. (98-12-99) O'lchamlari `24m` $\times$ `15m` bo'lgan zalni tomoni 20 sm bo'lgan kvadrat shaklidagi plitkalardan nechtasi bilan qoplash mumkin.
A) 900 B) 18000 C) 9000 D) 1800 E) 6000

11. (00-4-50) To'g'ri to'rtburchakning uzunligi 25% ga orttirildi. Uning yuzi o'zgarmasligi uchun enini necha % ga kamaytirish kerak?
A) 20 B) 16 C) 25 D) 18 E) $19,2$

12. (00-6-39) To'g'ri to'rtburchakning to'g'ri burchagi uchidan uning diagonaliga tushirilgan perpendikulyar to'g'ri burchakni 3 : 1 kabi nisbatda bo'ladi. Shu perpendikulyar bilan boshqa diagonal orasidagi burchakni toping.
A) $22,5^0$ B) 30^0 C) 45^0 D) 40^0 E) $32,5^0$

13. (01-1-13) Kvadrat shaklidagi tunukadan eni 3 ga teng bo'lgan qismi qirqib olindi. Agar qolgan qismining yuzi 10 ga teng bo'lsa, kvadratning tomonini aniqlang.
A) 10 B) 9 C) 8 D) 6 E) 5

14. (01-4-11) Tomoni 10 m ga teng bo'lgan kvadrat tomoni 5 sm ga teng bo'lgan kvadratchalarga ajratildi. Shu kvadratchalar kengligi 10 sm bo'lgan tasma shaklida joylashtirilsa, uning uzunligi qancha bo'ladi?
A) 100m B) 20m C) 200m D) 1km E) 10km

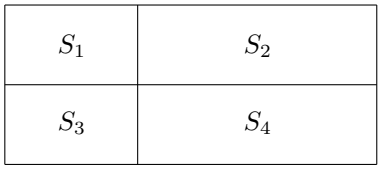
15. (01-6-48) To'g'ri to'rtburchakka uchlari uning tomonlari o'rtalari bilan ustma-ust tushadigan to'rtburchak ichki chizilgan. Ichki chizilgan to'rtburchakning perimetri 40 ga teng. To'g'ri to'rtburchak tomonlarining nisbati 8 : 6 kabi bo'lsa, uning perimetrini toping.
A) 48 B) 50 C) 52 D) 56 E) 54

16. (01-8-42) To'g'ri to'rtburchakning ikkita uchidan diagonaliga tushirilgan perpendikulyar uning diagonalini uchta teng bo'lakka ajratadi. To'g'ri tortburchakning kichik tomoni a ga teng. Uning katta tomonini toping.
A) $2a$ B) $a\sqrt{2}$ C) $a\sqrt{3}$ D) $3a$ E) $1,5a$

17. (02-2-36) Katetlari 6 sm dan bo'lgan to'g'ri burchakli uchburchakka, u bilan umumiy burchakka ega bo'lgan to'g'ri to'rtburchak ichki chizilgan. Bu to'rtburchakning perimetrini toping.
A) 12 B) 16 C) 20 D) 10 E) 14

18. (02-2-38) To'g'ri to'rtburchakning perimetri 52 ga, uning diagonallari kesishgan nuqtadan tomonlarigacha bo'lgan masofalar ayirmasi 7 ga teng. To'g'ri to'rtburchakning kichik tomonini toping.
A) 6 B) 8 C) 5 D) 9 E) 7

19. (02-7-36) $ABCD$ to'g'ri to'rtburchakda $S_1 = 2$; $S_2 = 6$; $S_3 = 3$ bo'lsa, S_4 ni toping.
A) 9 B) 10 C) 7 D) 8 E) 12



20. (03-4-50) To'g'ri to'rtburchakka diagonallar o'tkazish natijasida u to'rtta uchburchakka ajratildi. Shu uchburchaklardan birining yuzi 27 ga teng. To'g'ri to'rtburchakning yuzini toping.
A) 112 B) 108 C) 111 D) 96 E) 102

21. (03-5-51) To'g'ri to'rtburchak yuzini ifodalaydigan son uning perimetrini ifodalaydigan sonning 120% iga teng. Agar to'g'ri to'rtburchakning asosi balandligidan 2 birlik uzun bo'lsa, uning yuzini toping.
A) 24 B) 15 C) 35 D) 8 E) 48

22. (03-6-27) To'g'ri to'rtburchak shaklidagi maydonning eni 32 m. Agar shu maydonning yuzi 2 gektar bo'lsa, uning bo'yi necha metr bo'ladi?
A) 610 B) 615 C) 620 D) 625 E) 630

23. (03-6-34) To'g'ri to'rtburchakning bo'yi 20% va eni 10% ga orttirilsa, uning yuzi necha protsent ortadi?
A) 30 B) 20 C) 27 D) 32 E) 35

24. (03-6-35) To'g'ri to'rtburchakning bo'yi 30% orttirilsa va eni 30% kamaytirilsa, uning yuzi qanday o'zgaradi?
A) o'zgarmaydi B) 9% kamayadi C) 15% kamayadi D) 7% kamayadi E) 7% ortadi

25. (03-11-29)* O'lchovlari 8 va 20 ga teng bo'lgan to'g'ri to'rtburchaklardan eng kamida nechtasini birlashtirib, kvadrat hosil qilish mumkin?
A) 10 B) 12 C) 6 D) 8 E) 15

26. (03-11-34) To'g'ri to'rtburchakning perimetri 32 ga, yuzasi esa 48 ga teng. Uning diagonallari orasidagi burchakning sinusini toping.
A) $\frac{3}{5}$ B) $\frac{3}{4}$ C) $\frac{2}{5}$ D) $\frac{4}{5}$ E) $\frac{2}{3}$

27. (03-12-38) Diagonali 18 ga teng bo'lgan to'g'ri to'rtburchakning yuzi eng ko'pi bilan nechaga teng bo'lishi mumkin?
A) aniqlab bo'lmaydi B) 180 C) 162 D) 174
E) 167

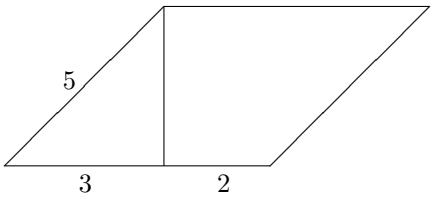
3.4.2 Romb.

d_1, d_2 romb diagonallari a tomoni α biror burchagi, h balandligi.

1. $S = \frac{1}{2}d_1d_2$;
2. $S = ah$;
3. $S = a^2 sin\alpha$;
4. $d_1^2 + d_2^2 = 4a^2$.
5. Rombning diagonallari o'zaro perpendikulyardir.
6. Rombning diagonali uning burchagini teng ikkiga bo'ladi.

(98-6-36) Rombning uchidan tushirilgan balandligi uning tomonini, o'tkir burchagi uchidan boshlab hisoblaganda, 3 va 2 ga teng kesmalarga bo'ladi. Rombning yuzini toping.
A) 10 B) 20 C) 15 D) 18 E) 24

Yechish: Masalaning shartiga ko'ra rombning tomoni $a = 3 + 2 = 5$ ga teng.



U holda Pifagor teoremasiga ko'ra rombning balandligi $h = \sqrt{5^2 - 3^2} = 4$ ga teng. Shuning uchun uning yuzi $S = ab = 5 \cdot 4 = 20$ ga teng bo'ladi. J:20 (B).

1. (96-6-38) Rombning yuzi 18 ga, diagonallaridan biri 9 ga teng. Ikkinchi diagonalining uzunligi qancha?
   A) $3,5$ B) 5 C) $4,5$ D) 4 E) 6

2. (97-7-44) Rombning $3\sqrt{3}$ ga teng bo'lgan balandligi tomonini teng ikkiga bo'ladi. Rombning perimetri toping.
   A) $12\sqrt{3}$ B) 24 C) 36 D) $36\sqrt{3}$ E) 48

3. (96-7-47) Rombning diagonallarini 3 : 4 kabi nisbatda, yuzi esa 384 ga teng. Uning tomonini toping.
   A) 18 B) 20 C) 24 D) 28 E) 30

4. (96-7-48) Rombning diagonali tomoni bilan 25^0 li burchak tashkil qiladi. Rombning katta burchagini toping.
   A) 165^0 B) 150^0 C) 130^0 D) 120^0 E) 115^0

5. (97-3-47) Rombning yuzi 24 ga, diagonallaridan biri 6 ga teng. Uning tomonini toping.
   A) 10 B) 5 C) 8 D) $4,8$ E) 6

6. (97-7-47) Rombning tomoni 10 ga, diagonallarining nisbati 4 : 3 ga teng. Rombning yuzini toping.
   A) 192 B) 96 C) 24 D) 60 E) 48

7. (97-9-104) Perimetri 14 ga teng bo'lgan ABCD romb berilgan. $A_1B_1C_1D_1$ to'rtburchak ushbu romb tomonlarining o'rtalarini tutashtiradi. $A_2B_2C_2D_2$ to'rtburchak $A_1B_1C_1D_1$ to'rtburchak tomonlarining o'rtalarini tutashtiradi. $A_2B_2C_2D_2$ to'rtburchakning perimetrini toping.
   A) 7 B) 10 C) 8 D) 6 E) 9

8. (97-9-114) Ikkita o'xshash romblar tomonlarining nisbati 3 ga teng. Ularning yuzlarining nisbatini hisoblang.
   A) 7 B) 8 C) 10 D) 11 E) 9

9. (97-9-115) Agar rombning bir diagonalini 10% ga uzaytirib, ikkinchi diagonalini 15% ga qisqartirilsa, rombning yuzi qanday o'zgaradi.
   A) 5% ortadi B) o'zgarmaydi C) $6,5$% kamayadi D) $5,65$% kamayadi E) $6,5$% ortadi

10. (97-10-47) Tomoni $2\sqrt{5}$ ga, diagonallaridan biri 4 ga teng bo'lgan rombning yuzini toping.
    A) 20 B) $8\sqrt{5}$ C) 16 D) 32 E) $24\sqrt{5}$

11. (97-10-48) Romb diagonallarining tomonlari bilan hosil qilgan burchaklari kattaliklarining nisbati 2 : 7 ga teng. Rombning kichik burchagini toping.
    A) 20^0 B) 30^0 C) 40^0 D) 60^0 E) 70^0

12. (98-1-45) To'g'ri burchakli uchburchakning burchaklaridan biri 60^0 ga teng. Bu uchburchakka romb shunday ichki chizilganki, 60^0 li burchak umumiy, rombning qolgan uchlari uchburchakning tomonlarida yotadi. Agar rombning tomoni $\frac{\sqrt{12}}{5}$ ga teng bo'lsa, berilgan uchburchakning katta katetini toping.
    A) $1,8$ B) $2,4$ C) $\frac{3\sqrt{3}}{5}$ D) $\frac{6\sqrt{3}}{5}$ E) $2,2$

13. (98-2-50) Rombning balandligi 5 ga, diagonallarining ko'paytmasi 80 ga teng. uning perimetrini toping.
    A) 32 B) 16 C) 24 D) 28 E) 20

14. (98-5-40) Perimetri $2p$ ga, diagonallarining yig'indisi m ga teng bo'lgan rombning yuzini toping.
    A) $\frac{m^2+p^2}{2}$ B) $\frac{m^2-p^2}{2}$ C) $\frac{m^2+p^2}{4}$
    D) $\frac{m^2-p^2}{4}$ E) $\frac{m^2 \cdot p^2}{4}$

15. (98-8-45) Teng yonli to'g'ri burchakli uchburchakka romb shunday ichki chizilganki, ularning bir burchagi umumiy rombning qolgan uchlari uchburchakning tomonlarida yotadi. Agar uchburchakning kateti $\frac{2+\sqrt{2}}{5}$ ga teng bo'lsa, rombning tomonini toping.
    A) $\frac{\sqrt{2}}{5}$ B) $0,2$ C) $0,4$ D) $\frac{2\sqrt{2}}{5}$ E) $0,1$

16. (98-10-23) Rombning tomoni 6 ga, o'tkir burchagi 30^0 ga teng. Uning diagonallari ko'paytmasini toping.
    A) 27 B) 18 C) 42 D) 36 E) 28

17. (99-2-49) Rombning tomoni 4 ga, yuzi 9 ga teng. Rombning diagonallari yig'indisini toping.
    A) 12 B) 11 C) 10 D) $9,5$ E) $11,5$

18. (99-4-45) Rombning kichik diagonali $\sqrt[4]{3}$ ga, yuzi $1,5$ ga teng. Uning o'tmas burchagini toping.
A) 150^0 B) 120^0 C) 135^0 D) 110^0 E) 140^0

19. (99-7-39) Rombning yuzi 16 ga, perimetri 12 ga teng. Uning diagonallari yig'indisini toping.
A) 8 B) 12 C) 11 D) 10 E) 9

20. (99-9-40) Rombning o'tmas burchagi 120^0 ga, katta dioganali $d\sqrt[4]{3}$ ga teng. Rombning yuzini toping.
A) $\frac{3}{4}d^2\sqrt{3}$ B) $0,6d^2\sqrt{3}$ C) $\frac{3d^2}{4}$ D) $\frac{1}{2}d^2$ E) $0,9d^2$

21. (00-1-52) Rombning tomoni 5 ga, diagonallaridan biri 6 ga teng. Rombning yuzini toping.
A) 24 B) 28 C) 30 D) 20 E) 22

22. (00-5-58) Agar rombning tomoni 10 ga, burchaklaridan biri esa 150^0 ga teng bo'lsa, uning yuzi qanchaga teng bo'ladi?
A) 100 B) 80 C) 90 D) 50 E) 60

23. (96-10-50) Rombning tomoni a, o'tmas burchagi α ga teng. Keltirilganlardan qaysi biri uning yuzini ifodalaydi?
A) $a^2 \cdot \cos\alpha$ B) $\frac{1}{2}a^2 \cdot \cos\alpha$ C) $\frac{1}{2}a^2 \cdot \sin\alpha$
D) $a^2 \cdot \sin\alpha$ E) $\frac{a^2}{\sin\alpha}$

24. (00-9-3) Rombning katta burchagi 120^0 ga, kichik diagonali $8\sqrt[4]{3}$ ga teng. Rombning yuzini toping.
A) 54 B) 102 C) 84 D) 48 E) 96

25. (01-5-36) ABCD rombda $A = 31^0$. Diagonallari O nuqtada kesishadi. BOC uchburchakning burchaklarini toping.
A) $15,5^0; 90^0; 74,5^0$ B) $31^0; 90^0; 59^0$
C) $15,5^0; 89,5^0; 75^0$ D) $31^0; 89^0; 60^0$
E) $15^0; 90^0; 75^0$

26. (01-8-39) Rombning tomoni 10 ga teng. Agar uning balandligi 4 ga uzaytirilsa, yuzi 50% ga ortadi. rombning yuzini toping.
A) 40 B) 60 C) 80 D) 100 E) 50

27. (01-10-43) Diagonallari 16 va 12 ga teng bo'lgan rombning o'tkir burchagi tangensini toping.
A) $\frac{5}{6}$ B) $\frac{3}{4}$ C) $\frac{7}{6}$ D) $\frac{7}{8}$ E) $\frac{24}{7}$

28. (01-11-45) Tomoni 10 ga va kichik diagonali 12 ga teng bo'lgan rombning yuzini toping.
A) 102 B) 94 C) 98 D) 104 E) 96

29. (97-2-38) Rombning tomoni 6 ga, yuzi 18 ga teng. rombning o'tmas burchagini toping.
A) 135^0 B) 120^0 C) 150^0 D) 140^0 E) 165^0

30. (02-2-37) Romb tomonining uning diagonallari bilan tashkil qilgan burchaklari nisbati $5:4$ kabi. Rombning o'tmas burchagini toping.
A) 100^0 B) 120^0 C) 96^0 D) 120^0 E) 140^0

31. (02-6-50) Diagonallari 32 va 24 ga teng bo'lgan rombning o'tmas burchagi kotangensini toping.
A) $-\frac{5}{21}$ B) $-\frac{7}{24}$ C) $-\frac{9}{28}$ D) $-\frac{7}{16}$ E) $-\frac{3}{7}$

32. (02-12-60) Rombning tomoni 10 ga, kichik diagonali 12 ga teng. Rombning yuzini toping.
A) 98 B) 96 C) 94 D) 102 E) 92

33. (03-3-60) Rombning yuzi 12 ga, diagonallarining nisbati $1:2$ ga teng. Romb tomonining uzunligini toping.
A) 4 B) $\sqrt{7}$ C) $\sqrt{15}$ D) 6 E) 2

34. (03-5-60) Rombning perimetri 24 ga teng bo'lib, diagonallaridan biri uning tomoni bilan 75^0 li burchak tashkil etadi. Rombning qarama-qarshi tomonlari orasidagi masofani toping.
A) 3 B) 4 C) $3,2$ D) $3,5$ E) $3,6$

35. (03-7-45) Rombning yuzi 24 ga, diagonalalarining nisbati $0,75$ ga teng. Shu rombning tomonini toping.
A) 7 B) 4 C) 5 D) 10 E) 9

36. (03-8-1) ABCD rombning diagonalalri 5 va 12 ga teng. Katta diagonali AC da N nuqta olingan va $AN : NC = 4 : 1$. AND uchburchakning yuzini toping.
A) 11 B) 12 C) $12,5$ D) 13 E) $13,25$

37. (03-10-64) Rombning burchaklaridan biri boshqasidan uch marta katta, perimetri esa 20 ga teng. Rombning yuzini toping.
A) $12\sqrt{3}$ B) $12,5\sqrt{2}$ C) $10,5\sqrt{3}$ D) $8\sqrt{3}$
E) $7,5\sqrt{3}$

38. (03-11-35) Rombning perimetri 52 ga, diagonallarining yig'indisi 34 ga teng. Rombning yuzini toping.
A) 30 B) 128 C) 32 D) 120 E) 24

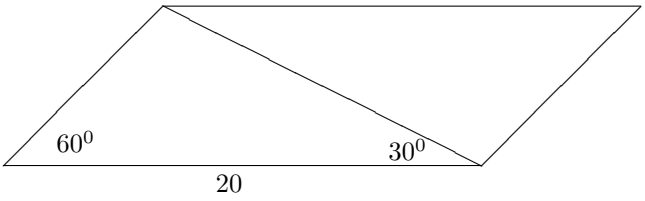
3.4.3 Parallelogramm.

$\varphi-$ diagonallar orasidagi burchak.

1. $S = a \cdot h_a$;
2. $S = absin\alpha$;
3. $S = \frac{1}{2}d_1d_2sin\varphi$;
4. $d_1^2 + d_2^2 = 2(a^2 + b^2)$.
5. Parallelogrammning diagonali uning yuzini teng ikkiga bo'ladi.
6. Parallelogrammning diagonallari kesishish nuqtasida teng ikkiga bo'linadi.
7. Parallelogrammning qarama-qarshi burchaklari teng.

(98-2-49) Parallelogrammning o'tkir burchagi 60^0 ga teng. Uning kichik diagonali katta tomoni bilan 30^0 li burchak tashkil qiladi. Parallelogrammning katta tomoni 20 ga teng. Uning yuzini toping.
A) $100\sqrt{2}$ B) 85 C) $95\sqrt{3}$ D) $100\sqrt{3}$ E) $110\sqrt{3}$

Yechish: Parallelogrammning kichik diagonali uning yon tomoni bilan $180^0 - (60^0 + 30^0) = 90^0$ burchak hosil qiladi. Demak, parallelogrammning kichik diagonali undan to'g'ri burchakli uchburchak ajratar ekan.



Parallelogrammning yon tomoni x ni topamiz. $x = 20 \cdot \sin 30^0 = 10$. U holda uning yuzi

$$S = 20 \cdot 10 \cdot sin60^0 = 20 \cdot 10 \cdot \frac{\sqrt{3}}{2} = 100\sqrt{3}$$

ga teng bo'ladi. J: $100\sqrt{3}$ (D).

1. (96-1-45) Yuzasi $144sm^2$, balandliklari 8sm va 12sm bo'lgan parallelogrammning perimetrini toping.
   A) 40 B) 30 C) 80 D) 120 E) 60

2. (96-3-102) Parallelogrammning yon tomoni 3 ga teng va u kichik diagonalga perpendikulyar. Parallelogrammning yuzi 12 ga teng bo'lsa, uning asosiga tushirilgan balandligini toping.
   A) 2sm B) 2,2sm C) 2,3sm D) 2,1sm E) 2,4sm

3. (96-12-106) Parallelogrammning yon tomoni uning kichik diagonaliga perpendikulyar. Agar parallelogrammning kichik diagonali 4 sm ga, yuzi 12 sm^2 ga teng bolsa, uning asosini toping.
   A) 6sm B) 7sm C) 5,5sm D) 5sm E) 6,5sm

4. (96-7-44) Parallelogrammning 5 ga teng bo'lgan diagonali uning 12 ga teng bo'lgan tomoniga perpendikulyar. Parallelogrammning perimetrini toping.
   A) 50 B) 34 C) 100 D) 48 E) 68

5. (96-9-36) Parallelogrammning yon tomoni uning kichik diagonaliga teng va unga perpendikulyar. Agar parallelogrammning yuzi $32sm^2$ bo'lsa, uning asosiga tushirilgan balandligini toping.
   A) 4 B) $4,5$ C) 3 D) $3,5$ E) 5

6. (96-9-97) Parallelogrammning diagonallari $6sm$ va $8sm$, ular orasidagi burchak 30^0. Parallelogrammning yuzini toping.
   A) 48 B) 24 C) $24\sqrt{3}$ D) 12 E) $12\sqrt{3}$

7. (96-9-100) Parallelogrammning tomonlari a va b ga, o'tmas burchagi α ga teng. Parallelogrammning yuzini hisoblash uchun quyidagi ifodalardan qaysi biri to'g'ri?
   A) $ab \cdot cos\alpha$ B) $\frac{1}{2}ab \cdot cos\alpha$ C) $ab \cdot sin\alpha$
   D) $\frac{ab}{2sin\alpha}$ E) $\frac{1}{2}ab \cdot sin\alpha$

8. (96-13-44) Parallelogrammning kichik diagonali yon tomoniga perpendikulyar va unga teng. Agar parallelogrammning yuzi $32sm^2$ bo'lsa, uning asosini toping.
   A) $6sm$ B) $9sm$ C) $7sm$ D) $5\sqrt{2}sm$ E) $8sm$

9. (97-1-30) Parallelogramm tomonlarining nisbati $3:5$ kabi. Agar parallelogrammning perimetri 48 ga, burchaklaridan biri 120^0ga teng bo'lsa, uning yuzini toping.
   A) $67,5$ B) $135\frac{\sqrt{3}}{4}$ C) 48 D) $67,5\sqrt{3}$ E) $48\sqrt{3}$

10. (97-3-44) Parallelogrammning burchaklaridan biri 150^0 ga teng. Uning 6 ga teng bo'lgan diagonali tomoniga perpendikulyar. Parallelogrammning perimetrini toping.
    A) 36 B) 48 C) $12(2+\sqrt{3})$ D) 36 E) $36\sqrt{3}$

11. (97-3-48) Parallelogrammning diagonali tomonlari bilan 20^0 va 50^0 li burchaklar tashkil qiladi. Parallelogrammning katta burchagini toping.
    A) 100^0 B) 145^0 C) 130^0 D) 110^0 E) 135^0

12. (97-5-44) Parallelogramm burchaklaridan ikkitasining ayirmasi 70^0 ga teng. Shu burchaklarni toping.
    A) $45^0; 115^0$ B) $65^0; 135^0$ C) $75^0; 105^0$
    D) $55^0; 125^0$ E) $60^0; 130^0$

13. (97-6-30) Parallelogrammning tomonlaridan biri ikkinchisidan 4 marta katta. Agar uning perimetri $20\sqrt{2}$ ga, o'tkir burchagi 45^0 ga teng bo'lsa, yuzini toping.
    A) $8\sqrt{2}$ B) $32\sqrt{2}$ C) 16 D) 8 E) $16\sqrt{2}$

14. (97-7-48) Ikkita burchagi yig'indisi 100^0 ga teng bo'lgan parallelogrammning katta burchagini toping.
    A) 100^0 B) 110^0 C) 120^0 D) 130^0 E) 150^0

15. (97-8-37) Tomonlari 4 va 8 bo'lgan parallelogrammning yuzi $16m^2$. Parallelogrammning o'tmas burchagini toping.
    A) 120^0 B) 150^0 C) 135^0 D) 105^0 E) 160^0

16. (97-9-44) Parallelogramm burchaklaridan ikkitasining ayirmasi 50^0 ga teng. Shu burchaklarni toping.
    A) $65^0; 115^0$ B) $60^0; 110^0$ C) $45^0; 135^0$
    D) $55^0; 115^0$ E) $50^0; 100^0$

17. (97-10-44) Burchklarining biri 45^0 bo'lgan, parallelogrammning 4 ga teng diagonali tomoniga perpendikulyar. Parallelogrammning perimetrini toping.
    A) 32 B) $8(1+\sqrt{2})$ C) $16\sqrt{2}$
    D) $4+8\sqrt{2}$ E) 24

18. (97-11-30) Perimetri 60 ga teng bo'lgan parallelogrammning tomonlari nisbati $2:3$ ga, o'tkir burchagi esa 30^0 ga teng. Parallelogrammning yuzini toping.
    A) 108 B) 54 C) 96 D) $48\sqrt{3}$ E) $54\sqrt{3}$

19. (98-9-44) ABCD parallelogrammning AC diagonaliga BO perpendikulyar tushirilgan. `AO=8`, `OC=6` va `BO=4` bo'lsa, parallelogrammning yuzini toping.
    A) 50 B) 28 C) 56 D) 52 E) 32

20. (99-1-33) ABCD parallelogrammning perimetri 10 ga teng. ABD uchburchakning perimetri 8 ga teng. BD diagonalning uzunligini toping.
    A) 3 B) 4 C) 2 D) $3,5$ E) $2,5$

21. (99-2-45) Parallelogrammning o'tkir burchagi uchidan uning shu uchidan o'tmaydigan tomonlariga

tushirilgan perpendikulyarlar orasidagi burchak 130^0 ga teng. Parallelogrammning o'tkir burchagini toping.
A) 40^0 B) 45^0 C) 50^0 D) 55^0 E) 35^0

22. (99-2-46) Parallelogrammning 6 ga teng bo'lgan kichik diagonali 8 ga teng bo'lgan kichik yon tomoniga perpendikulyar. Parallelogrammning katta tomoniga tushirilgan balandligini toping.
A) $4,2$ B) $4,4$ C) $4,6$ D) 4 E) $4,8$

23. (99-4-41) Balandliklari $12\sqrt{3}$ va 4 ga, ular orasidagi burchak 60^0 ga teng. Parallelogrammning yuzini toping.
A) $48\sqrt{3}$ B) 48 C) $24\sqrt{3}$ D) 96 E) 72

24. (00-1-51) ABCD parallelogrammda AC perpendikulyar CD ga va CE perpendikulyar AD ga, `AE=16` va `ED=4`. Parallelogrammning yuzini toping.
A) 150 B) 145 C) 155 D) 148 E) 160

25. (00-3-80) Parallelogramm o'tkir burchagining bissektrisasi uning diagonalini uzunliklari $3,2$ va $8,8$ bo'lgan kesmalarga ajratadi. Agar parallelogrammning perimetri 30 ga teng bo'lsa, uning katta tomonini toping.
A) 8 B) 9 C) 12 D) 11 E) 10

26. (00-3-82) Parallelogrammning tomonlari 11 va 23ga, diagonallarining nisbati $2:3$ ga teng. Uning katta diagonalini toping.
A) 18 B) 20 C) 24 D) 25 E) 30

27. (00-5-57) Tomonlari 5sm va 6 sm bo'lgan parallelogrammning yuzi $24sm^2$ ga teng. Parallelogrammning kichik diagonalini toping.
A) $\sqrt{97}$ B) 5 C) $4,5$ D) 4 E) 6

28. (00-6-42) Parallelogrammning tomonlari 12 va 5 ga teng. Uning katta tomoniga yopishgan burchaklarining bissektrisalari qarama-qarshi tomonni uch qismga ajratadi. Shu qismlardan eng kichigining uzunligini toping.
A) 2 B) $2,5$ C) $3,2$ D) $3,6$ E) 3

29. (00-7-41) ABCD parallelogrammning A burchagi 30^0 ga teng. A burchagining bissektrisasi BC tomonni E nuqtada kesib o'tadi. Agar `BE=4` ga va `EC=2` bo'lsa, parallelogrammning yuzini toping.
A) 10 B) 11 C) 9 D) 12 E) 8

30. (01-1-54) Parallelogrammning burchaklaridan biri ikkinchisidan uch marta katta. Parallelogrammning katta burchagini toping.
A) 105^0 B) 110^0 C) 120^0 D) 135^0 E) 150^0

31. (01-2-45) Diagonallari 6 va 8 ga, ular orasidagi burchak 60^0 ga teng bo'lgan parallelogrammning perimetrini toping.
A) $20\sqrt{2}$ B) $2(\sqrt{13}+\sqrt{37})$ C) $4\sqrt{13}$
D) $4\sqrt{37}$ E) $\sqrt{13}+\sqrt{17}$

32. (01-5-42) Parallelogrammning bir tomoni, shu tomonga tushirilgan balandlikdan 3 marta katta. Agar parallelogrammning yuzi 48 ga teng bo'lsa, uning shu tomonini toping.
A) 12 B) 16 C) 8 D) 24 E) 6

33. (01-6-50) Parallelogrammning ikki qo'shni tomonlari o'rtalarini tutashtiruvchi to'g'ri chiziq undan yuzi 32 ga teng bo'lgan uchburchak ajratadi. Parallelogrammning yuzini toping.
A) 250 B) 256 C) 254 D) 258 E) 255

34. (01-11-47) Parallelogrammning diagonallari $6\sqrt{2}$ va $8\sqrt{2}$ ga teng. Uning tomonlari kvadratlarining yig'indisini toping.
A) 100 B) 200 C) 196 D) 198 E) 400

35. (02-1-70) Parallelogrammning tomonlari 3 va 5 ga, uning kichik diagonali 4 ga teng. Shu parallelogrammning yuzini toping.
A) 6 B) 8 C) 10 D) 12 E) 14

36. (02-9-54) Diagonallari 16 va 12 ga teng bo'lgan barcha parallelogrammlardan yuzasi eng katta bo'lganining perimetrini toping.
A) 28 B) 32 C) 64 D) 48 E) 40

37. (02-12-59) Parallelogramm qo'shni tomonlarining yig'indisi 10 ga, ayirmasi esa 6 ga teng. Shu parallelogramm diagonallari kvadratlarining yig'indisini toping.
A) 120 B) 20 C) 136 D) 64 E) 32

38. (03-4-48) Parallelogrammning perimetri 44 ga teng. Uning diagonallari parallelogrammni to'rtta uchburchakka ajratadi. Shu uchburchaklardan ikkitasining perimetrlari ayirmasi 2 ga teng. Parallelogrammning katta tomoni uzunligini toping.
A) 10 B) 12 C) 8 D) $10,5$ E) $8,5$

39. (03-5-54) Parallelogramm diagonallarining yig'indisi 8 ga teng. Parallelogramm barcha tomonlari kvadratlari yig'indisining eng kichik qiymatini toping.
A) 32 B) 30 C) 64 D) 48 E) 34

40. (03-5-55) Parallelogrammning diagonali uning o'tmas burchagini $1:3$ nisbatda bo'ladi. Agar parallelogrammning perimetri 60 ga, o'tkir burchagi 60^0 ga teng bo'lsa, uning katta tomonini toping.
A) 20 B) 18 C) 22 D) 25 E) 24

41. (03-5-56)* Parallelogrammning o'tkir burchagi α 30^0 dan kichik emas va 45^0 dan katta emas. Qo'shni tomonlariga o'tazilgan ikkita balandligining ko'paytmasi 10 ga teng. Shu parallelogramm yuzasining eng katta qiymati nechaga teng bo'lishi mumkin?
A) 20 B) $10\sqrt{3}$ C) $10\sqrt{2}$ D) $5\sqrt{3}$ E) $20\sqrt{2}$

42. (03-6-74)* Asosi a va unga tushirilgan balandligi h ga teng bo'lgan uchburchak ichiga parallelogramm shunday chizilganki, parallelogrammning bir tomoni a asosida yotadi. Shu parallelogrammning yuzi eng katta qiymatga ega bo'lishi uchun uning asosini qanday tanlab olish kerak?
A) $a\frac{\sqrt{3}}{2}$ B) $\frac{a}{2}$ C) $\frac{a\sqrt{2}}{2}$ D) $\frac{a}{4}$ E) $\frac{a}{3}$

43. (03-11-28) Parallelogrammning diagonallari 4 va $\sqrt{32}$ ga teng. Ular 45^0 li burchak ostida kesishadi. Parallelogrammning katta balandligini toping.
A) 4 B) 2 C) $2\sqrt{2}$ D) $\sqrt{2}$ E) 3

44. (03-12-34) Diagonali 10 ga, o'tkir burchagi 45^0 ga teng parallelogrammning yuzi nimaga teng?
A) berilganlar yetarli emas
B) 50 C) $25\sqrt{2}$ D) $50\sqrt{2}$ E) 40

3.4.4 Trapetsiya.

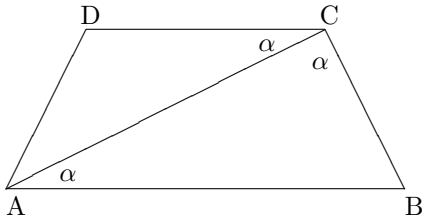
$l-$ ABCD ($AD\|BC$) trapetsiyaning o'rta chizig'i, $O-$esa AC va BD diagonallarining kesishgan nuqtasi.
$AD = a, BC = b$.

Trapetsiyaning elementlari.

1. $l = \frac{a+b}{2}$.
2. $\frac{OA}{OC} = \frac{OD}{OB} = \frac{AD}{BC}$.
3. ABCD teng yonli bo'lib, BE balandlik bo'lsa, $AE = \frac{a-b}{2}$, $ED = l = \frac{a+b}{2}$ bo'ladi.
4. Trapetsiyaning o'rta chizig'i uning diagonali va balandligini teng ikkiga bo'ladi.

(98-8-37) Teng yonli trapetsiyaning kichik asosi 3 ga, perimetri 42 ga teng. Uning diagonali o'tmas burchagini teng ikkiga bo'ladi. Trapetsiyaning o'rta chizig'ini toping.
A) 8 B) $8,5$ C) 12 D) $7,5$ E) 10

Yechish: Ikki parallel to'g'ri chiziq uchunchi to'g'ri chiziq bilan kesilganda ichki almashinuvchi burchaklar teng bo'ladi. Shu sababli ACD teng yonli uchburchak bo'ladi `(AD=CD)`.



Trapetsiyaning teng yonli ekanidan uning asosi va ikki yon tomonlari o'zaro teng ekani kelib chiqadi. Bu tomonlarni x bilan belgilab $x + x + x + 3 = 42$ tenglikni, bu yerdan esa $x = 13$ ni topamiz. U holda trapetsiyaning l o'rta chizig'i $l = \frac{13+3}{2} = 8$ ga teng. J: 8 (A).

1. (96-10-46) Teng yonli trapetsiyaning perimetri 36, o'rta chizig'i 10sm. Yon tomonining uzunligini toping.
A) 10 B) 8 C) 9 D) 13 E) 12

2. (96-1-43) Trapetsiyaning o'rta chizig'i 9 sm, asoslaridan biri ikkinchisidan 6 sm qisqa. Trapetsiyaning katta asosini toping.
A) 15 B) 18 C) 14 D) 12 E) 10

3. (96-6-27) ABCD trapetsiyaning asoslari $AB = 6$ va $DC = 3$. Uning AC va BD diagonallari O nuqtada kesishadi. $OC = 2$ bo'lsa, OA ni toping.
A) 16 B) 4 C) 12 D) 14 E) 8

4. (96-9-95) Trapetsiyaning kichik asosi 4sm. O'rta chizig'i katta asosidan 4sm qisqa. Trapetsiyaning o'rta chizig'ini toping.
A) 6 B) 10 C) 8 D) 9 E) 12

5. (96-10-47) Teng yonli trapetsiyaning asoslari 6 va 18 sm, diagonali 12 sm. Diagonallarining kesishish nuqtasida diagonal qanday kesmalarga bo'lingan?
A) 4 va 8 B) 3 va 9 C) 2 va 10
D) 5 va 7 E) $3,5$ va $8,5$

6. (96-9-96) Trapetsiya diagonallaridan birining uzunligi 27sm, ikkinchsi esa diagonallarning kesishish nuqtasida 10 va 8 sm li kesmalarga ajraldi. Birinchi diagonal qanday uzunlikdagi kesmalarga bo'lingan?
A) 20 va 7 B) 14 va 13 C) 18 va 9
D) 12 va 15 E) 10 va 17

7. (97-4-51) Teng yonli trapetsiyaning burchaklaridan biri 120^0 bo'lsa, shu traetsiya kichik asosining yon tomoniga nisbati qancha bo'lishi mumkin?
A) 2 B) $\frac{1}{2}$ C) aniqlab bo'lmaydi D) $1,5$ E) 3

8. (97-8-25) Trapetsiyaning katta asosi 12 ga teng. Agar uning bir diagonali diagonallari kesishgan nuqtasida 3 : 1 nisbatda bo'linsa, kichik asosini toping.
A) $4,8$ B) 9 C) 8 D) 6 E) 4

9. (97-9-103) Teng yonli trapetsiyaning burchaklaridan biri ikkinchisidan 4 marta katta bo'lsa, shu burchaklarni toping.
A) $30^0; 120^0$ B) $40^0; 60^0$ C) $25^0; 100^0$
D) $36^0; 144^0$ E) $32^0; 128^0$

10. (97-9-107) Teng yonli trapetsiyaning yon tomoni $4\sqrt{2}$ ga, kichik asosi 4 ga teng. uning diagonali yon tomoni va katta asosi bilan mos ravishda 30^0 va α burchak hosil qiladi. α burchakni toping.
A) 60^0 B) 35^0 C) 30^0 D) 50^0 E) 45^0

11. (97-12-17) ABCD to'g'ri burchakli trapetsiyaning ($AB\|DC$ va AB perpendikulyar AD ga) kichik diagonali katta yon tomoniga teng. Trapetsiyaning kichik diagonali va kichik asosi orasidagi burchak 40^0 ga teng. Trapetsiyaning o'tkir burchagini toping.
A) 40^0 B) 50^0 C) 30^0 D) 45^0 E) 35^0

12. (97-12-25) Teng yonli trapetsiyaning diagonali uning yon tomoniga perpendikulyar. Trapetsiyaning uchidan katta asosga tushirilgan balandligi uni 4 va 9 ga teng kesmalarga ajratadi. Trapetsiyaning balandligini toping.
A) 4 B) 5 C) 6 D) 7 E) 8

13. (98-1-37) Teng yonli trapetsiyaning diagonali uning o'tkir burchagini teng ikkiga bo'ladi. Agar trapetsiyaning perimetri 48 ga, katta asosi 18ga teng bo'lsa, uning o'rta chizig'ini toping.
A) 14 B) 15 C) 16 D) 12 E) 13

14. (98-2-51) Teng yonli trapetsiyaning asoslari 15 va 25 ga, balandligi esa 15 ga teng. Trapetsiyaning diagonalini toping.
A) 35 B) 28 C) 25 D) 30 E) 20

15. (98-5-38) Teng yonli trapetsiyaning yon tomoni 41 ga, balandligi 40 ga va o'rta chizig'i 45 ga teng. Trapetsiyaning katta asosini toping.
A) 50 B) 54 C) 55 D) 60 E) 65

16. (98-10-94) Asoslari 6 va 14 ga teng bo'lgan teng yonli trapetsiyaning diagonallari o'zaro perpendikulyar. Trapetsiyaning yon tomonini toping.
A) $\sqrt{29}$ B) $\sqrt{58}$ C) $2\sqrt{29}$ D) $4\sqrt{5}$ E) $7\sqrt{3}$

17. (99-1-34) Trapetsiyaning yon tomoni uchta teng qismga bo'lingan, bo'linish nuqtalaridan ikkinchi yon tomoniga asosga parallel kesmalar o'tkazilgan. Trapetsiyaning asoslari 2 va 5 ga teng bo'lsa, bu kesmalarning uzunliklarini toping.
A) $3; 4$ B) $2,5; 3,5$ C) $3,5; 4,5$
D) $2,5; 4$ E) $3; 4,5$

18. (99-1-45) Teng yonli trapetsiyaning katta asosi $2,7$ ga, yon tomoni 1 ga, ular orasidagi burchak 60^0 ga teng. Uning kichik asosini toping.
A) $1,7$ B) $2,35$ C) $1,35$ D) $2,7-\sqrt{3}$
E) $2,7-(\sqrt{3})/2$

19. (99-7-37) Teng yonli trapetsiyaning yon tomoni 5 ga, balandligi 4 ga va katta asosi 9 ga teng. Uning o'rta chizig'ini toping.
A) 4 B) 5 C) 3 D) 2 E) 6

20. (99-8-46) Trapetsiyaning asoslari 44 va 16 ga, yon tomonlari esa 25 va 17 ga teng. Trapetsiyaning balandligini toping.
A) 15 B) 14 C) 12 D) 16 E) 10

21. (99-8-47) Teng yonli trapetsiyaning yon tomoni 7 ga, diagonali 8 ga va o'rta chizig'i 4 ga teng. Trapetsiyaning kichik asosini toping.
A) 3 B) 4 C) 5 D) 2 E) $4,2$

22. (00-1-50) ABCD trapetsiyaning kichik asosi 6 ga teng. Agar ABE uchburchakning $(BE\|CD)$ perimetri 36 ga teng bo'lsa, trapetsiyaning perimetrini toping.
A) 45 B) 48 C) 42 D) 50 E) 52

23. (00-3-78) Teng yonli trapetsiyaning asoslari 4 va 6 ga, yon tomoni esa 5 ga teng. Trapetsiya diagonallari uzunliklarining yig'indisini toping.
A) 10 B) 12 C) 14 D) 15 E) 16

24. (00-3-79) To'g'ri burchakli trapetsiyaning diagonali uni tomoni 20 ga teng bo'lgan teng tomonli uchburchakka va to'g'ri burchakli uchburchakka bo'ladi. Trapetsiyaning o'rta chizig'ini toping.
A) 10 B) 12 C) 15 D) 16 E) 18

25. (00-7-45) ABCD trapetsiyaning AC diagonali yon tomoniga perpendukulyar hamda DAB burchakning bissektrisasida yotadi. Agar $AC=8$ va burchak $DAB=60^0$ bo'lsa, trapetsiyaning o'rta chizig'ini toping.
A) $1,5\sqrt{3}$ B) $2\sqrt{3}$ C) $2,5\sqrt{3}$ D) $4\sqrt{3}$ E) $3\sqrt{3}$

26. (01-1-55) O'tmas burchagi 120^0 ga, asoslarining uzunliklari 6 va 2 ga teng bo'lgan teng yonli trapetsiyaning perimetrini toping.
A) 12 B) 16 C) 18 D) 20 E) 14

27. (01-5-37) ABCD trapetsiyada $(AD\|BC)$ $\angle A=90^0$, $\angle C=135^0$ va $AB=2$. Agar diagonali yon tomoniga perpendikulyar bo'lsa, uning o'rta chizig'ini toping.
A) 3 B) 4 C) 6 D) 2 E) $2\sqrt{2}$

28. (01-5-38) Trapetsiyaning yon tomonlari 3 va 4, asoslari 10 va 5 ga teng. Yon tomonlarini davom ettirishdan hosil bo'lgan burchakning qiymatini toping.
A) 90^0 B) 60^0 C) 45^0 D) 120^0 E) 30^0

29. (01-5-39) Teng yonli trapetsiyaning bir asosi ikkinchisidan 2 marta katta. Katta asosining o'rtasi o'tmas burchagi uchidan kichik asos uzunligiga teng masofada yotadi. Trapetsiyaning burchaklarini toping.
A) $60^0; 120^0; 120^0; 60^0$ B) $45^0; 135^0; 135^0; 45^0$
C) $80^0; 100^0; 100^0; 80^0$ D) $30^0; 150^0; 150^0; 30^0$
E) $50^0; 130^0; 130^0; 50^0$

30. (01-10-44) Asoslari 17 va 7 ga teng bo'lgan trapetsiyaning diagonallari o'rtalarini tutashtiruvchi kesmaning uzunligini toping.
A) $3,5$ B) 4 C) 5 D) $4,5$ E) $6,25$

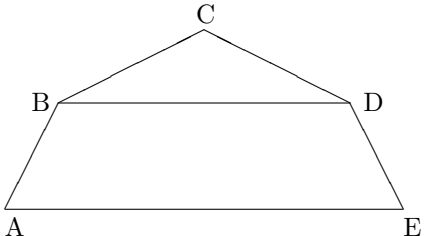
31. (02-2-39) O'tkir burchagi 60^0 bo'lgan teng yonli trapetsiyaning asoslari $1:2$ nisbatga teng. Agar trapetsiyaning perimetri 50 ga teng bo'lsa, uning katta asosini toping.
A) 20 B) 18 C) 22 D) 24 E) 16

32. (02-3-64) Trapetsiya asoslarining uzunliklari 28 va 12 ga teng. Trapetsiya diagonallari o'rtalarini tutashtiruvchi kesmaning uzunligini aniqlang.
A) 8 B) 10 C) 6 D) 9 E) 7

33. (02-9-49) ABCD trapetsiyada AC diagonal CD yon tomonga perpendikulyar. Agar $\angle D=72^0$ va $AB=BC$ bo'lsa, $\angle ABC$ ni toping.
A) 150^0 B) 144^0 C) 136^0 D) 112^0 E) 108^0

34. (02-10-35) Trapetsiyaning diagonallari uning o'rta chizig'ini uchta teng bo'lakka ajratsa, katta asosning kichik asosga nisbatini toping.
A) $2:1$ B) $3:1$ C) $3:2$ D) $5:2$ E) $7:3$

35. (97-9-111) Rasmdagi BCD teng yonli uchburchakning BCD burchagi 135^0. ABDE teng yonli trapetsiyaning ABD burchagi $112,5^0$ bo'lsa, $\frac{AB}{BC}$ nisbatini hisoblang.



A) 2 B) 3 C) 1,5 D) hisoblab bo'lmaydi E) 0,5

36. (03-2-47) Teng yonli trapetsiyaning diagonali $8\sqrt{3}$ ga teng va u asosi bilan 30^0 li burchak tashkil etadi. Trapetsiyaning o'rta chizig'i nimaga teng?
A) 16 B) 12 C) 10 D) 20
E)hisoblab bo'lmaydi

37. (03-5-59) ABCD trapetsiyaning o'rta chizig'i uni o'rta chiziqlari 13 va 17 bo'lgan ikkita trapetsiyaga ajratadi. ABCD trapetsiyaning katta asosini toping.
A) 19 B) 21 C) 18 D) 30 E) 23

38. (03-8-2) $ABCD(AB\|DC)$ trapetsiyada AB=6, BC=3, CD=4 va $DA = 2$ bo'lsa, C burchakning kosinusini toping.
A) $\frac{\sqrt{5}}{4}$ B) $-\frac{\sqrt{5}}{4}$ C) $-\frac{3}{4}$ D) $\frac{3}{4}$ E) $-\frac{\sqrt{5}}{4}$

39. (03-10-54) Teng yonli trapetsiya asoslarining ayirmasi uning yon tomoniga teng. Shu trapetsiyaning katta burchagini toping.
A) 120^0 B) 135^0 C) 150^0
D) 100^0 E) aniqlab bo'lmaydi

40. (03-11-45) Trapetsiyaning asoslari 8 va 12 ga, o'tkir burchaklaridan biri 30^0 ga teng. Yon tomonlari davom ettirilsa, to'g'ri burchak ostida kesishadi. Trapetsiyaning balandligini toping.
A) $\sqrt{3}$ B) $\sqrt{2}$ C) $2\sqrt{2}$ D) $2\sqrt{3}$ E) 3

41. (03-12-83) Trapetsiyaning diagonallari uning katta asosidagi burchaklarini teng ikkiga bo'ladi. Trapetsiyaning o'rta chizig'i 11,7 ga, perimetri esa 36 ga teng. Trapetsiya katta tomonining uzunligini toping.
A) 18 B) 17,6 C) 17,1 D) 16,3 E) 16,8

Trapetsiyaning yuzi

1. $S = \frac{a+b}{2} \cdot h$.

2. $S = \frac{1}{2} d_1 d_2 sin\varphi$.
$\varphi-$ diagonallari orasidagi burchak;

3. ABCD trapetsiyaning, AC va BD diagonallarining kesishgan nuqtasi O bo'lsin. $S_{AOB} = S_{COD} = \sqrt{S_{AOD} S_{BOC}}$

1. (96-3-48) Trapetsiyaning asoslari 6 va 2 ga teng, bir yon tomoni 8 ga, bu yon tomon bilan katta asosi orasidagi burchak 45^0 ga teng. Trapetsiyaning yuzini toping.
A) $18\sqrt{2}$ B) $16\sqrt{2}$ C) $14\sqrt{2}$
D) $15\sqrt{2}$ E) $12\sqrt{2}$

2. (96-7-43) Teng yonli trapetsiyaning asoslari 7 va 13 ga, o'tmas burchagi 135^0 ga teng. Shu trapetsiyaning yuzini hisoblang.
A) 60 B) 30 C) $10\sqrt{3}$ D) 136,5 E) 120

3. (96-11-49) Trapetsiyaning asoslari 5 va 3 ga, bir yon tomoni 2 ga teng va katta asos bilan 45^0li burchak hosil qiladi. Trapetsiyaning yuzini toping.
A) $4\sqrt{2}$ B) $6\sqrt{2}$ C) $5\sqrt{2}$ D) $\frac{5\sqrt{2}}{2}$ E) $6\sqrt{3}$

4. (97-1-38) Teng yonli trapetsiyaning asoslari 2,1 va 7,5 ga, diagonali esa 6 ga teng. Trapetsiyaning yuzini hisoblang.
A) 16,8 B) 14,5 C) 20,4 D) 17,28 E) 19,88

5. (97-3-43) Teng yonli trapetsiyaning asoslari 10 va 20 ga, asosidagi burchagi 60^0 ga teng. Shu trapetsiyaning yuzini hisoblang.
A) $500\sqrt{3}$ B) $75\sqrt{3}$ C) $25\sqrt{3}$ D) $250\frac{\sqrt{3}}{3}$
E) 150

6. (97-6-38) Teng yonli trapetsiyaning asoslari 4,2 va 5,4 ga, kichik asosidagi burchagi 135^0 ga teng. Trapetsiyaning yuzini hisoblang.
A) 24,8 B) 9,6 C) 16,8 D) 4,8 E) 2,88

7. (97-7-43) Teng yonli trapetsiyaning asoslari 16 va 8 ga, o'tmas burchagi 150^0 ga teng. Shu trapetsiyaning yuzini hisoblang.
A) $32\sqrt{3}$ B) $\frac{68}{\sqrt{3}}$ C) $16\sqrt{3}$ D) $\frac{34\sqrt{3}}{3}$ E) 34

8. (97-10-43) Asoslari 12 va 16 ga, o'tmas burchagi 120^0 ga teng bo'lgan teng yonli trapetsiyaning yuzini hisoblang.
A) $56\sqrt{3}$ B) $\frac{56}{\sqrt{3}}$ C) $28\sqrt{3}$ D) 14 E) 42

9. (97-11-38) Teng yonli trapetsiyaning asoslari 8 va 14 ga, yon tomoni esa 5 ga teng. Trapetsiyaning yuzini hisoblang.
A) 22 B) 36 C) 44 D) 80 E) 224

10. (98-9-49) ABCD trapetsiyaning asoslari $AD = 6, BC = 3$ ga, yuzi 30 ga teng. Uning yon tomonlari E nuqtada kesishguncha davom ettirilgan. BEC uchburchakning yuzini toping.
A) 12 B) 10 C) 8 D) 15 E) 14

11. (98-3-47) Asoslari 8 va 12 ga teng bo'lgan teng yonli trapetsiyaning diagonallari o'zaro perpendikulyar. Trapetsiyaning yuzi nechaga teng?
A) 100 B) 64 C) 144 D) 52 E) 76

12. (98-6-35) Diagonallari 10 va 12 ga teng bo'lgan trapetsiyaning yuzi eng ko'pi bilan nechaga teng bo'lishi mumkin?
A) 30 B) 120 C) $60\sqrt{3}$ D) $60\sqrt{2}$ E) 60

13. (98-11-38) Trapetsiyaning yuzasi 30 ga, balandligi 6 ga teng bo'lsa, uning o'rta chizig'i qanchaga teng bo'ladi?
A) 2,5 B) 5 C) 7,5 D) 4,5 E) 6

14. (98-11-83) Teng yonli trapetsiyaning asoslari 12 va 6 ga teng. Uning diagonallari o'zaro perpendikulyar bo'lsa, trapetsiyaning yuzi qanchaga teng bo'ladi?
A) 80 B) 64 C) 72 D) 81 E) 100

15. (99-2-47) Teng yonli trapetsiyaning yon tomoni va kichik asosi 5 ga, balandligi 4 ga teng. Trapetsiyaning yuzi 12 dan qancha ko'p?
A) 19 B) 22 C) 20 D) 18 E) 24

16. (99-5-44) BC va AD trapetsiyaning asoslari; $O-$ AC va BD diagonallarning kesishish nuqtasi. BOC

va AOD uchburchaklarning yuzlari mos ravishda 4 va 9 ga teng. Trapetsiyaning yuzini toping.
A) 16 B) 25 C) 26 D) 30 E) 36

17. (00-2-38) Trapetsiyaning yuzi 594 ga, balandligi 22 ga, asoslari ayirmasi 6 ga teng. Trapetsiya katta asosining uzunligini toping.
A) 34 B) 32 C) 28 D) 30 E) 36

18. (00-9-48) BC va AD trapetsiyaning asoslari; $O-$ AC va BD diagonallarning kesishish nuqtasi. BOC va AOD uchburchaklarning yuzlari mos ravishda 9 va 16 ga teng. Trapetsiyaning yuzini toping.
A) 32 B) 36 C) 49 D) 64 E) 56

19. (00-10-33) Trapetsiyaning o'rta chizig'i 3 ga, balandligi 8 ga teng. Uning yuzini hisoblang.
A) 24 B) 12 C) 16 D) 32 E) 28

20. (01-2-44) Teng yonli trapetsiyaning yon tomoni 5 ga teng, uning diagonali esa o'rta chizig'ini 3 va 7 ga teng kesmalarga bo'ladi. Trapetsiyaning yuzini hisoblang.
A) 45 B) 40 C) 35 D) 30 E) 25

21. (01-3-10) ABCD trapetsiyaning kichik asosi BC 8 ga va balandligi 10ga teng. ACD uchburchakning yuzi 60 ga teng bo'lsa, trapetsiyaning yuzini toping.
A) 120 B) 140 C) 100 D) 180 E) 160

22. (01-4-27) Trapetsiyaning asoslari 2 va 3 ga, katta asosiga yopishgan burchaklari 30^0 va 45^0 ga teng bo'lsa, trapetsiyaning yuzi qanchaga teng bo'ladi?
A) $\frac{5}{4}(\sqrt{3}-1)$ B) $\frac{5}{4}(\sqrt{3}+1)$ C)$\frac{4}{5}(\sqrt{3}-1)$
D) $\frac{4}{5}(\sqrt{3}+1)$ E)$\frac{2}{5}(\sqrt{3}+1)$

23. (01-6-49)Teng yonli trapetsiyaning diagonali yon tomoniga perpendikulyar. Uning o'tmas uchidan tushirilgan balandligi 4 ga teng va asosini 4 : 1 nisbatda bo'ladi. Trapetsiyaning yuzini toping.
A) 30 B) 28 C) 32 D) 34 E) 26

24. (01-9-54) Katta asosi 32 ga teng va kichik asosi balandligidan 2 marta katta bo'lgan trapetsiyaning yuzi 132 dan katta va 161 dan kichik. Shu trapetsiyaning balandligi qanday oraliqda bo'ladi?
A) $(3;4)$ B) $(2,5;3)$ C) $(2;3)$ D) $(5;6)$ E) $(6;7)$

25. (01-11-46) Teng yonli trapetsiyaning diagonallari o'zaro perpendikulyar. Trapetsiyaning katta asosi $18\sqrt{2}$ ga, kichik asosi esa $6\sqrt{2}$ ga teng. Trapetsiyaning yuzini toping.
A) 290 B) 296 C) 288 D) 286 E) 284

26. (02-1-73) To'g'ri burchakli trapetsiyaning kichik asosi b ga, katta yon tomoni $6\sqrt{2}$, asosidagi burchagi 45^0 ga teng. Trapetsiyaning yuzini toping.
A) $3b+6$ B) $6b+12$ C) $6b+18$
D) $b+6$ E) $\frac{3b}{b+3}$

27. (02-9-55) Teng yonli trapetsiyaning yon tomoni va kichik asosi b ga, katta asosiga yopishgan burchagi α ga teng. Shu trapetsiyaning yuzini toping.
A) $2b^2sin\alpha$ B) $b^2sin2\alpha$ C) $sin\frac{\alpha}{2}$
D) $b^2sin\alpha cos^2\frac{\alpha}{2}$ E) $2b^2sin\alpha cos^2\frac{\alpha}{2}$

28. (02-12-62) Teng yonli trapetsiyaning diagonallari o'zaro perpendikulyar. Trapetsiyaning katta asosi $18\sqrt{2}$ ga, kichik asosi $6\sqrt{2}$ ga teng. Shu trapetsiyaning yuzini toping.
A) 288 B) 290 C) 248 D) $264\sqrt{2}$ E) $238\sqrt{2}$

29. (00-6-46)* To'g'ri burchakli trapetsiyaning o'tkir burchagi 45^0 ga, perimetri 2 ga teng. Balandlik qanday bo'lganda, shu trapetsiyaning yuzi eng katta bo'ladi?
A) $\sqrt{2}-0,5$ B) $0,5$ C) $\frac{\sqrt{2}}{2}$
D) $2-\sqrt{2}$ E) $\sqrt{2}-1$

30. (03-9-51) ABCD ($BC\|AD$) trapetsiyaning doagonallari O nuqtada kesishadi. Agar $BO=2, DO=4$ va BOC uchburchakning yuzi 6 ga teng bo'lsa, shu trapetsiyaning yuzini toping.
A) 42 B) 48 C) 52 D) 54 E) 60

31. (03-9-62) Teng yonli trapetsiyaning yon tomoni 5 ga teng, diagonali esa o'rta chizig'ini 3 va 7 ga teng bo'lgan kesmalarga ajratadi. Trapetsiyaning yuzini toping.
A) 30 B) 40 C) 45 D) 25 E) 50

32. (03-11-46) Teng yonli trapetsiyaning o'rta chizig'i 6 ga teng va diagonallari o'zaro perpendikulyar. Trapetsiyaning yuzini toping.
A) 36 B) 32 C) 49 D) 40 E) 25

3.5 Ko'pburchaklar.

1. Qavariq ko'pburchak ichki burchaklarining yig'indisi $(n-2)\pi$ ga teng.

2. Qavariq ko'pburchak tashqi burchaklarining yig'indisi 360^0 ga teng.

3. Qavariq ko'pburchak doagonallari soni $\frac{(n-3)n}{2}$ ga teng.

(99-4-39) Qavariq ko'pburchak ichki burchaklarining va bitta tashqi burchakgining yig'indisi $\frac{23\pi}{2}$ ga teng. Ko'pburchakning nechta tomoni bor?
A) 10 B) 11 C) 13 D) 15 E) 16

Yechish: Qavariq ko'pburchak ichki burchaklarining yig'indisi $(n-2)\pi$ ga teng. Masala shartida aytilgan tashqi burchak α ga teng bo'lsin. U holda shartga ko'ra $(n-2)\pi+\alpha=\frac{23}{2}\pi$. Bu tenglikni π ga bo'lamiz. $n-2+\frac{\alpha}{\pi}=11+\frac{1}{2}$. Endi $\alpha<\pi$ ekanidan tenglik chap qismining butun qismi $n-2$ ga, kasr qismi esa $\frac{\alpha}{\pi}$ ga teng. Shu sababli $n-2=11$ va $\frac{\alpha}{\pi}=\frac{1}{2}$. Bu yerdan $n=13, \alpha=\frac{\pi}{2}$ ekanini hosil qilamiz. J: 13 (C)

1. (96-3-45) Har bir ichki burchagi 150^0 bo'lgan qavariq ko'pburchakning nechta tomoni bor?
A) 5 B) 7 C) 10 D) 12 E) 15

2. (96-3-92) α_3, α_4 va α_5 mos ravishda uchburchak, qavariq to'rtburchak va beshburchak tashqi burchaklarining yig'indilari. Quyidagi munosabatlardan qaysi biri o'rinli?

A) $\alpha_3 < \alpha_4 < \alpha_5$ B) $\alpha_3 = \alpha_4 < \alpha_5$
C) $\alpha_3 < \alpha_4 = \alpha_5$ D) $\alpha_3 = \alpha_5 < \alpha_4$
E) $\alpha_3 = \alpha_4 = \alpha_5$

3. (96-6-39) Ikkita o'xshash ko'pburchak perimetrlarining nisbati 2 : 3 kabi. Katta ko'pburchakning yuzi 27 bo'lsa, kichik ko'pburchakning yuzini toping.
A) 12 B) 18 C) 16 D) 14 E) 10

4. (96-7-42) $\beta-$ muntazam sakkiz burchakning ichki burchagi bo'lsa, $ctg\beta$ ning qiymatini toping.
A) $-\frac{1}{\sqrt{2}}$ B) -1 C) $\frac{1}{\sqrt{3}}$ D) $-\sqrt{3}$ E) 1

5. (96-9-27) Qavariq beshburchakning ichki burchaklari yig'indisi necha gradus?
A) 900^0 B) 720^0 C) 540^0 D) 600^0 E) 500^0

6. (96-9-93) Qavariq beshburchak burchaklaridan ikkitasi to'g'ri, qolganlari o'zaro 2 : 3 : 4 nisbatda. beshburchakning katta burchagini toping.
A) 90^0 B) 120^0 C) 150^0 D) 110^0 E) 160^0

7. (96-11-46) Har bir burchagi 135^0 bo'lgan qavariq ko'pburchakning nechta tomoni bor?
A) 5 B) 6 C) 8 D) 10 E) 12

8. (96-12-48) Har bir ichki burchagi 120^0 bo'lgan qavariq ko'pburchakning nechta tomoni bor?
A) 6 B) 8 C) 10 D) 12 E) 15

9. (96-12-93) Muntazam sakkizburchakning tashqi burchagi necha gradus?
A) 40^0 B) 60^0 C) 72^0 D) 45^0 E) 35^0

10. (96-13-33) Muntazam beshburchakning ichki burchagi necha gradus?
A) 135^0 B) 105^0 C) 102^0 D) 108^0 E) 120^0

11. (97-3-42) $\alpha-$ muntazam o'n ikki burchakning ichki burchagi bo'lsa, $sin\alpha$ ning qiymatini toping.
A) $-\frac{1}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $-\frac{\sqrt{2}}{2}$ D) $\frac{1}{2}$ E) $\frac{1}{\sqrt{2}}$

12. (97-4-52) Muntazam sakkizburchak ichki burchagining sinusini toping.
A) $-\frac{\sqrt{2}}{2}$ B) $-\frac{1}{2}$ C) $-\frac{\sqrt{3}}{2}$ D) $\frac{1}{2}$ E) $\frac{\sqrt{2}}{2}$

13. (97-7-42) $\beta-$ muntazam oltiburchakning ichki burchagi, $tg\beta$ ning qiymatini toping.
A) $\frac{1}{\sqrt{3}}$ B) $-\frac{\sqrt{2}}{2}$ C) $-\sqrt{3}$ D) $-\frac{\sqrt{3}}{3}$ E) $\frac{\sqrt{3}}{2}$

14. (97-8-15) Quyidagi mulohazalardan qaysi biri noto'g'ri?
A) teng tomonli uchburchakning balandliklari kesishish nuqtasida 2 : 1 nisbatda bo'linadi.
B) agar ikkita teng yonli uchburchakning asoslari va asoslaridagi burchaklari teng bo'lsa, bunday uchburchaklar tengdir.
C) qavariq beshburchak ichki burchaklarining yig'indisi 540^0 ga teng.
D) ikki qo'shni burchakning yig'indisi 180^0 ga teng.
E) agar bir uchburchakning bir tomoni va shu tomon qarshisidagi burchagi, ikkinchi uchburchakning bir tomoni va shu tomon qarshisidagi burchagiga mos ravishda teng bo'lsa, bu uchburchaklar tengdir.

15. (97-8-38) Ikkita o'xshash ko'pburchak yuzlarining nisbati 9 : 4 ga teng. Kichik ko'pburchakning perimetri 4 sm. Katta ko'pburchakning perimetrini toping.
A) 9 B) 8 C) 6 D) 4 E) 10

16. (97-9-112) Muntazam o'nsakkizburchak ichki burchagi uchlanganining kosinusini toping.
A) $-\frac{1}{2}$ B) $\frac{\sqrt{2}}{2}$ C) $\frac{\sqrt{3}}{2}$ D) 0 E) 1

17. (97-10-42) α - muntazam sakkizburchakning ichki burchagi $cos\alpha$ ning qiymatini toping.
A) $\frac{1}{2}$ B) $-\frac{\sqrt{3}}{2}$ C) $-\frac{1}{\sqrt{2}}$ D) $\frac{\sqrt{2}}{2}$ E) $-\frac{1}{\sqrt{3}}$

18. (98-1-48) Tashqi burchagi 36^0 ga teng bo'lgan muntazam ko'pburchakning nechta tomoni bor?
A) 8 B) 10 C) 12 D) 15 E) 18

19. (98-4-10) Qavariq yigirmaburchakning dioganallari nechta?
A) 170 B) 40 C) 200 D) 160 E) 120

20. (98-6-40) Muntazam sakkizburchakning ichki burchaklari nimaga teng?
A) $\frac{5\pi}{4}$ B) 120^0 C) 130^0 D) 150^0 E) 135^0

21. (98-8-48) Har bir tashqi burchagi 24^0 dan bo'lgan muntazam ko'pburchakning nechta tomoni bor?
A) 24 B) 18 C) 15 D) 12 E) 10

22. (98-11-89) Muntazam sakkizburchakning nechta diagonali bor?
A) 8 B) 10 C) 24 D) 16 E) 20

23. (98-12-69) Agar qavariq ko'pburchakning diagonallari 90 ta bo'lsa, uning tomonlari nechta bo'ladi?
A) 15 B) 20 C) 30 D) 45 E) 12

24. (99-1-37) Muntazam ko'pburchakning tashqi burchagi 36^0 ga teng. Uning nechta tomoni bor?
A) 10 B) 6 C) 8 D) 12 E) 9

25. (99-2-48) Muntazam ABCDEF oltiburchakning tomoni 6 ga teng. C uchidan AE diagonalgacha bo'lgan masofani toping.
A) 8 B) 9 C) 10 D) 7 E) 12

26. (99-8-52) Ko'pburchakning tomoni 5 ga teng. Yuzasi berilgan ko'pburchakning yuzasidan 4 marta katta hamda unga o'xshash bo'lgan ko'pburchakning tomonini toping.
A) 20 B) 10 C) 12 D) 16 E) 14

27. (99-10-49) Muntazam ko'pburchakning tashqi burchagi 60^0 ga teng, perimetri 54 ga teng. Uning katta diagonalini toping.
A) 12 B) 16 C) 18 D) 20 E) 10

28. (00-3-81) Agar qavariq ko'pburchak ichki burchaklarining yig'indisi tashqi burchaklari yig'indisidan 4 marta katta bo'lsa, uning tomonlari nechta?
A) 5 B) 6 C) 10 D) 8 E) 12

29. (00-5-62) Qavariq 12 burchakli ko'pburchakning diagonallari nechta?
A) 42 B) 36 C) 54 D) 52 E) 62

30. (00-6-38) Ichki burchaklari yig'indisi uning har bir uchidan bittadan olingan tashqi burchaklari yig'indisidan 6 marta katta bo'lgan ko'pburchakning tomoni nechta?
A) 16 B) 10 C) 15 D) 12 E) 14

31. (01-3-40) Qavariq yettiburchakning har bir uchidan bittadan olingan tashqi burchaklari yig'indisini toping.
A) 5π B) 7π C) 2π D) $3,5\pi$ E) 4π

32. (01-3-41) Har bir ichki burchagi 135^0 dan bo'lgan muntazam ko'pburchakning nechta tomoni bor?
A) 8 B) 7 C) 6 D) 10 E) 9

33. (01-3-42) Qavariq o'nikkiburchakning nechta diagonali bor?
A) 24 B) 54 C) 36 D) 30 E) 18

34. (01-3-43) Qavariq o'nikkiburchak ichki burchaklarining yig'indisi qavariq oltiburchak ichki burchaklarining yig'indisidan necha marta katta?
A) 2 B) 3 C) 2,5 D) 4 E) 3,5

35. (01-5-44) ABCDEF muntazam oltiburchakning yuzi 144 ga teng. ABC uchburchakning yuzini toping.
A) 24 B) 16 C) 48 D) 12 E) 22

36. (01-11-43) Muntazam ko'pburchakning uchidagi ichki va bitta tashqi burchagi ayirmasi 120^0 ga teng bo'lsa, uning tomoni nechta bo'ladi?
A) 10 B) 12 C) 9 D) 14 E) 8

37. (01-12-7) Muntazam ko'pburchakning har bir uchidan bittadan olingan 7 ta tashqi burchagi yig'indisi 84^0 ga teng. Ko'pburchakning tomonlari nechta?
A) 12 B) 24 C) 28 D) 32 E) 30

38. (01-12-15)* Eng kichik burchagi 50^0 bo'lgan biror qavariq ko'pburchakning ichki burchaklari, ayirmasi 10^0 bo'lgan arifmetik progressiyani tashkil qiladi. Bu ko'pburchakning tomoni eng ko'pi bilan nechta bo'lishi mumkin?
A) 3 ta B) 27 ta C) 24 ta D) 5 ta E) 30 ta

39. (02-8-29) Muntazam n burchakning ichki bir burchagi tashqi bir burchagidan 5 marta katta bo'lsa, bu ko'pburchakning diagonallari soni nechta?
A) 54 B) 32 C) 36 D) 42 E) 35

40. (02-9-50) Ko'pburchakning diagonallari soni uning tomonlari sonidan 2,5 marta ko'p. Ko'pburchakning tomoni nechta?
A) 5 B) 6 C) 7 D) 8
E) bunday ko'pburchak mavjud emas.

41. (02-11-60) Qavariq ko'pburchakning diagonallari uning tomonlaridan 12 ta ko'p. Ko'pburchakning tomonlari nechta?
A) 5 B) 6 C) 8 D) 9 E) 10

42. (02-12-58) Muntazam ko'pburchakning uchidagi tashqi burchaklaridan biri 30^0 ga teng. Bu ko'pburchakning nechta tomoni bor?
A) 15 B) 13 C) 14 D) 12 E) 16

43. (03-1-42)* Qavariq ko'pburchakning n ta ichki burchagi 30^0 dan kichik, n ning eng katta qiymati nechaga teng bo'lishi mumkin?
A) 2 B) 3 C) 4 D) 5
E) aniqlab bo'lmaydi

44. (03-1-47) Qavariq n burchakning diagonallari soni 25 tadan kam emas va 30 tadan ko'p emas, n nechaga teng bo'lishi mumkin?
A) 7 B) 8 C) 9 D) 10 E) 11

45. (03-2-48) Muntazam beshburchakning bir uchidan o'tkazilgan ikki diagonali orasidagi burchakni toping.
A) 30^0 B) 40^0 C) 36^0 D) 42^0 E) 48^0

46. (03-7-3) Muntazam oltiburchak ichidagi ixtiyoriy nuqtadan uning tomonlari yotgan to'g'ri chiziqlargacha bo'lgan masofalar yig'indisi 9 ga teng. Shu oltiburchakning perimetrini toping.
A) $5\sqrt{3}$ B) $4,5\sqrt{3}$ C) $6\sqrt{3}$ D) $5,5\sqrt{3}$ E) $4\sqrt{3}$

47. (03-8-3) Muntazam oltiburchak ichidagi ixtiyoriy nuqtadan uning tomonlari yotgan to'g'ri chiziqlargacha bo'lgan masofalar yig'indisi 9 ga teng bo'lsa, shu oltiburchakning yuzini toping.
A) $5\sqrt{3}$ B) $4,5\sqrt{3}$ C) $6\sqrt{3}$ D) $5,5\sqrt{3}$ E)$4\sqrt{3}$

48. (03-9-59) Diagonallari 14 ta bo'lgan qavariq ko'pburchakning nechta tomoni bor?
A) 5 B) 6 C) 7 D) 8 E) 10

49. (03-10-53) Muntazam oltiburchak tomonining uzunligi 1 ga teng. Shu oltiburchak tomonlarining o'rtalari ketma - ket tutashtirildi, so'ngra hosil bo'lgan oltiburchak tomonlarining o'rtalari yana ketma - ket tutashtirildi va h.k. Hosil bo'lgan barcha oltiburchaklar yuzlarining yig'indisini toping.
A) $3\sqrt{3}$ B) $2\sqrt{6}$ C) $2\sqrt{3}$ D) $3\sqrt{6}$ E) $6\sqrt{3}$

50. (03-11-43) Muntazam oltiburchakning tomoni $4\sqrt{6}$ ga teng. Shu ko'pburchakka tengdosh bo'lgan teng tomonli uchburchakning tomonini toping.
A) 24 B) 18 C) 12 D) 30 E)16

51. (03-11-44) Tomonlari ayirmasi 4 ga teng bo'lgan arifmetik progressiya tashkil etuvchi ko'pburchakning perimetri 75 ga, eng katta tomoni 23 ga teng. Bu ko'pburchakning tomonlari soni nechta?
A) 5 B) 6 C) 7 D) 4 E) 3

3.6 Aylana va doira

3.6.1 Urinma, vatar, radius, diametr.

1. (97-9-105) AB vatar 90^0 li yoyni tortib turadi. AB ga doiraning O markazidan OD perpendikulyar tushirilgan. $\frac{AB}{OD}$ nisbatni hisoblang.
A) 3 B) 4 C) 2 D) 2,5 E)3,3

2. (98-9-43) Radiusi R ga teng bo'lgan aylanadagi nuqtadan uzunliklari R ga teng bo'lgan ikkita vatar o'tkazildi. vatarlar orasidagi burchakni toping.
A) 40^0 B) 110^0 C) 135^0 D) 120^0 E)150^0

3. (00-1-49) Ikkita aylana shunday joylashganki, ularning har biri ikkinchisining markazidan o'tadi. Shu aylanalarga o'tkazilgan umumiy vatar ularning markazlaridan qanday burchak ostida ko'rinadi?
A) 170^0 B) 160^0 C) 145^0 D) 120^0 E)90^0

4. (00-2-36) Aylananing A nuqtasidan o'tkazilgan AB va AC vatarlarning uzunliklari mos ravishda 5 va 12 ga teng. Agar ularning ikkinchi uchlari tutashtirilsa, yuzi 15 ga teng uchburchak hosil bo'ladi. AB va AC vatarlar orasidagi o'tkir burchakni toping.
A) 30^0 B) 15^0 C) 45^0 D) 60^0 E)20^0

5. (98-2-52) Radiusi 5 ga teng aylananing markazidan 4 ga teng masofada joylashgan nuqta orqali diametrga perpendikuliyar vatar o'tkazilgan. Shu vatarning uzunligini toping.
A) 8 B) 6 C) 7 D) 9 E)4

6. (99-8-53) Radiusi 5 sm bo'lgan doiradagi 8 sm li vatar doira markazidan necha sm uzoqlikda bo'ladi?
A) 3 B) 4 C) $2,6$ D) $2,8$ E)$3,2$

7. (00-8-24) Aylana diammetrining uchlaridan aylanaga o'tkazilgan urinmagacha bo'lgan masofalar $1,6$ va $0,6$ ga teng. Diametrning uzunligini toping.
A) $2,2$ B) $1,8$ C) 2 D) $2,4$ E)$1,9$

8. (01-12-53) Aylana tashqarisidagi nuqtadan aylanaga ikkita urinma o'tkazilgan. Agar urinmalar orasidagi burchak 72^0 bo'lsa, aylananing urinish nuqtalari orasidagi katta yoyini toping.
A) 252^0 B) 240^0 C) 228^0 D) 236^0 E)248^0

9. (02-1-33) Aylananing kesishuvchi ikkita vatari orasidagi burchaklardan biri 80^0 ga teng. Shu burchakka qo'shni bo'lgan burchaklarning yig'indisini toping.
A) 100^0 B) 90^0 C) 200^0 D) 160^0 E)150^0

10. (02-2-42) Aylana markazidan turli tomonda uzunliklari 36 va 48 ga teng bo'lgan parallel vatarlar o'tkazilgan. Ular orasidagi masofa 42 ga teng bo'lsa, aylananing radiusini toping.
A) 30 B) 28 C) 32 D) 26 E)34

11. (02-7-23) Radiuslari 6 va 2 sm bo'lgan aylanalar tashqi tomondan urinadi. Aylanalarning urinish nuqtasidan ularning umumiy urinmalarigacha bo'lgan masofani (sm) aniqlang.
A) 3 B) 2 C) 4 D) $2,5$ E)$3,5$

12. (02-8-30) Aylanadan tashqaridagi nuqtadan o'tkazilgan ikki urinmaning urinish nuqtalari aylanani $1:9$ nisbatdagi ikkita yoyga ajratadi. Urinmalar orasidagi burchakni toping.
A) 144^0 B) 72^0 C) 120^0 D) 110^0
E) aniqlab bo'lmaydi

3.6.2 Aylananing uzunligi.

1. Aylananing uzunligi $L = 2\pi R$

1. (96-6-29) Aylananing $6\sqrt{3}$ ga teng bo'lgan vatari 120^0 li yoyni tortib turadi. Aylananing uzunligini toping.
A) 12π B) 10π C) 13π D) 14π E) 9π

2. (97-2-29) Aylananing $12\sqrt{2}$ ga teng vatari 90^0 li yoyni tortib turadi. Aylananing uzunligini toping.
A) 24π B) 20π C) 22π D) 26π E) 28π

3. (97-8-28) Aylananing uzunligi $18\pi\sqrt{2}$ ga teng. Aylanadagi AB vatar 90^0 li yoyni tortib turadi. Vatarning uzunligini toping.
A) 8 B) 18 C) 16 D) 15 E) $8,5$

4. (01-3-4) Teng yonli to'g'ri burchakli uchburchaknng kateti uzunligi a ga teng bo'lgan aylananing diametriga teng. Gipotenuzaning uzunligini toping.
A) $\frac{\sqrt{2}a}{\pi}$ B) $\frac{a}{\pi}$ C) $\frac{a}{2\pi}$ D) $\frac{2a}{\pi}$ E) $\frac{a}{\sqrt{2}\pi}$

5. (01-8-37) Aylanadan tashqaridagi nuqtadan ungacha bo'lgan eng uzun va eng qisqa masofalar mos ravishda 6 va 2 ga teng. Aylananing uzunligini toping.
A) 2π B) π C) 4π D) 3π E) $2,5\pi$

3.6.3 Aylananing yoyining uzunligi.

1. α markaziy burchakka mos yoy uzunligi $l = R\alpha$.

(98-1-43) Radiusi 5 ga teng bo'lgan aylana yoyining uzunligi radiusi 2 ga teng aylana uzunligiga teng bo'lsa, hosil bo'lgan markaziy burchakni toping.
A) 120^0 B) 150^0 C) 144^0 D) 135^0 E) 148^0

Yechish: Radiusi 5 ga teng aylana yoyiga mos kelgan markaziy burchak α bo'lsin. U holda bu yoy uzunligi $l = \alpha \cdot 5$ ga teng. Radiusi 2 ga teng bo'lgan aylana uzunligi esa $2\pi \cdot r = 2\pi \cdot 2 = 4\pi$ ga teng. Masalaning shartiga ko'ra birinchi aylana yoyining uzunligi ikkinchi aylananing uzunligiga teng. $5\alpha = 4\pi$. Bu yerdan $\alpha = \frac{4\pi}{5} = 144^0$ ekanini topamiz. J:144^0 (C)

1. (96-3-46) Aylananing markaziy burchagi 100^0, u tiralgan yoy uzunligi 10 sm bo'lsa, aylananing radiusi necha sm ($\pi = 3$ deb olinsin)?
A) 5 B) 6 C) 3 D) 2 E) 8

2. (96-11-47) Aylananing markaziy burchagi 90^0, u tiralgan yoy uzunligi 15 sm bo'lsa, aylananing radiusi necha sm?
A) $\frac{15}{\pi}$ B) $\frac{18}{\pi}$ C) $\frac{24}{\pi}$ D) $\frac{30}{\pi}$ E) $\frac{36}{\pi}$

3. (96-12-49) Aylananing markaziy burchagi 60^0, u tiralgan yoy uzunligi 10 sm bo'lsa, aylananing radiusi necha sm?
A) $\frac{15}{\pi}$ B) $\frac{18}{\pi}$ C) $\frac{30}{\pi}$ D) $\frac{36}{\pi}$ E) $\frac{24}{\pi}$

4. (97-12-28) Uzunligi 30π ga teng bo'lgan aylananing 60^0 li yoyini tortib turuvchi yoy uzunligi qancha?
A) 12π B) 6π C) 5π D) 3π E) 7π

5. (98-8-43) Aylananing uzunligi radiusi 4 ga, markaziy burchagi 120^0 ga teng yoy uzunligiga teng. Aylananing radiusini toping.
A) $\frac{2\sqrt{2}}{3}$ B) $\frac{2\sqrt{2}}{\sqrt{3}}$ C) $2\frac{2}{3}$ D) $1\frac{1}{3}$ E) 2

6. (98-11-28) Radiusi 8 ga teng aylananing $\frac{\pi}{8}$ radianga teng bo'lgan yoyining uzunligini aniqlang.
A) $\frac{\pi}{64}$ B) π C) 2π D) $\frac{\pi}{32}$ E) $\frac{\pi}{2}$

7. (99-8-57) Uzunligi 10π ga teng bo'lgan aylana, radiusi 20 ga teng bo'lgan yoy shakliga keltirilgan. Hosil bo'lgan yoyning markaziy burchagini toping.
A) 90^0 B) 60^0 C) 120^0 D) 75^0 E) 45^0

8. (00-10-24) Radiusi 32 ga teng bo'lgan aylananing $\frac{\pi}{16}$ radianga teng yoyining uzunligini aniqlang.
A) $0,5\pi$ B) π C) 2π D) 4π E) 6π

9. (97-9-48) Radiusi 1 ga teng aylana uchta yoyga bo'lingan. Ularga mos markaziy burchaklar 1, 2, va 3 sonlarga proportsional. Yoylardan eng kattasining uzunligini toping.
A) $\frac{\pi}{3}$ B) π C) $\frac{3\pi}{2}$ D) $\frac{2\pi}{3}$ E) $\frac{4\pi}{3}$

10. (99-8-56) Radiuslari orasidagi burchagi 36^0 va radiusi uzunligi 5 ga teng bo'lgan sektor yoyining uzunligini toping.
A) 2π B) π C) $\frac{\pi}{2}$ D) $\frac{\pi}{3}$ E) $1,5\pi$

11. (01-5-46) Aylananing uzunligi 8π ga teng. Uzunligi uning 90^0 li yoyiga teng bo'lgan aylananing radiusini toping.
A) 1 B) 2 C) $\frac{1}{2}$ D) 3 E) $\frac{3}{2}$

12. (01-8-35) Aylana yoyining uzunligi aylana uzunligining 40 % ga teng. Shu yoyga tiralgan markaziy burchakni toping.
A) 72^0 B) 144^0 C) 124^0 D) 104^0 E) 136^0

13. (02-3-61) Radiusi 12 ga va markaziy burchagi 105^0 ga teng bo'lgan doiraviy sektorning yoyi aylana shakliga keltirilgan. Shu aylananing radiusini aniqlang.
A) $3,5$ B) $3,2$ C) $4,5$ D) 4 E) $4,2$

3.6.4 Ichki chizilgan va markaziy burchaklar. Urinma va vatar orasidagi burchak.

1. Aylanaga ichki chizilgan burchak – mos markaziy burchakning yarimiga teng.

1. (96-6-19) Aylanani AB vatar ikkita yoyga ajratadi. Bu yoylarning nisbati 4:5 kabi. AB vatar katta yoyning ixtiyoriy nuqtasidan qanday burchak ostida ko'rinadi?
A) 100^0 B) 95^0 C) 80^0 D) 85^0 E) 90^0

2. (97-2-19) Aylananing AB vatari o'zi ajratgan yoylardan birining ixtiyoriy nuqtasidan 80^0 li burchak ostida ko'rinadi. A va B nuqta chegarasi bo'lgan yoylar necha gradus?
A) 160^0 va 200^0 B) 80^0 va 280^0
C) 100^0 va 260^0 D) 110^0 va 250^0
E) 120^0 va 240^0

3. (97-5-42) Markaziy burchakka mos yoy aylananing $\frac{1}{6}$ qismiga teng. Shu markaziy burchakni toping.
A) 45^0 B) 60^0 C) 90^0 D) 30^0 E) 120^0

4. (97-5-48) Radiusi 1 ga teng aylana uchta yoyga bo'lingan. Ularga mos markaziy burchaklar 1; 2 va 6 sonlarga proporsional. Yoylardan eng kattasining uzunligini toping.
A) $\frac{4\pi}{3}$ B) $\frac{3\pi}{4}$ C) $\frac{2\pi}{9}$ D) $\frac{5\pi}{9}$ E) $\frac{4\pi}{9}$

5. (97-8-19) Aylananing MN vatari 140^0 li yoyni tortib turadi. MN vatar o'zi tortib turgan yoyning ixtiyoriy nuqtasidan qanday burchak ostida ko'rinadi?
A) 270^0 B) 70^0 C) 100^0 D) 110^0 E) 120^0

6. (97-9-42) Markaziy burchakka mos yoy aylananing $\frac{2}{5}$ qismiga teng. Shu markaziy burchakni toping.
A) 72^0 B) 144^0 C) 15^0 D) 216^0 E) 36^0

7. (97-12-18) 140^0 li yoyga tiralgan vatar aylanani ikki qismga ajratadi. Katta yoyning ixtiyoriy nuqtasidan qaraganda, bu vatar qanday burchak ostida ko'rinadi?
A) 110^0 B) 115^0 C) 120^0 D) 70^0 E) 65^0

8. (98-4-19) Chizmada $\angle MNO = 35^0$ ga; $\angle MEO = 25^0$ bo'lsa, $\angle NOE$ ni toping.
A) 105^0 B) 120^0 C) 150^0 D) 135^0 E) 140^0

9. (98-12-79) Shaklda AB=AC va $\angle BMC = 80^0$ bo'lsa, $\angle ANB$ necha gradusga teng bo'ladi?
A) 50^0 B) 60^0 C) 70^0 D) 80^0

E) aniqlab bo'lmaydi

10. (99-5-43) To'rtta nuqta aylanani yoylarga ajratadi. Yoylarning uzunliklari maxraji 2 ga teng geometrik progressiyani tashkil etadi. Shu to'rtta nuqtani ketma-ket tutashtirish natijasida hosil bo'lgan to'rtburchakning diagonallari orasidagi eng katta burchakni toping.
A) 100^0 B) 120^0 C) 150^0 D) 130^0 E) 140^0

11. (99-9-39) MN vatar radiusi 8 ga teng bo'lgan aylanani bir-biriga teng bo'lmagan ikkita yoyga ajratadi. Bu vatar kichik yoyning ixtiyoriy nuqtasidan 120^0 li burchak ostida ko'rinadi. MN vatarning uzunligini toping.
A) $8\sqrt{2}$ B) 8 C) $9\sqrt{3}$ D) $8\sqrt{3}$ E) $9\sqrt{2}$

12. (00-9-47) To'rtta nuqta aylanani yoylarining uzunligi maxraji 3 ga teng bo'lgan geometrik progressiya tashkil etuvchi bo'laklarga ajratadi. Shu nuqtalarni ketma-ket tutashtirish natijasida hosil bo'lgan to'rtburchakning diagonallari orasidagi kichik burchakni toping.
A) 30^0 B) 45^0 C) 60^0 D) 70^0 E) 75^0

13. (98-7-44) Radiusga teng bo'lgan vatarning uchidan aylanaga urinma o'tkazilgan. Shu urinma bilan vatar yotgan to'g'ri chiziq hosil qilgan burchaklarni toping.
A) 30^0, 150^0 B) 60^0, 120^0 C) 90^0, 90^0
D) 40^0, 140^0 E) 50^0, 130^0

14. (98-12-44) Radiusga teng bo'lgan vatarning uchlaridan o'tkazilgan urinmalar hosil qilgan burchaklarni toping.
A) 120^0, 60^0 B) 90^0, 90^0 C) 100^0, 80^0
D) 140^0, 40^0 E) 150^0, 30^0

15. (96-3-93) Aylananing B nuqtasidan radiusiga teng vatar va aylanaga urinma o'tkazildi. Urinma va vatar orasidagi katta burchakni toping.
A) 120^0 B) 150^0 C) 140^0 D) 135^0 E) 145^0

16. (02-10-36) ABC uchburchakda $\angle A = 32^0$, $\angle C = 24^0$. Markaziy B nuqtada bo'lgan aylana A nuqtadan o'tib AC tomonni M nuqtada, BC tomonni N nuqtadan kesib o'tadi. ANM burchakni toping.
A) 58^0 B) 62^0 C) 59^0 D) 60^0 E) 61^0

17. (03-3-57) Aylanadagi nuqtadan BA vatar va BC diametr o'tkazildi. BA vatar 46^0 li yoyga tiralgan. O'tkazilgan vatar va diametr orasidagi burchakni toping.
A) 23^0 B) 30^0 C) 134^0 D) 60^0 E) 67^0

3.6.5 Kesishuvchi vatarlar.

1. Aylananing AB va CD vatarlari O nuqtada kesishsa, u holda $AO \cdot BO = CO \cdot DO$.

1. (96-1-44) Aylananing ikkita kesishuvchi vatarlaridan birining uzunligi 32 sm, ikkinchisi kesishish nuqtasida 12 sm va 16 sm li kesmalarga ajraladi. Birinchi vatarning kesmalarini aniqlang.
A) 12 va 20 B) 15 va 17 C) 24 va 8
D) 22 va 10 E) $20,5$ va $11,5$

2. (98-10-46) AB va CD vatarlarning kesishish nuqtasi O nuqta AB vatarni AO=4 va OB=12 ga, CD vatarni esa uzunliklarining nisbati 1:3 bo'lgan kesmalarga ajratadi. CD vatarning uzunligini toping.
A) 12 B) 15 C) 18 D) 27 E) 16

3. (98-10-84) AB va CD vatarlar E nuqtada kesishadi. AE=4, EB=10, CE=2 bo'lsa, DE ni toping.
A) 15 B) 16 C) 18 D) 20 E) 22

4. (99-3-47) Radiusi 13 ga teng bo'lgan doiraning markazidan 5 ga teng masofada M nuqta olingan. M nuqtadan uzunligi 25 ga teng bo'lgan AB vatar o'tkazilgan. M nuqta AB vatarni qanday uzunlikdagi kesmalarga ajratadi?
A) $15;10$ B) $16;9$ C) $18;7$ D) $13;12$ E) $17;8$

5. (99-4-47) Aylananing diametriga perpendikulyar vatar o'tkazildi. Ularning kesishish nuqtasi diametrni uzunliklari 18 va 32 bo'lgan kesmalarga ajratadi. Vatarning uzunligini aniqlang.
A) 24 B) 48 C) 36 D) 28 E) 40

6. (99-8-49) Radiusi 6 ga teng bo'lgan aylanadagi nuqtadan uning diametriga tushirilgan perpenikulyar diametrni 1:3 nisbatda bo'ladi. Perpendikulyarning uzunligini toping.
A) $3\sqrt{3}$ B) $3\sqrt{2}$ C) 4 D) $3,6$ E) $4,2$

7. (03-5-57) Radiusi 15 ga teng bo'lgan doira ichida uning markazidan 7 birlik masofadagi M nuqtadan AB=27 uzunlikdagi vatar o'tkazilgan. AB vatardan M nuqta ajratgan kesmalar uzunliklarining ko'paytmasini toping.
A) 176 B) 168 C) 184 D) 172 E) 170

3.6.6 Urinma va kesuvchi.

1. P nuqtadan PA urinma va aylanani B, C nuqtalarda kesuvchi to' g'ri chiziq o'tkazilgan.

$$PA^2 = PB \cdot PC$$

2. P nuqtadan aylanani A, B va C, D nuqtalarda kesuvchi ikki to' g'ri chiziq o'tkazilgan.

$$PA \cdot PB = PC \cdot PD$$

1. (98-3-37) B nuqtadan aylanaga BA urinma va kesuvchi o'tkazilgan. Kesuvchi aylanani C va D nuqtada kesib o'tadi. Agar BD=54 va BC=24 bo'lsa, AB ni toping.
A) 40 B) 32 C) 38 D) 36 E) 42

2. (98-10-47) P nuqta radiusi 6 sm bo'lgan aylananing markazidan 12 sm uzoqlikda joylashgan. P nuqtadan urinma va aylananing markazidan o'tadigan kesuvchi o'tkazilgan. Urinma va kesuvchi orasidagi burchakni toping.
A) 75^0 B) 65^0 C) 60^0 D) 30^0 E) 45^0

3. (98-11-84) Aylanaga tashqaridagi P nuqtadan aylanaga PA urinma o'tkazilgan. P va aylananing O markazini tutashtiruvchi kesma aylanani B nuqtada kesib o'tadi. Agar PA=4, PB=2 bo'lsa, aylananing radiusini toping.
A) 3 B) 5 C) $3\sqrt{3}$ D) $4\sqrt{2}$ E) $2\sqrt{3}$

4. (00-9-4) Aylanadan tashqaridagi nuqtadan ungacha bo'lgan eng qisqa masofa 2 ga, urinish nuqtasigacha bo'lgan masofa esa 6 ga teng. Aylananing radiusini toping.
A) 12 B) 4 C) 10 D) 8 E) 6

5. (01-6-51) Aylanadan tashqaridagi P nuqtadan aylanaga PM urinma o'tkazildi. Agar PM=16 aylananing radiusi 12 ga teng bo'lsa, P nuqtadan aylanagacha bo'lgan eng qisqa masofani toping.
A) 6 B) 9 C) 8 D) 10 E) 7

6. (01-7-58) Aylanadan tashqaridagi nuqtadan ikkita kesuvchi o'tkazildi. Birinchi kesuvchining aylana ichidagi qismi 47 ga, tashqi qismi esa 9 ga teng. Ikkinchi kesuvchining ichki qismi tashqi qismidan 72 ga katta. Ikkinchi kesuvchining uzunligini toping.
A) 76 B) 80 C) 82 D) 84 E) 88

7. (01-11-48) Aylanadan tashqaridagi nuqtadan aylanaga uzunligi 12 ga teng bo'lgan urinma va uzunligi 24 ga teng bo'lgan eng katta kesuvchi o'tkazildi. Berilgan nuqtadan aylanagacha bo'lgan eng qisqa masofani toping.
A) 5 B) 7 C) 8 D) 4 E) 6

8. (03-6-76) Markaziy O nuqtada bo'lgan aylanaga A nuqtadan AB urinma o'tkazilgan. Agar AB=10 sm, OA=26 sm bo'lsa, aylananing uzunligini toping.
A) 36π B) 40π C) 46π D) 48π E) 50π

3.6.7 Doiraning yuzi.

1. Doira yuzasi $S = \pi R^2$

1. (00-10-26) Yuzasi 9π bo'lgan doira aylanasining uzunligini hisoblang.
A) $\frac{3\pi}{2}$ B) 3π C) 6π D) $\frac{4\pi}{3}$ E) 2π

2. (97-1-77) Doiraning radiusi 40% ga oshsa, uning yuzi necha foizga oshadi?
A) 140 B) 196 C) 96 D) 4
E) to'g'ri javob berilmagan

3. (97-6-65) Doiraning yuzi 96% ortishi uchun uning radiusini necha foizga orttirish kerak?
A) 40 B) 62 C) 4 D) 196 E) 140

4. (98-7-53) Har birining diametri 50 ga teng bo'lgan uchta quvur suv o'tkazish qobiliyati shu uchta quvurnikiga teng bo'lgan bitta quvur bilan almashtirildi. Yangi quvurning diametrini toping.
A) 85 B) 150 C) $50\sqrt{3}$ D) 75 E) 100

5. (98-11-31) Yuzasi $6,25\pi$ bo'lgan doira aylanasining uzunligini hisoblang.
A) 5π B) $2,25\pi$ C) $2,5\pi$ D) $5,25\pi$ E) $5,5\pi$

6. (98-12-53) Diametri 50 ga teng ikkita vodoprovod quvurini, suv o'tkazish qobiliyati shu ikki quvurnikiga teng bo'lgan bitta quvur bilan almashtirildi. Katta quvurning diametrini toping.
A) $50\sqrt{2}$ B) 100 C) $50\sqrt{3}$ D) 70 E) 75

7. (00-3-77) Ikkita doiraning umumiy vatari 60^0 va 120^0 li yoylarni tortib turadi. Kichik doira yuzining katta doira yuziga nisbatini toping.
A) 1 : 2 B) 1 : 3 C) 1 : 4 D) 2 : 3 E) 2 : 5

8. (02-4-27) Doiraning radiusi 20% ga kamaytirilsa, uning yuzi necha foizga kamayadi?
A) 25 B) 36 C) 45 D) 40 E) 20

3.6.8 Doira sektori va segmentining yuzi.

1. Sektor yuzasi $S = \frac{1}{2}\alpha R^2$

2. Segment yuzasi $S = \frac{1}{2}R^2(\alpha - sin\alpha)$

1. (99-6-34) Markazi O nuqtada bo'lgan aylana AB yoyining uzunligi 6 ga teng. Agar aylananing radiusi 4 ga teng bo'lsa, OAB sektorning yuzini toping.
A) 12 B) 8 C) 10 D) 14 E) 16

2. (98-8-41) Uzunligi m ga teng bo'lgan vatar 90^0 li yoyga tiraladi. Hosil bo'lgan segmentning yuzini hisoblang.
A) $\frac{\pi m^2}{8}$ B) $\frac{m^2}{8}(\pi - 2)$ C) $\frac{(\pi - \sqrt{3})m^2}{4}$
D) $\frac{\pi m^2}{4}$ E) $\frac{m^2}{4}(\pi - \sqrt{2})$

3. (98-1-41) Doiraning radiusi r ga teng. 90^0 li yoyga mos keladigan segmentning yuzini toping.
A) $\frac{\pi r^2}{8}$ B) $\frac{r^2}{2}(\pi - 2)$ C) $\frac{\pi r^2}{4}$
D) $\frac{r^2}{2}(\pi - 2)$ E) $\frac{r^2}{4}(\pi - 2)$

4. (01-7-57) Radiusi R ga teng bo'lgan doiraning markazidan bir tomonda ikkita bir-biriga parallel vatar o'tkazildi. Bu vatarlardan biri 120^0 li yoyni tortib turadi. Parallel vatarlar orasida joylashgan kesimning yuzini toping.
A) $\frac{\pi R^2}{6}$ B) $\frac{\pi R^2}{4}$ C) $\frac{\pi R^2}{3}$
D) $\frac{3\pi R^2}{8}$ E) $\frac{\pi R^2}{8}$

5. (01-8-43) Radiusi 6 ga teng bo'lgan doira va markaziy burchagi 90^0 bo'lgan doiraviy sektorlar tengdosh. Sektorning perimetrini toping.
A) $2\pi + 10$ B) $6(\pi + 4)$ C) $3(\pi + 8)$
D) $4\pi + 15$ E) $6(\pi + 3)$

6. (01-8-45) To'g'ri chiziq doiraning aylanasini uzunliklarining nisbati $1 : 3$ kabi bo'lgan ikki yoyga ajratadi. Bu chiziq doiraning yuzini qanday nisbatda bo'ladi?
A) $\frac{\pi+1}{2\pi+1}$ B) 1:9 C) $\frac{\pi+2}{3\pi+2}$ D) 4:9 E) $\frac{\pi-2}{3\pi+2}$

7. (01-11-49) Doira sektorining yuzi 72π ga teng. Agar sektorning yoyi 45^0 ga teng bo'lsa, shu doira aylanasi uzunligini toping.
A) 46π B) 40π C) 42π D) 48π E) 44π

8. (03-2-50) Radiusi $\sqrt{13}$ ga, yoyining radian o'lchovi 2 ga teng bo'lgan sektorning yuzini hisoblang.
A) 13 B) 26 C) 39 D) 52 E) 18

9. (03-4-52) $y = |x|$ funksiyaning grafigi va
$$x^2 + y^2 = 36$$
tenglama bilan berilgan aylananing kichik yoyi bilan chegaralangan shaklning yuzini toping.
A) 8π B) 10π C) $8,5\pi$ D) 7π E) 9π

10. (03-10-47) Radiuslari $\sqrt{2}$ ga teng bo'lgan ikki doiraga uzunligi 2 ga teng bo'lgan umumiy vatar o'tkazildi. Shu doiralar umumiy qismining yuzini toping.
A) $\pi - 1$ B) $\frac{\pi}{2} - 1$ C) $\pi - 2$
D) $\frac{\pi}{2} - \frac{1}{2}$ E) $\frac{\pi-3}{2}$

3.6.9 Aylana tenglamasi.

1. Markazi $O(a, b)$ nuqtada, radiusi R ga teng bo'lgan aylana tenglamasi:
$$(x - a)^2 + (y - b)^2 = R^2$$

1. (96-3-96) Ushbu $x^2+y^2+4x+6y-3 = 0$ tenglama bilan berilgan aylananing radiusini toping.
A) 3 B) 6 C) 4 D) 5 E) $3,5$

2. (96-9-32) Ushbu $x^2+y^2+4x-6y-3 = 0$ tenglama bilan berilgan aylananing markazini toping.
A) $(-2; 3)$ B) $(2; -3)$ C) $(4; -3)$
D) $(-4; 6)$ E) $(4; -6)$

3. (96-12-96) Tenglama bilan berilgan aylananing markazini toping.
$$x^2 + y^2 - 4x + 6y - 3 = 0$$
A) $(-4; -3)$ B) $(4; -4)$ C) $(-4; 6)$
D) $(2; -3)$ E) $(-2; 3)$

4. (96-13-37) Tenglama bilan berilgan aylananing radiusini toping.
$$x^2 + y^2 - 4x - 6y - 3 = 0$$
A) 3 B) 5 C) 6 D) $3,5$ E) 4

5. (97-5-46) A(10;6) aylanadagi nuqta, C(1;-6) nuqta aylananing markazi bo'lsa, aylananing radiusini toping.
A) 14 B) 13 C) 16 D) 15 E) 17

6. (97-9-46) A(12;20) aylanadagi nuqta, C(5;-4) nuqta aylananing markazi bo'lsa, aylananing radiusini toping.
A) 15 B) 16 C) 17 D) 25 E) 27

7. (98-5-41) Markazi (1;1) nuqtada bo'lib, koordinatalar boshidan o'tuvchi aylananing tenglamasini tuzing.
A) $x^2 + y^2 - 2x - 2y = 1$
B) $x^2 + y^2 - x - 2y = 0$
C) $x^2 + y^2 - 2x - y = 0$
D) $x^2 + y^2 - 3x - 3y = 0$
E) $x^2 + y^2 - 2x - 2y = 0$

8. (98-5-55) Barcha nuqtalarining koordinatalari
$$x^2 + y^2 \le 4x + 6y$$
tengsizlikni qanoatlantiradigan tekis figuraning yuzini toping.
A) 13π B) 12π C) 9π D) 10π E) 18π

9. (99-1-35) $M_1(1; 2)$, $M_2(3; 4)$, $M_3(-4; 3)$, $M_4(0; 5)$, va $M_5(5; -1)$ nuqtalardan qaysi birlari $x^2 + y^2 = 25$ tenglama bilan berilgan aylanada yotadi?
A) M_2, M_3, M_4 B) M_1 C) M_5
D) M_1, M_5 E) hammasi

10. (99-4-42) Aylananing tenglamasi
$$x^2 + y^2 - 2x - 2y = 0$$
. Uning uzunligini hisoblang.
A) 2π B) 4π C) 8π D) $\pi\sqrt{2}$ E) $2\pi\sqrt{2}$

11. (99-7-40) Markazdan (2;3) nuqtada joylashgan va radiusi 2 ga teng bo'lgan aylananing tenglamasini ko'rsating.
A) $x^2 + y^2 - 4x - 6y = 0$
B) $x^2 + y^2 - 6x - 4y + 6 = 0$
C) $x^2 + y^2 - 4x - 6y + 9 = 0$
D) $x^2 + y^2 - 6x - 4y + 10 = 0$
E) $x^2 + y^2 - 4x - 6y + 8 = 0$

12. (00-2-37) $3x + y = 10$ va $2x - 3y - 36 = 0$ to'g'ri chiziqlarning kesishish nuqtasi markazi koordinatalar boshida bo'lgan aylanaga tegishli. Aylananing radiusi toping.
A) 6 B) 8 C) 10 D) 12 E) 13

13. (00-8-21) Ushbu $x^2 + y^2 - 4x - 6y - 12 \le 0$ tengsizlik bilan berilgan figuraning yuzini hisoblang.
A) 25π B) 36π C) 20π D) 16π E) 40π

14. (00-8-22) Tenglamasi $x^2+y^2-6x-8y+9=0$ bo'lgan aylana markazidan koordinatalar boshigacha bo'lgan masofani toping.
A) 5 B) 4 C) 3 D) 7 E) 6

15. (00-10-60) A(4;-7) nuqtadan o'tuvchi va

$$x^2+y^2+4x-2y-11=0$$

aylana bilan konsentrik bo'lgan aylana tenglamasini ko'rsating.
A) $(x+2)^2+(y-1)^2=100$
B) $(x-1)^2+(y+2)^2=100$
C) $(x+3)^2+(y-1)^2=100$
D) $(x-3)^2+(y-1)^2=100$
E) $(x-1)^2+(y-3)^2=100$

16. (01-5-41) Ushbu $y+x-5=0$ to'g'ri chiziq va $x^2+y^2=25$ aylananing kesishishidan hosil bo'lgan vatarning uzunligini toping.
A) $5\sqrt{2}$ B) 5 C) $\sqrt{5}$ D) $2,5\sqrt{2}$ E) $2\sqrt{5}$

17. (01-8-15) Koordinat tekisligida

$$x^2+y^2\le 4|y|$$

tengsizlik bilan berilgan shaklning yuzini toping.
A) 4π B) $6,5\pi$ C) 12π D) 8π E) 16π

18. (01-8-47) a ning nechta qiymatida $x^2+y^2=1$ va $(x-a)^2+y^2=4$ aylanalar urinadi?
A) 4 B) 3 C) 2 D) 1
E) birorta qimatida ham urinmaydi

19. (02-3-48) $36x^2+36y^2+48x+36y-299=0$ aylananing markazi koordinatalar tekisligining qaysi choragiga tegishli?
A) III B) I C) II D) IV
E) Oy o'qida yotadi

20. (02-9-47) Uchlari A(1;3), B(-1;1) va C(2;2) nuqtalarda joylashgan uchburchakka tashqi chizilgan aylana markazining koordinatalarini toping.
A) $(1;2)$ B) $(0,5;1,5)$ C) $(\frac{1}{3};2)$ D) $(0;2)$
E) aniqlab bo'lmaydi

21. (02-10-77) M(3;-1) nuqtadan $x^2+2x+y^2-4y=11$ aylanagacha bo'lgan masofani toping.
A) 1 B) $0,5$ C) $1,5$ D) 2 E) $2,5$

22. (02-10-78) $x^2+y^2=25$ va $(x-8)^2+y^2=25$ aylanalarning umumiy vatarini o'z ichiga olgan to'g'ri chiziq tenglamasini tuzing.
A) $x=4$ B) $y=3$ C) $y=x+1$
D) $y=3x-4$ E) $y=2x+3$

23. (03-2-52) $x^2+y^2=10$ aylana va $x+y=2$ to'g'ri chiziqning kesishishidan hosil bo'lgan vatarning uzunligini toping.
A) 6 B) $4\sqrt{2}$ C) $5\sqrt{2}$ D) $4\sqrt{3}$ E) $3\sqrt{6}$

24. (03-7-2) $x^2+y^2-5x-6y+4=0$ aylananing ordinata o'qidan ajratgan kesma uzunligini toping.
A) $\sqrt{3}$ B) 4 C) $2\sqrt{5}$ D) 5 E) 3

25. (03-7-40) $x^2+y^2-5x-6y+4=0$ aylananing abssissa o'qidan ajratgan kesma uzunligini toping.
A) $\sqrt{3}$ B) 4 C) $2\sqrt{5}$ D) 5 E) 3

26. (03-7-41) A(2;13) nuqtadan

$$x^2+y^2-4x-8y-5=0$$

aylanaga urinma o'tkazilgan. A nuqtada n urinish nuqtasigacha bo'lgan masofani toping.
A) $3\sqrt{5}$ B) $2\sqrt{14}$ C) 6 D) $4\sqrt{2}$ E) $\sqrt{41}$

27. (03-9-61) $x^2+y^2-4x-6y-12=0$ formula bilan berilgan chiziqning uzunligini toping.
A) 10π B) 5π C) 8π D) 12π E) 25π

3.7 Aylana va ko'pburchak.

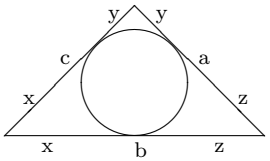
3.7.1 Uchburchak va aylana.

Uchburchakka ichki chizilgan aylana.

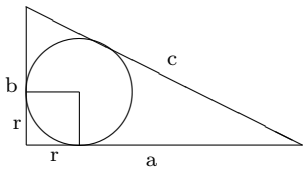
1. Uchburchakka ichki chizilgan aylananing markazi uning bissektrisalari kesishgan nuqtasida yotadi.

2. $S=\frac{a+b+c}{2}r$

3. Asosi a ga, yon tomoni b ga, asosiga tushirilgan balandligi h ga, asosidagi burchagi α ga teng bo'lgan teng yonli uchburchkda
a) $r=\frac{1}{2}a\cdot tg\frac{\alpha}{2}$
b) $r=\frac{ah}{2b+a}$
4. $x=\frac{b+c-a}{2}$



Xususan, to'g'ri burchakli uchburchakda $r=\frac{a+b-c}{2}$



4. Teng tomonli uchburchakda $r=\frac{h}{3}$

1. (96-3-103) Tog'ri burchakli uchburchakning gipotenuzasi 5 sm, katetlaridan birining gipotenuzadagi proeksiyasi 1,8 sm. Ushbu uchburchakka ichki chizilgan aylananing radiusi necha sm?
A) $1,2$ B) 1 C) $1,5$ D) 2 E) $1,6$

2. (96-1-39) Muntazam uchburchakning balandligi 9 sm. Uchburchakka ichki chizilgan aylananing radiusini toping.
A) 6 B) $4,5$ C) 3 D) $2,5$ E) 5

3. (96-9-37) Tog'ri burchakli uchburchakning gipotenuzasi 10 sm ga, gipotenuzaga tushirilgan balandlik ajratgan kesmalarning biri 3,6 sm ga teng. Uchburchakka ichki chizilgan aylananing radiusini toping.
A) 3 B) 2,5 C) 2 D) 1,5 E) 1,8

4. (96-9-90) Yon tomoni $4\sqrt{3}$, uchidagi burchagi 60^0 ga teng bo'lgan teng yonli uchburchakka ichki chizilgan aylananing radiusini toping.
A) $2\sqrt{3}$ B) 4 C) 2 D) $\sqrt{3}$ E) 1

5. (96-12-107) Tog'ri burchakli uchburchakning bir kateti 6 sm ga, bu katetning gipotenuzadagi proeksiyasi 3,6 sm ga teng. Uchburchakka ichki chizilgan aylananing radiusini toping.
A) 3 B) $2,5$ C) 2 D) $2,4$ E) $1,8$

6. (97-8-29) Muntazam uchburchakning bissektrisasi 21 ga teng. Bu uchburchakka ichki chizilgan aylana radiusini toping.
A) 10 B) 12 C) 7 D) 8 E) 14

7. (00-2-40) Tog'ri burchakli uchburchakka ichki chizilgan aylananing urinish nuqtasi gepotenuzadan uzunliklari 3 va 10 ga teng kesmalar ajratadi.Uchburchakning yuzini toping.
A) 15 B) 12 C) 30 D) 21 E) 18

8. (98-3-42) Tog'ri burchakli uchburchak katetlarining gepotenuzasidagi proeksiyalari 9 va 16 ga teng. Uchburchakka ichki chizilgan aylananing radiusi qancha?
A) 5 B) 4 C) 6 D) $5,5$ E) $6,5$

9. (98-10-24) Muntazam uchburchakning medianasi 24 ga teng. Unga ichki chizilgan doiraning yuzini toping.
A) 60π B) 64π C) 68π D) 56π E) 72π

10. (99-1-32) Aylananing O markazi to'g'ri burchakli ABC uchburchakning AC gepotunuzasida yotadi. Uchburchakning katetlari aylanaga urinadi. Agar OC kesmaning uzunligi 4 ga, C nuqtadan CB katetning aylana bilan urinish nuqtasigacha bo'lgan masofa 3 ga teng bo'lsa, CB ni toping.
A) $3+\sqrt{7}$ B) 7 C) 8 D) 6 E) $4+\sqrt{7}$

11. (00-3-74) Teng yonli uchburchakning balandligi 20, asosining yon tomoniga nisbati esa $4:3$ kabi. Shu uchburchakka ichki chizilgan aylananing radiusini toping.
A) 4 B) 10 C) 12 D) 6 E) 8

12. (00-3-75) Radiusi 4 ga teng bo'lgan doiraga gipotenuzasi 26 ga teng to'g'ri burchakli uchburchak tashqi chizilgan. Shu uchburchakning perimetrini toping.
A) 60 B) 64 C) 52 D) 56 E) 58

13. (00-9-54) ABC uchburchakning AB, BC va AC tomonlari mos ravishda 4; 5 *va* 6 ga teng. AB va BC tomonlarga urinadigan aylananing markazi AC tomonda yotadi. Aylananing markazi AC tomondan ajratgan kesimlarning uzunliklari ko'paytmasini toping.
A) $6\frac{4}{9}$ B) $7\frac{3}{4}$ C) $8\frac{8}{9}$ D) $8\frac{2}{5}$ E) $9\frac{1}{3}$

14. (01-1-56) Teng yonli uchhburchakka ichki chizilgan aylananing markazi uning asosiga tushirilgan balandligini, uning uchidan boshlab hisoblaganda 5 va 3 ga teng kesmalarga ajratadi. Uchburchakning asosini toping.
A) 8 B) 9 C) 10 D) 14 E) 12

15. (01-2-41) Katetlari 40 va 30 ga teng bo'lgan to'g'ri burchakli uchhburchakka ichki chizilgan aylananing radiusini toping.
A) 10 B) 7 C) $6,5$ D) $7,5$ E) 8

16. (01-4-6) To'g'ri burchakli uchburchakning to'g'ri burchagi uchidan tushurilgan balandlik va mediana to'g'ri burchakni uchta teng qismga ajratadi. To'g'ri burchakning uchi hamda balandlik va mediananing gipotenuza bilan kesishgan nuqtalardan hosil bo'lgan uchburchakning yuzi $2\sqrt{3}$ ga teng. Berilgan uchburchakka ichki chizilgan doiraning yuzini toping.
A) $\frac{9}{4}\pi$ B) $4\pi(\sqrt{3}-1)$ C) $8\pi(2-\sqrt{3})$
D) $4\pi(2-\sqrt{3})$ E) $\pi(2\sqrt{3}-1)$

17. (02-1-72) Uchburchak uchlaridan unga ichki chizilgan aylananing urinish nuqtalarigacha bo'lgan masofalar mos ravishda $2;3$ va 5 ga teng. Shu uchburchakning perimetrini toping.
A)18 B) 19 C) 20 D) 21 E) 24

18. (02-3-54) To'g'ri burchakli uchburchakka ichki chizilgan aylananing urinish nuqtasi gipotenuzani 7 va 3 ga teng kesmalarga ajratadi. Uchburchakning yuzini toping.
A)21 B) 24 C) 18 D) $10,5$ E) 42

19. (02-3-56) To'g'ri burchakli uchburchakka ichki chizilgan aylananing markazidan gipotenuza uchlarigacha bo'lgan masofalar $\sqrt{5}$ va $\sqrt{10}$ ga teng. Gipotenuzaning uzunligini toping.
A)5 B) $\frac{1}{2}\sqrt{50}$ C) $\sqrt{50}$ D) 6 E) $5,2$

20. (02-10-37) To'g'ri burchakli uchburchakka ichki chizilgan aylananing radiusi katetlar ayirmasining yarmiga teng. Katta katetning kichik katetga nisbatini toping.
A)$\sqrt{3}$ B) $1,5$ C) $\sqrt{2}$ D) 1 E) 2

21. (02-10-74) To'g'ri burchakli uchburchakka ichki chizilgan aylana urinish nuqtasida katetlardan birini to'g'ri burchak uchidan boshlab hisoblaganda 6 va 10 ga teng kesmalarga ajratadi. Uchburchakning perimetrini toping.
A)80 B) 74 C) 82 D) 75 E) 81

22. (98-3-39) Teng yonli uchburchakning yon tomoni b ga, uchidagi burchagi $2a$ ga teng. Unga ichki chizilgan aylananing radiusi quyidagilardan qaysi biriga teng?
A) $bsin\alpha \cdot tg(\frac{\pi}{4}-\frac{\alpha}{2})$
B) $bcos\alpha \cdot tg(\frac{\pi}{4}-\frac{\alpha}{2})$
C) $bsin\alpha \cdot ctg(\frac{\pi}{4}-\frac{\alpha}{2})$
D) $bcos\alpha \cdot ctg(\frac{\pi}{4}-\frac{\alpha}{2})$
E) $bsin\alpha \cdot cos(\frac{\alpha}{2})$

23. (98-10-86) Teng yonli uchburchakning uchidagi burchagi 2α ga teng. Unga ichki chizilgan aylananing radiusi r ga teng.Uchburchakning yon tomonini toping.

A) $\frac{1+cos\alpha}{cos\alpha}\cdot r$ B) $\frac{1+cos\alpha}{sin\alpha}\cdot r$ C) $\frac{1+sin\alpha}{sin\alpha}\cdot r$
D) $\frac{1+sin\alpha}{cos\alpha}\cdot r$ E) $\frac{1+cos\alpha}{sin\alpha\cdot cos\alpha}\cdot r$

24. (01-12-13) Uchburchak tomonlarining uzunliklari arifmetik progressiyani tashkil etadi. Kattaligi bo'yicha o'rtacha tomonga tushirilgan balandlik 10 ga teng bo'lsa, ichki chizilgan doiraning radiusi qancha?
A)5 B) $3,2$ C) $3\frac{1}{3}$ D) $3,5$ E) 3

25. (02-3-63) ABC uchburchakka ichki chizilgan aylanaga o'tkazilgan urinma BC va AC tomonlarni mos ravishda A_1 va B_1 nuqtalarda kesib o'tadi. Agar $BC=5,\ AC=6,\ AB=7$ bo'lsa, $A_1\ B_1\ C$ uchburchakning perimetrini aniqlang.
A)4 B) 5 C) 3 D) 6 E) $4,8$

26. (03-2-58) Teng yonli to'g'ri burchakli uchburchakning kateti $\sqrt{2}$ ga teng. Shu uchburchakning medianalari kesishgan nuqtadan bissektrisalari kesishgan nuqtagacha bo'lgan masofani aniqlang?
A) $\frac{\sqrt{2}-1}{2}$ B) $\frac{2-\sqrt{3}}{3}$ C) $\frac{2\sqrt{3}-3}{6}$
D) $\frac{3\sqrt{2}-4}{3}$ E) $\frac{2\sqrt{3}-3}{2}$

27. (03-7-85) Teng yonli uchburchakka ichki chizilgan aylananing markazi uning balandligini 17:15 nisbatda bo'ladi. Uchburchakning asosi 60 ga teng. Shu doiraning yuzini toping.
A) $56,25\pi$ B) $22,5\pi$ C) 900π D) 15π E) 64π

28. (03-9-52) To'g'ri burchakli uchburchakka ichki chizilgan aylananing urinish nuqtasi gipotenuzani 2:3 nisbatda bo'ladi. To'g'ri burchak uchidan aylananing markazigacha bo'lgan masofa $2\sqrt{2}$ ga teng. Berilgan uchburchakning yuzini toping.
A) 12 B) 16 C) 18 D) 20 E) 24

29. (03-11-39) To'g'ri burchakli uchburchakning katetlaridan biri 15 ga, ikkinchi katetining gipotenuzadagi proyeksiyasi 16 ga teng. Bu uchburchakka ichki chizilgan aylananing radiusini toping.
A) 5 B) 6 C) 7 D) 8 E) 4

30. (03-12-37) ABC uchburchakka ($AB=BC=15$) ichki chizilgan aylana uning yon tomonlariga B uchidan boshlab hisoblaganda 5 ga teng mosafada urinadi. Uchburchakning yuzini toping.
A) $50\sqrt{2}$ B) $25\sqrt{2}$ C) $50\sqrt{5}$ D) $20\sqrt{5}$ E) $50\sqrt{3}$

31. (03-12-84) Teng yonli uchburchakning yon tomoni 5 ga, asosidagi burchakning kosinusi 0,6 ga teng. Shu uchburchakka ichki chizilgan aylananing radiusini toping.
A) 3 B) $1,5$ C) $\sqrt{2}$ D) $1,2$ E) $2,4$

Uchburchakka tashqi chizilgan aylana.

1. Uchburchakka tashqi chizilgan aylananing markazi uning tomonlariga o'tkazilgan o'rta perpendikulyar kesishgan nuqtasida yotadi.

2. $a=2Rsin\alpha,\ b=2Rsin\beta,\ c=2Rsin\gamma.$

3. $S=\frac{abc}{4R}.$

4. Uchburchakka tashqi va ichki chizilgan aylanalarning radiuslari R va r ga, aylanalar markazlari orasidagi masofa d ga teng bo'lsa, u holda $d^2=R^2-2Rr$.

5. Asosi a ga, balandligi h ga teng bo'lgan teng yonli uchburchakda $(\frac{a}{2})^2+(h-R)^2=R^2$.

6. To'g'ri burchakli uchburchakda $R=\frac{c}{2}$.

7. Teng tomonli uchburchakda $R=\frac{2h}{3}$.

8. O'tkir burchakli uchburchakka tashqi chizilgan aylananing markazi uning ichida yotadi.

9. To'g'ri burchakli uchburchakka tashqi chizilgan aylananing markazi gipatenuzaning o'rtasida yotadi.

10. O'tmas burchakli uchburchakka tashqi chizilgan aylananing markazi uning tashqarisida yotadi.

(97-7-39) Ikkita burchagi 45^0 va 75^0 bo'lgan uchburchakning uzunligi bo'yicha o'rtacha tomoni $3\sqrt{3}$ ga teng. Uchburchakka tashqi chizilgan aylananing radiusini toping.
A) $\sqrt{3}$ B) $\frac{3\sqrt{3}}{2}$ C) 3 D) $\sqrt{6}$ E) 2

Yechish. Uchburchakning uchinchi burchagini topamiz. $\alpha=180^0-(45^0+75^0)=60^0$. Uchburchakda katta burchak qarshisida katta tomon, kichik burchak qarshisida kichik tomon yotadi. Shu sababli o'rtacha 60^0 li burchak qarshisida $3\sqrt{3}$ tomon yotadi. Agar a uchburchak tomoni, *alpha* bu tomon qarshisidagi burchagi, R uchburchakka tashqi chizilgan aylana radiusi bo'lsa, u holda $a=2Rsin\alpha$ ekani ma'lum. Bu erdan

$$R=\frac{a}{2sin\alpha}=\frac{3\sqrt{3}}{2\cdot sin60^0}=\frac{3\sqrt{3}}{2\cdot\frac{\sqrt{3}}{2}}=3$$

ekanini topamiz. J: 3 (C).

1. (96-10-42) Aylananing radiusi 10 sm. Shu aylanaga ichki chizilgan muntazam uchburchak medianasining uzunligini toping.
A) 12 B) $\frac{10}{\sqrt{3}}$ C) 15 D) 18 E) $10\sqrt{3}$

2. (96-12-108) Tomonlari 8; 15 va 17 sm bo'lgan uchburchakka tashqi chizilgan aylananing radiusi necha sm?
A) $8,5$ B) 9 C) 8 D) $9,5$ E) 7

3. (96-7-39) Uchburchak ikkita burchagi 25^0 va 65^0, katta tomoni $4\sqrt{2}$ ga teng. Uchburchakka tashqi chizilgan aylananing radiusini toping.
A) 4 B) 2 C) $2\sqrt{2}$ D) $3\sqrt{2}$ E) $\frac{3\sqrt{2}}{2}$

4. (96-13-45) To'g'ri burchakli uchburchakning bir kateti 3 sm, uning gipotenuzadagi proeksiyasi 1,8 sm. Uchburchakka tashqi chizilgan aylananing radiusini toping.
A) 2 B) 3 C) $2,2$ D) $2,5$ E) $2,7$

5. (96-13-46) Asosi 16 sm, balandligi 4 sm bo'lgan teng yonli uchburchakka tashqi chizilgan aylananing radiusi necha sm?
A) 10 B) 11 C) 12 D) $10,5$ E) $9,5$

6. (97-1-71) Bir tomoni 10, unga yopishgan burchaklari 105^0 va 45^0 bo'lgan uchburchakka tashqi chizilgan aylananing radiusini toping.
A) 5 B) 10 C) 15 D) 20 E) 25

7. (97-3-39) Teng yonli uchburchakning yon tomoni 3 ga, uchidagi burchagi 120^0 ga teng. Shu uchburchakka tashqi chizilgan aylananing radiusini toping.
A) $1,5$ B) $2\sqrt{3}$ C) 3 D) $\frac{\sqrt{3}}{2}$ E) 1

8. (97-6-75) Uchburchakning bir tomoni 17 ga unga yopishgan burchaklari 103^0 va 47^0 ga teng. Uchburchakka tashqi chizilgan aylananing radiusini toping.
A) $8,5$ B) $8,5\sqrt{3}$ C) $17\sqrt{2}$ D) 17 E) $17\sqrt{3}$

9. (97-7-62) Tomoni 81 ga teng bo'lgan teng tomonli uchburchakka tashqi chizilgan aylananing radiusini toping.
A) $27\sqrt{3}$ B) $28\sqrt{3}$ C) $23\sqrt{3}$
D) $24\sqrt{3}$ E) $25\sqrt{3}$

10. (97-9-55) Tomoni 84 bo'lgan teng tomonli uchburchakka tashqi chizilgan aylananing radiusini toping.
A) $25\sqrt{3}$ B) $28\sqrt{3}$ C) $26\sqrt{3}$
D) $42\sqrt{3}$ E) $24\sqrt{3}$

11. (97-9-113) Teng yonli to'g'ri burchakli uchburchakning yuzi 8 ga teng bo'lsa, shu uchburchakka tashqi chizilgan aylana uzunligini hisoblang.
A) 4π B) $3\sqrt{2}\pi$ C) $4\sqrt{2}\pi$ D) 3π E) 5π

12. (97-10-39) Kichik tomoni $2\sqrt{2}$ bo'lgan uchburchakning ikkita burchagi 75^0 va 60^0. Uchburchakka tashqi chizilgan aylananing radiusini toping.
A) $\sqrt{2}$ B) 2 C) $\frac{\sqrt{3}}{2}$ D) $\frac{1}{\sqrt{2}}$ E) 1

13. (97-12-29) Muntazam uchburchakning balandligi 18 ga teng. Bu uchburchakka tashqi chizilgan aylananing radiusini toping.
A) 8 B) 9 C) 13 D) 12 E) 10

14. (98-1-36) Teng yonli uchburchakning asosi 16 ga, balandligi 4 ga teng. Shu uchburchakka tashqi chizilgan aylananing radiusini toping.
A) $2\sqrt{5}$ B) 5 C) 10 D) $6,5$ E) $4\sqrt{5}$

15. (98-5-32) Muntazam uchburchakka ichki chizilgan aylananing radiusi r bo'lsa, unga tashqi chizilgan aylana uzunligini toping.
A) $2\pi r$ B) $3\pi r$ C) $4\pi r$ D) $5\pi r$ E) $8\pi r$

16. (98-8-36) ABC uchburchakning AB tomoni 5 ga, BD balandligi 4 ga teng. Agar shu uchburchakka tashqi chizilgan aylananing radiusi 5 ga teng bo'lsa, BC tomonning uzunligini toping.
A) $4,5$ B) 8 C) 6 D) 10 E) $5,6$

17. (98-9-47) Muntazam uchburchakka ichki chizilgan aylananing uzunligi 24π ga teng. Shu uchburchakka tashqi chizilgan aylananing uzunligini toping.
A) 48π B) 32π C) 36π D) 52π E) 64π

18. (98-10-89) To'g'ri burchakli uchburchak katetlaridan biri 4 sm, uning gipotenuzasidagi proeksiyasi $\frac{4}{3}$ sm. Uchburchakka tashqi chizilgan aylananing radiusi nehca sm?
A) 4 B) 5 C) 6 D) 7 E) $6,5$

19. (98-10-93) Aylananing radiusi 6 ga teng. Aylanaga ichki chizilgan muntazam uchburchakning yuzini toping.
A) 27 B) $27\sqrt{2}$ C) $27\sqrt{3}$ D) $18\sqrt{5}$ E) $18\sqrt{3}$

20. (99-2-50) Teng yonli uchburchakning uchidagi burchagi 2α ga, unga tashqi chizilgan aylananing radiusi R ga teng. Uchburchakning yuzi nimaga teng?
A) $R^2 \cdot sin2\alpha \cdot cos\alpha$ B) $2R^2 \cdot cos\alpha \cdot sin^2\alpha$
C) $R^2 \cdot sin^2 2\alpha \cdot$ D) $4R^2 \cdot cos^3\alpha \cdot sin\alpha$
E) $2R^2 \cdot cos^2\alpha$

21. (99-3-45) To'g'ri burchakli uchburchakning katetlaridan biri 6 ga, uning qarshisida yotgan burchagi $\frac{\pi}{6}$ ga teng. Shu uchburchakka tashqi chizilgan doiraning yuzini toping.
A) 6π B) 9π C) 36π D) 144π E) 24π

22. (00-4-49) Doiraga ichki chizilgan uchburchakning bir tomoni uning diametriga teng. Doiraning yuzi 289π ga, uchburchak tomonlaridan birining uzunligi 30 ga teng. Shu uchburchakka ichki chizilgan doiraning yuzini toping.
A) 16π B) 36π C) 64π D) 20π E) 25π

23. (99-4-43) Uchburchakning burchaklari 45^0 va 60^0 ga, unga tashqi chizilgan doiraning yuzini toping.
A) $3R^2 \cdot \frac{\sqrt{3}}{4}$ B) $R^2 \cdot \sqrt{3} \cdot \frac{\sqrt{3}+1}{2}$ C) $\frac{R^2}{2} \cdot (\sqrt{2}+\sqrt{3})$
D) $R^2 \cdot \frac{\sqrt{6}}{4}$ E) $\frac{R^2}{4} \cdot (3+\sqrt{3})$

24. (99-8-54) Teng yonli uchburchakning asosi 12 ga, balandligi 3 ga teng. Unga tashqi chizilgan aylananing diametrini toping.
A) 17 B) 18 C) 14 D) 16 E) 15

25. (00-5-53) Katetlari 20 va 21 ga teng bo'lgan to'g'ri burchakli uchburchakka tashqi chizilgan aylananing radiusini toping.
A) $7,25$ B) $14,5$ C) 10 D) $20,5$ E) 15

26. (00-10-62) Asosidagi burchagi α ga teng bo'lgan teng yonli uchburchakka ichki va tashqi chizilgan aylanalar radiuslarining nisbatini toping.
A) $sin2\alpha \cdot tg\frac{\alpha}{2}$ B) $tg\alpha \cdot sin\frac{\alpha}{2}$ C) $cos\frac{\alpha}{2} \cdot ctg2\alpha$
D) $sin2\alpha \cdot tg^2\frac{\alpha}{2}$ E) $cos2\alpha \cdot ctg^2 2\alpha$

27. (01-5-33) Aylanaga ichki chizilgan uchburchakning bir tomoni uning markazidan, qolgan tomonlari esa markazdan 3 va $3\sqrt{3}$ ga teng masofadan o'tadi. Aylananing radiusini toping.
A) 6 B) 12 C) 3 D) 9 E) 8

28. (01-5-34) ABC uchburchak aylanaga ichki chizilgan. $AB = 24$ va aylana markazi shu tomondan 5 birlik masofada yotsa, aylananing radiusini toping.
A) 13 B) 12 C) 10 D) 9 E) 11

29. (01-8-41) Teng yonli to'g'ri burchakli uchburchak R radiusli doiraga ichki chizilgan. Boshqa aylana bu uchburchakning katetlariga va birinchi aylanaga urinadi. Shu aylananing radiusini toping.
A) $\frac{2}{3}R$ B) $\frac{R\sqrt{3}}{4}$ C) $\frac{R\sqrt{2}}{2}$
D) $R(\sqrt{2}-1)$ E) $2R(\sqrt{2}-1)$

30. (01-9-8) To'g'ri burchakli uchburchakning tomonlari 6; 8 va 10 bo'lsa, unga ichki va tashqi chizilgan aylanalar markazlari orasidagi masofani toping.
A) $\sqrt{5}$ B) $\sqrt{3}$ C) $\sqrt{2}$ D) $\sqrt{6}$ E) 4

31. (01-9-24) Uchburchak burchaklarining kattaliklari nisbati 2:3:7 kabi, kichik tomonining uzunligi a ga teng. Shu uchburchakka tashqi chizilgan aylananing radiusini toping.
A) a B) $2a$ C) $a\sqrt{2}$ D) $0,5a$ E) $a\sqrt{3}$

32. (01-11-44) ABC uchburchakning C uchidagi tashqi burchagi 90^0 ga, A uchidagi tashqi burchagi esa 150^0 ga teng. Agar shu uchburchakning kichik tomoni $12,5$ ga teng bo'lsa, unga tashqi chizilgan aylananing diametrini toping.
A) 24 B) 26 C) 20 D) 25 E) 23

33. (02-3-59) ABC to'g'ri burchakli uchburchakning A o'tkir burchagi bissektrisasi BC tomonni uzunliklari 2 va 4 ga teng kesmalarga ajratadi. Bu uchburchakka tashqi chizilgan aylananing radiusini toping.
A) $2\sqrt{3}$ B) 4 C) $4\sqrt{3}$ D) 6 E) $4\sqrt{2}$

34. (02-4-46) Bir burchagi 150^0 bo'lgan uchburchakka tashqi chizilgan aylananing radiusi 1 ga teng. Uchburchak katta tomonining uzunligini toping.
A) 1 B) 2 C) 3 D) 4 E) 5

35. (02-4-47) ABC uchburchakning A burchagi 45^0 ga, BC tomoni $\sqrt{2}$ ga teng. Shu uchburchakka tashqi chizilgan aylananing radiusini toping.
A) 1 B) 2 C) 3 D) 4 E) 5

36. (02-4-48) Uchburchakning kichik tomoni 3 ga, unga tashqi chizilgan aylananing diametri esa $3\sqrt{2}$ ga teng. Uchburchakning kichik burchagini toping.
A) 30^0 B) 45^0 C) 60^0 D) 75^0 E) 90^0

37. (02-4-50) Uchburchak tomonlarining uzunliklari 10, 13, *va* 17 ga teng. Bu uchburchakka tashqi chizilgan aylananing markazi qayerda bo'lishini aniqlang.
A) uchburchak ichida
B) uchburchakning kichik tomonida
C) uchburchak tashqarisida
D) aniqlab bo'lmaydi
E) uchburchakning katta tomonida

38. (02-12-61) ABC uchburchakning C uchidagi tashqi burchagi 90^0 ga, A uchidagi tashqi burchagi 150^0 ga va kichik tomoni uzunligi $12,5$ ga teng. Shu uchburchakka tashqi chizilgan aylananing diametrini toping.
A) 24 B) 26 C) 25 D) 23 E) 28

39. (03-1-39) To'g'ri burchakli uchburchakka tashqi chizilgan doira yuzi 49π ga, ichki chizilgan doiraning yuzi esa 9π ga teng. Shu uchburchakning yuzini toping.
A) 49 B) 52 C) 43 D) 51 E) 57

40. (03-2-12) Radiusi 5 ga teng bo'lgan doiraga to'g'ri burchakli uchburchak ichki chizilgan. Shu uchburchakka ichki chizilgan doiraning radiusi 1 ga teng. Uchburchakning yuzini toping.
A) 12 B) $8\sqrt{2}$ C) 11 D) 22 E) $6\sqrt{2}$

41. (03-9-54) Uchburchakning ikkita burchagi 45^0 dan, unga tashqi chizilgan aylananing radiusi $\sqrt{8}$ ga teng. Shu uchburchakning perimetrini toping.
A) $2+\sqrt{2}$ B) $2\cdot(2+\sqrt{2})$ C) $3\cdot(2+\sqrt{2})$
D) $4\cdot(2+\sqrt{2})$ E) $6\cdot(2+\sqrt{2})$

42. (03-10-50) Uchburchakning uchlari unga tashqi chizilgan aylana to'la yoyini 1 : 2 : 3 nisbatda bo'lgan uchta bo'lakka ajratadi. Shu uchburchakning eng kichik tomoni $\sqrt[4]{6}$ ga teng bo'lsa, uning yuzini toping.
A) $2\sqrt{3}$ B) $3\sqrt{2}$ C) $2\sqrt{2}$ D) $1,5\sqrt{2}$ E) $2,5\sqrt{3}$

43. (03-10-52) Uchburchakka tashqi chizilgan aylananing uzunligi 7π ga teng. Uchburchakning katta tomoni aylananing diametriga teng bo'lsa, uning katta burchagidan tushirilgan medianasining uzunligini toping.
A) $2,5$ B) 3 C) $3,5$ D) 4 E) $4,5$

44. (03-11-32) Uchburchakning tomonlari 5 : 7 va 8 ga teng. Bu uchburchakka tashqi chizilgan doiraning yuzini toping.
A) $16\frac{1}{3}\pi$ B) $18\frac{2}{3}\pi$ C) 17π D) $15\frac{2}{3}\pi$ E) $15\frac{1}{3}\pi$

45. (03-11-36) Uchburchakning burchaklaridan biri 60^0, unga tashqi chizilgan aylana radiusi $\frac{7}{\sqrt{3}}$ ga, ichki chizilgan aylana radiusi $\sqrt{3}$ ga teng. Uchburchakning yuzini toping.
A) $10\sqrt{3}$ B) $5\sqrt{3}$ C) $20\sqrt{3}$ D) $8\sqrt{3}$ E) $16\sqrt{3}$

46. (03-11-41) To'g'ri burchakli uchburchakning perimetri va yuzasi bir xil son, ya'ni 24 bilan ifodalanadi. Shu uchburchakka tashqi chizilgan doiraning yuzini toping.
A) 25π B) 36π C) 16π D) 49π E) 18π

47. (03-12-30) Uchburchakning tomonlaridan biri unga tashqi chizilgan aylananing diametridan iborat. Uchburchakning eng kichik balandligi qarama - qarshi tomonni uzunliklari 9 va 16 ga teng kesmalarga ajratadi. Shu uchburchakning eng kichik tomoni uzunligini toping.
A) 20 B) 15 C) 10 D) 12 E) 18

48. (03-12-85) Aylana vatarining uzunligi 10 ga teng. Shu vatarning bir uchidan aylana urinma, ikkinchi uchidan esa, urinmaga parallel qilib kesuvchi o'tkazilgan. Agar shu kesuvchining aylana ichidagi kesmaning uzunligi 12 teng bo'lsa, aylananing radiusini toping.
A) 6,75 B) 8 C) 6,5 D) 6,25 E) 7,5

49. (03-12-86) ABCD parallelogrammning BD diagonali 2 ga, C burchagi 45^0 ga teng. CD tomon D nuqtada ABD uchburchakka tashqi chizilgan aylanaga urinadi. Parallelogrammning yuzini toping.
A) 4 B) $4\sqrt{2}$ C) $8\sqrt{2}$ D) $3\sqrt{2}$ E) $\frac{7\sqrt{2}}{2}$

3.7.2 Kvadrat va aylana

R, $r-$ kvadratga tashqi va ichki chizilgan aylanalar radiuslari.

1. Tomoni a ga, diagonali d ga teng bo'lgan kvadratda

$$r = \frac{a}{2}, \quad R = \frac{d}{2}.$$

1. (96-1-48) Diagonali $2\sqrt{2}$ sm bo'lgan kvadratga aylana ichki chizilgan. Shu aylananing uzunligini hisoblang.
A) 2π B) 4π C) $\pi\sqrt{2}$ D) 8π E) $\pi\sqrt{3}$

2. (96-3-11) Kvadratning tomoni 4 ga teng. Shtrixlangan figuraning S yuzi va P perimetrini toping ($\pi = 3$ deb hisoblansin).
A) P=10sm, S=$18sm^2$ B) P=10sm, S=$10sm^2$
C) P=22sm, S=$22sm^2$ D) P=18sm, S=$10sm^2$
E) P=16sm, S=$10sm^2$

3. (96-11-12) Kvadratning tomoni 6 ga teng. Shtrixlangan figuraning S yuzi va P perimetrini toping ($\pi = 3$ deb hisoblansin).
A) P=33sm, S=$22{,}5sm^2$ B) P=27sm, S=$22.5sm^2$
C) P=27sm, S=$27sm^2$ D) P=22,5sm, S=$12{,}5sm^2$
E) P=22,5sm, S=$33sm^2$

4. (98-5-36) Kvadratning yuzi 25 ga teng bo'lsa, unga ichki chizilgan doiraning yuzini hisoblang.
A) 6π B) $6,25\pi$ C) $\frac{5\sqrt{2}}{2}\pi$ D) $6,16\pi$ E) $5\sqrt{7}\pi$

5. (99-1-38) Doiraning yuzi unga ichki chizilgan kvadratning yuzidan necha marta katta?
A) $\frac{\pi}{2}$ B) 2 C) 4 D) π E) 2π

6. (00-6-44) Radiusi 5 ga teng bo'lgan aylanaga muntazam uchburchak, uchburchakka yana aylana va aylanaga kvadrat ichki chizilgan. Kvadratning perimetrini toping.
A) 10 B) $10\sqrt{2}$ C) 8 D) $8\sqrt{2}$ E) $10\sqrt{3}$

7. (03-4-49) Kvadratning tomoni 20 ga teng. Unga ichki va tashqi chizilgan aylanalar orasidagi yuzani toping.
A) 96π B) 110π C) 100π D) 108π E) 98π

8. (03-11-38) Aylanaga ichki chizilgan muntazam uchburchakning tomoni 6 ga teng. Shu aylanaga ichki chizilgan kvadratning yuzasini toping.
A) 24 B) 18 C) 48 D) 36 E) 20

3.7.3 To'g'ri to'rtburchak va aylana

1. Diagonali d ga teng bo'lgan to'g'ri to'rtburchakda

$$R = \frac{d}{2}$$

1. (97-11-31) Yuzasi 169π bo'lgan doiraga ichki chizilgan to'g'ri to'rtburchakning bir tomoni 24 ga teng. To'g'ri to'rtburchakning ikkinchi tomonini toping.
A) 7 B) 10 C) 5 D) 12 E) 16

2. (97-1-31) Doiraga ichki chizilgan to'g'ri to'rtburchakning tomonlari 12 va 16 ga teng. Doiraning yuzini toping.
A) 200π B) 100π C) 400π D) 120π E) 240π

3. (97-6-31) Aylanaga ichki chizilgan to'g'ri to'rtburchakning tomonlari 32 va 24 ga teng. Aylananing uzunligini toping.
A) 40π B) 20π C) 80π D) 48π E) 32π

4. (99-8-55) Radiusi 6 ga teng bo'lgan doiraga diagonallari orasidagi burchagi 60^0 bo'lgan to'g'ri to'rtburchak ichki chizilgan. To'g'ri to'rtburchakning kichik tomonini toping.
A) 6 B) $6\sqrt{3}$ C) 3 D) 4 E) $4,8$

3.7.4 Romb va aylana

1. Balandligi h ga teng bo'lgan rombda $r = \frac{h}{2}$.

(00-6-40) Diagonallari 12 va 16 ga teng bo'lgan rombga ichki chizilgan aylananing radiusini toping.
A) $9,6$ B) 8 C) 6 D) $3,6$ E) $4,8$

Yechish: Rombning dioganallari uni katetlari $\frac{d_1}{2}$, $\frac{d_2}{2}$ ga teng bo'lgan to'rtta to'g'ri burchakli uchburchakka ajratadi. Rombning tomoni bu to'g'ri burchakli uchburchaklarning gipotenuzasi bo'ladi. Pifagor teoremasidan rombning a tomonini topamiz.

$$a^2 = \left(\frac{d_1}{2}\right)^2 + \left(\frac{d_2}{2}\right)^2 = 6^2 + 8^2 = 100.$$

Bu yerdan $a = 10$ ekani kelib chiqadi. Rombning yuzini topamiz.
$S = \frac{1}{2}d_1 \cdot d_2 = \frac{1}{2}12 \cdot 16 = 96.$

$S = ah$ formuladan rombning h balandligini topamiz. $ah = 96$, $10h = 96$, $h = 9,6$. Rombga ichki chizilgan aylananing r radiusi uchun $h = 2r$ ekanidan $2r = 9,6$ va $r = 4,8$ bo'ladi. J: 4,8 (E).

1. (96-3-105) Tomoni 4 sm bo'lgan rombga ichki chizilgan aylananing radiusi 1 sm. Rombning o'tkir burchagi sinusini toping.
A) $\frac{\sqrt{3}}{2}$ B) $\frac{\sqrt{2}}{2}$ C) $\frac{2}{3}$ D) $\frac{1}{2}$ E) $\frac{\sqrt{3}}{4}$

2. (96-9-40) Tomoni 4 sm bo'lgan rombga ichki chizilgan aylananing radiusi 1 sm. Rombning o'tkir burchagi kosinusini toping.
A) $\frac{1}{4}$ B) $\frac{\sqrt{2}}{3}$ C) $\frac{2}{3}$ D) $\frac{\sqrt{3}}{4}$ E) $\frac{\sqrt{3}}{2}$

3. (96-9-101) Uzunligi 2π ga teng aylana o'tkir burchagi 30^0 bo'lgan rombga ichki chizilgan. Rombning perimetrini toping.
A) 2 B) 10 C) 8 D) 4 E) 16

4. (96-12-109) Tomoni 6 sm bo'lgan rombga ichki chizilgan aylananing radiusi 1 sm. Rombning o'tkir burchagi kosinusini toping.
A) $\frac{3}{4}$ B) $\frac{2\sqrt{2}}{3}$ C) $\frac{4}{5}$ D) $\frac{\sqrt{3}}{2}$ E) $\frac{\sqrt{5}}{3}$

5. (96-13-47) Tomoni 6 sm bo'lgan rombga ichki chizilgan aylananing radiusi 1 sm. Rombning o'tkir burchagi sinusini toping.
A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $\frac{1}{3}$ D) $\frac{1}{5}$ E) $\frac{2}{7}$

6. (97-2-30) Rombning kichik diagonali va tomoni $18\sqrt{3}$ ga teng. Rombga ichki chizilgan aylananing radiusini toping.
A) $13,5$ B) 27 C) $36\sqrt{2}$ D) $12\sqrt{3}$ E) $9\sqrt{3}$

7. (97-9-109) Aylanaga tashqi chizilgan parallelogrammning bir tomoni 6 ga teng bo'lsa, uning ikkinchi tomonini toping.
A) 4 B) 5 C) 6 D) 7 E) 8

8. (98-9-48) Balandligi 28 ga teng bo'lgan rombga ichki chizilgan doiraning yuzini toping.
A) 198π B) 190π C) 192π D) 200π E) 196π

9. (98-11-85) Rombning tomoni unga ichki chizilgan aylananing urinish nuqtasida 2 va 18 ga teng kesmalarga bo'linadi. Ichki chizilgan aylananing radiusini toping.
A) 9 B) 10 C) 4 D) 6 E) 3

10. (99-6-17) Rombning diagonallari 6 va 8 ga teng bo'lsa, unga ichki chizilgan aylananing radiusini toping.
A) 2 B) $1,4$ C) $0,4$ D) 1 E) $2,4$

11. (99-8-50) Radiusi 5 ga teng bo'lgan doiraga o'tkir burchagi 30^0 bo'lgan romb tashqi chizilgan. Rombning yuzini toping.
A) 100 B) 240 C) 200 D) 250 E) 180

12. (01-7-56) Yuzi Q ga teng bo'lgan doiraga burchagi 30^0 ga teng romb tashqi chizildi. Shu rombning yuzini toping.
A) $\frac{4Q}{\pi}$ B) $2Q$ C) $4Q$ D) $\frac{8Q}{\pi}$ E) $\frac{16Q}{\pi}$

13. (01-8-40) Diagonali orqali ikkita muntazam uchburchakka ajraladigan rombga ichki chizilgan aylananing radiusi r ga teng. Rombning yuzini toping.
A) $2r^2\sqrt{3}$ B) $4r^2$ C) $\frac{4r^2\sqrt{3}}{3}$ D) $4r^2\sqrt{2}$ E) $\frac{8r^2}{\sqrt{3}}$

14. (02-3-60) Yuzi Q ga teng bo'lgan doiraga o'tmas burchagi 150^0 bo'lgan romb tashqi chizilgan. Rombning yuzini hisoblang.
A) $\frac{8Q}{\pi}$ B) $\frac{4Q}{\pi}$ C) $2Q\pi$ D) $\frac{6Q}{\pi}$ E) $\frac{3}{2}\pi Q$

15. (02-3-62) Kichik diagonali tomoniga teng bo'lgan rombga doira ichki chizilgan. Agar rombning tomoni 4 ga teng bo'lsa, bu doiraning yuzini toping.
A) 3π B) 4π C) 9π D) $\frac{9\pi}{2}$ E) 6π

16. (02-5-49) Tomoni 16 ga va o'tkir burchagi 30^0 ga teng rombga ichki chizilgan aylananing diametrini toping.
A) 6 B) 7 C) 8 D) 9 E) 10

17. (02-9-53) Rombning dioganallari 6 va 8 ga teng. Unga ichki chizilgan doira yuzining romb yuziga nisbatini toping.
A) $3\pi : 4$ B) $3\pi : 8$ C) $6\pi : 11$
D) $9\pi : 25$ E) $6\pi : 25$

18. (02-11-59) O'tkir burchagi 150^0 ga teng bo'lgan rombga ichki chizilgan aylananing radiusi 3 ga teng. Rombning yuzini toping.
A) 28 B) 72 C) 18 D) 36 E) 48

19. (03-2-13) Rombga ichki chizilgan aylananing radiusi 6 ga teng. Agar rombning perimetri 96 ga teng bo'lsa, uning o'tmas burchagini toping.
A) 150^0 B) 120^0 C) 135^0 D) 110^0 E) 130^0

20. (03-2-51) O'tmas burchagi 135^0 bo'lgan parallelogrammga ichki chizilgan doiraning yuzi 9π ga teng. Parallelogrammning perimetrini toping.
A) 24 B) $18\sqrt{2}$ C) 32 D) $24\sqrt{2}$
E) berilganlar etarli emas

21. (03-11-40) O'tkir burchagi 30^0 bo'lgan rombga doira ichki chizilgan. Shu doira yuzining romb yuziga nisbatini toping.
A) $\frac{\pi}{8}$ B) $\frac{\pi}{4}$ C) $\frac{\pi}{6}$ D) $\frac{\pi}{16}$ E) $\frac{\pi}{2}$

22. (03-12-31) Parallelogrammning dioganali $8\sqrt{2}$ ga teng. Shu parallelogrammga ichki va tashqi aylanalar chizish mumkin bo'lsa, parallelogrammning yuzini toping.
A) berilganlar yetarli emas
B) 32 C) 64 D) 128 E) 256

3.7.5 Trapetsiya va aylana

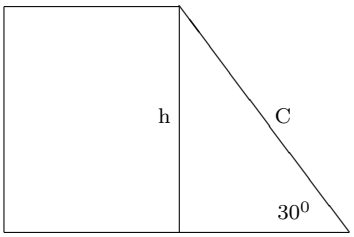
1. Aylanaga ichki chizilgan trapetsiya teng yonli bo'ladi.

2. r radiusli aylanaga tashqi chizilgan trapetsiyaning h balandligi $h = 2r$ ga teng.

3. Aylanaga tashqi chizilgan teng yonli trapesiyaning yon tomoni $c = \frac{a+b}{2}$ ga teng.

(99-9-37) O'tkir burchagi 30^0 bo'lgan to'g'ri burchakli trapetsiya diametri 8 ga teng aylanaga tashqi chizilgan. Trapetsiyaning yuzini toping.
A) 106 B) 98 C) 96 D) 104 E) 94

Yechish: Trapetsiyaning h balandligi unga ichki chizilgan aylananing diametriga teng bo'ladi. Shu sababli $h = 8$. Trapetsiyaning katta yon tomoni c ni topamiz.



$c = \frac{8}{sin30^0} = 16$. Aylanaga tashqi chizilgan to'trburchak qarama-qarshi tomonlarining yig'indilari o'zaro teng ekanidan

$$a + b = 8 + c = 8 + 16 = 24$$

tenglikni hosil qilamiz. U holda trapetsiyaning yuzi

$$S = \frac{a+b}{2} \cdot h = \frac{24}{2} \cdot 8 = 96$$

ga teng. J: 96 (C.)

1. (97-1-68) Radiusi $\sqrt{3}$ bo'lgan doiraga tashqi chizilgan teng yonli trapetsiyaning asosidagi burchagi 60^0. Trapetsiyaning yuzini toping.
   A) $8\sqrt{3}$ B) 3 C) 10 D) $\frac{3}{2}$
   E) to'g'ri javob berilmagan

2. (97-4-49) Aylanaga tashqi chizilgan teng yonli trapetsiyaning o'rta chizig'i 5 ga teng. Shu trapetsiyaning yon tomonini toping.
   A) 4 B) 6 C) 7 D) 5 E) 8

3. (00-8-50) Teng yonli trapetsiyaning asoslari 20 va 12 ga teng bo'lib, unga tashqi chizilgan aylananing markazi katta asosda yotadi. Trapetsiyaning diagonalini toping.
   A) $8\sqrt{5}$ B) $4\sqrt{5}$ C) $6\sqrt{5}$ D) 16 E) 12

4. (97-6-72) Radiusi $\sqrt{3}$ bo'lgan doiraga o'tkir burchagi 60^0 bo'lgan teng yonli trapetsiya tashqi chizilgan. Trapetsiyaning o'rta chizig'ini toping.
   A) 2 B) 3 C) 4 D) 5 E) 6

5. (97-6-74) ABCD trapetsiya aylanaga ichki chizilgan. Burchak $A = 120^0$, $CB = 3$, $CD = 7$. BD diagonalining uzunligini toping.
   A) $11\sqrt{2}$ B) $\sqrt{21}$ C) $\sqrt{58}$ D) $\sqrt{37}$ E) $10\sqrt{3}$

6. (98-3-40) Aylanaga tashqi chizilgan teng yonli trapetsiyaning asoslari 54 va 24 sm. Trapetsiyaning balandligi necha sm?
   A) 42 B) 40 C) 32 D) 36 E) 38

7. (98-4-7) Teng yonli trapetsiyaning asoslari 4 va 16 ga teng. Shu trapetsiyaga ichki chizilgan doiraning yuzini hisoblang.
   A) 20π B) 25π C) 36π D) 16π E) $\frac{25}{4}\pi$

8. (98-9-45) Radiusi 6 ga teng bo'lgan aylanaga teng yonli trapetsiya ichki chizilgan. Uning diagonali katta asosi bilan 30^0 li burchak tashkil qiladi hamda yon tomoniga perpendikulyar. Trapetsiyaning perimetrini toping.
   A) 26 B) 34 C) 29 D) 32 E) 30

9. (98-10-26) Doiraga tashqi chizilgan teng yonli trapetsiyaning perimetri 44 ga teng. Agar doiraning radiusi 5 ga teng bo'lsa, trapetsiyaning yuzi qanchaga teng bo'ladi?
   A) 200 B) 120 C) 220 D) 100 E) 110

10. (96-10-51) To'g'ri burchakli trapetsiyaga aylana ichki chizilgan. Katta yon tomoni 2 sm, o'tkir burchagi 30^0 ga teng. Aylananing uzunligini toping.
    A) 2π B) π C) 4π D) $\frac{1}{2}\pi$ E) 6π

11. (98-10-87) Aylanaga tashqi chizilgan teng yonli trapetsiyaning asoslari 54 va 24 sm. Aylananing radiusi necha sm?
    A) 15 B) 16 C) 17 D) 18 E) 19

12. (99-3-48) Doiraga tashqi chizilgan teng yonli trapetsiyaning yuzi 18 ga teng. Agar trapetsiyaning asosidagi burchagi $\frac{\pi}{6}$ ga teng bo'lsa, uning yon tomonini toping.
    A) 6 B) 4 C) 8 D) 5 E) 3

13. (99-5-45) Burchagi 60^0 ga teng, katta asosi 10 ga teng bo'lgan teng yonli trapetsiyaga aylana ichki chizilgan. Trapetsiya kichik asosining uchi va aylana markazi orasidagi masofani toping.
    A) $\frac{4\sqrt{2}}{3}$ B) $\frac{3\sqrt{3}}{2}$ C) $3\frac{2}{5}$ D) $3\frac{1}{3}$ E) $4\frac{1}{5}$

14. (99-8-48) Aylanaga tashqi chizilgan teng yonli trapetsiyaning asoslari 18 va 8 ga teng. Aylananing diametrini toping.
    A) 14 B) 10 C) 12 D) 11 E) 12,4

15. (99-10-48) Radiusi 4 ga teng bo'lgan doiraga tashqi chizilgan teng yonli trapetsiyaning perimetri 40 ga teng. Trapetsiyaning kichik asosini toping.
    A) 3 B) 4 C) 5 D) 2 E) 6

16. (00-5-56) Yon tomoni 3 ga teng bo'lgan teng yonli trapetsiyaga doira ichki chizilgan. Agar trapetsiyaning yuzi 6 ga teng bo'lsa, bu doiraning yuzini toping.
    A) 2π B) 3π C) π D) $\frac{\pi}{2}$ E) 36π

17. (00-9-49) Teng yonli trapetsiyaning burchagi 120^0 ga, kichik asosi 8 ga teng. Shu trapetsiyaga aylana ichki chizilgan. Trapetsiya katta asosining uchi aylananing markazidan qanday masofada joylashgan?
    A) $8\sqrt{2}$ B) $\frac{16\sqrt{3}}{3}$ C) $\frac{24}{\sqrt{3}}$ D) $6\sqrt{3}$ E) $\frac{18}{\sqrt{2}}$

18. (01-5-45) O'tkir burchagi 30^0 bo'lgan teng yonli trapetsiyaga aylana ichki chizilgan. Aylana uzunligining trapetsiya perimetriga nisbatini toping.
    A) $\frac{\pi}{8}$ B) $\frac{\pi}{4}$ C) $\frac{\pi}{6}$ D) π E) 2π

19. (01-10-45) Asoslari 9 ga va 16 ga teng bo'lgan teng yonli trapetsiyaga aylana ichki chizilgan. Shu aylananing uzunligini toping.
A) 24π B) 18π C) 12π D) 20π E) 8π

20. (02-6-51) Asoslari 9 va 36 ga teng bo'lgan teng yonli trapetsiyaga aylana ichki chizilgan. Shu aylana uzunligining trapetsiya perimetriga nisbatini toping.
A) $\frac{\pi}{2}$ B) $\frac{\pi}{3}$ C) $\frac{\pi}{4}$ D) $\frac{\pi}{5}$ E) $\frac{\pi}{6}$

21. (02-9-51) To'g'ri burchakli trapetsiyaning asoslari 6 va 4 ga teng. Unga ichki chizilgan aylananing uzunligini toping.
A) 2π B) 3π C) $2,4\pi$ D) $4,8\pi$ E) 6π

22. (03-2-15) Yon tomoni 10 ga teng bo'lgan teng yonli trapetsiyaga radiusi 2 ga teng bo'lgan doira ichki chizilgan. Trapetsiya yuzining doira yuziga nisbatini toping.
A) $\frac{4}{\pi}$ B) $\frac{20}{\pi}$ C) $\frac{5}{\pi}$ D) $\frac{10}{\pi}$ E) $\frac{16}{\pi}$

23. (03-2-49) Teng yonli trapetsiyaga ichki chizilgan aylananing markazidan uning kichik asosidagi uchigacha bo'lgan masofa 15 ga, katta asosidagi uchigacha bo'lgan masofa 20 ga teng. Shu trapetsiyaning yuzini hisoblang.
A) 300 B) 360 C) 540 D) 480 E) 600

24. (03-3-58) Teng yonli trapetsiyaning perimetri 40 ga, unga ichki chizilgan aylananing radiusi 3 ga teng. Shu trapetsiyaning yuzini hisoblang.
A) 40 B) 50 C) 60 D) 80 E) 100

25. (03-5-58) Aylanaga tashqi chizilgan teng yonli trapetsiyaning perimetri 60 ga teng. Trapetsiyaning o'rta chizig'ini toping.
A) 15 B) 30 C) 20 D) 18 E) 12

26. (03-7-53) Radiusi 2 ga teng bo'lgan aylanaga, yuzi 20 ga teng bo'lgan teng yonli trapetsiya tashqi chizilgan. Shu trapetsiyaning yon tomonini toping?
A) 7 B) 10 C) 5 D) 6 E) 8

27. (03-10-49) Teng yonli trapetsiyaga ichki chizilgan aylana urinish nuqtasida yon tomonni 1:9 kabi nisbatda bo'ldi. Agar aylananing uzunligi 6π bo'lsa, trapetsiyaning perimetrini toping.
A) 20 B) 30 C) 40 D) 50 E) 60

28. (03-11-37) Yon tomoni 12 ga teng bo'lgan teng yonli trapetsiyaga radiusi 5 ga teng bo'lgan aylana ichki chizilgan. Trapetsiyaning yuzini toping.
A) 120 B) 240 C) 60 D) 180 E) 124

29. (03-12-33) Teng yonli trapetsiyaga ichki chizilgan aylananing markazi ustki asosining uchidan 3 ga, pastki asosining uchidan 4 ga teng masofada joylashgan. Shu trapetsiyaga ichki chizilgan doiraning yuzini toping.
A) $2,56\pi$ B) $4,84\pi$ C) $3,24\pi$ D) $6,76\pi$ E) $5,76\pi$

3.7.6 Ko'pburchak va aylana

S_n- muntazam ko'pburchakning yuzasi, P_n- muntazam ko'pburchakning perimetri, a_n- ko'pburchakning tomoni R, $r-$ ko'pburchakka tashqi va ichki chizilgan aylanalar radiuslari.

1. $S_n = \frac{1}{2}P_n r$;
2. $a_n = 2Rsin\frac{180^0}{n}$;
3. $S_n = n \cdot \frac{1}{2}R^2 sin\frac{360^0}{n}$;
4. Aylanaga tashqi chizilgan to'rtburchakning qarama-qarshi tomonlari yig'indilari o'zaro teng.
5. Aylanaga ichki chizilgan to'rtburchakning qarama-qarshi burchaklari yig'indisi 180^0 ga teng.

(96-3-100) R radiusli aylanaga ichki chizilagan muntazam 12-burchakning tomonini toping.
A) $R\sqrt{2-\sqrt{3}}$ B) $R\sqrt{2-\sqrt{2}}$ C) R
D) $R\frac{\sqrt{2}}{2}$ E) $R\sqrt{\frac{5-\sqrt{5}}{2}}$
Yechish: Muntazam 12-burchakning tomoni a ga teng bo'lsin. Uning ikkita qo'shni burchaklari uchlarini aylana markazi bilan tutashtirib yon tomonlari R ga, asosi a ga teng bo'lgan uchburchak hosil qilamiz. Bu uchburchakning yon tomonlari orasidagi burchagi $360^0 : 12 = 30^0$ ga teng. U holda kosinuslar teoremasiga ko'ra $a^2 = R^2 + R^2 - 2RRcos30^0 = R^2(2-\sqrt{3})$. Bu erdan $a = R\sqrt{2-\sqrt{3}}$ ni hosil qilamiz. J: $R\sqrt{2-\sqrt{3}}$ (A).

1. (96-3-101) ABCD to'rtburchak aylanaga tashqi chizilgan. AB=6, AD=4, DC=3 bo'lsa, BC ni toping.
A) 4 B) $4,5$ C) 5 D) $5,5$ E) 6
2. (96-9-35) R radiusli aylanaga tashqi chizilgan muntazam 12-burchakning tomonini toping.
A) $\frac{2\sqrt{3}}{3}R$ B) $\frac{2\sqrt{2-\sqrt{2}}}{\sqrt{2+\sqrt{2}}}R$ C) $1,2R$
D) $2(2-\sqrt{3})R$ E) $1,5R$
3. (96-12-102) R radiusli aylanaga tashqi chizilgan muntazam oltiburchakning tomonlarini toping.
A) $\frac{2\sqrt{2-\sqrt{3}}}{\sqrt{2+\sqrt{3}}}R$ B) $\frac{2\sqrt{3}}{3}R$ C) $1,5R$
D) $1,2R$ E) $\frac{2\sqrt{2-\sqrt{2}}}{\sqrt{2+\sqrt{2}}}R$
4. (96-13-42) R radiusli aylanaga ichki chizilgan muntazam sakkizburchakning tomonini toping.
A) $R\sqrt{2-\sqrt{2}}$ B) $R\sqrt{2-\sqrt{3}}$ C) R
D) $\frac{R\sqrt{2}}{2}$ E) $R\sqrt{\frac{5-\sqrt{5}}{2}}$
5. (98-12-48) Muntazam ko'pburchakning perimetri 60 ga, unga ichki chizilgan aylananing radiusi 8 ga teng. Sh ko'pburchakning yuzini hisoblang.
A) 240 B) 480 C) 120 D) 60 E) 180
6. (97-1-70) ABCD to'rtburchak doiraga ichki chizilgan. $\angle A = 120^0$, BC=4 va CD=5. BD diagonal uzunligini toping.
A) 8 B) 20 C) $\sqrt{20}$ D) $\sqrt{21}$ E) $\sqrt{8}$

7. (98-2-47) Aylanaga ichki chizilgan muntazam oltiburchak tomoni 20 ga teng. Shu aylanaga kvadrat ham ichki chizilgan. Kvadratga ichki chizilgan doiraning yuzini toping.
A) 400π B) 300π C) 150π D) 200π E) 250π

8. (98-3-45) Kichik diagonali $12\sqrt{3}$ bo'lgan muntazam oltiburchakka tashqi chizilgan aylananing radiusini toping.
A) $4\sqrt{3}$ B) $6\sqrt{3}$ C) 12 D) 14 E) $8\sqrt{3}$

9. (98-3-46) Muntazam oltiburchakka tashqi chizilgan aylananing radiusi $5\sqrt{3}$ teng. Uning parallel tomonlari orasidagi masofa topilsin.
A) 10 B) 12 C) 15 D) 16 E) 17

10. (98-5-39) Muntazam oltiburchakka tashqi chizilgan aylananing radiusi $\sqrt{3}$ bo'lsa, unga ichki chizilgan aylananing radiusini toping.
A) $1,5$ B) $\frac{\sqrt{3}}{2}$ C) $\frac{\sqrt{6}}{2}$ D) $1,2$ E) 1

11. (98-6-39) Radiusi R ga teng aylanaga ichki chizilgan muntazam oltiburchakning tomonini toping.
A) R B) $\frac{2R}{\sqrt{3}}$ C) $\sqrt{3}R$ D) $\sqrt{2}R$ E) $\frac{R}{2}$

12. (98-7-48) Muntazam oltiburchakka tashqi chizilgan aylananing uzunligi 4π ga teng. Shu ko'pburchakning yuzini toping.
A) 6 B) $\sqrt{3}$ C) $6\sqrt{3}$ D) $4\sqrt{3}$ E) 12

13. (98-10-92) Muntazam oltiburchakka tashqi chizilgan aylananing radiusi 12 ga teng. Uning kichik diagonalini toping.
A) $12\sqrt{2}$ B) $12\sqrt{3}$ C) $6\sqrt{5}$ D) $8\sqrt{5}$ E) $9\sqrt{5}$

14. (98-11-88) Radiusi R ga teng aylanaga tashqi chizilgan muntazam oltiburchakning tomonini toping.
A) $\frac{\sqrt{3}}{2}R$ B) $\sqrt{3}R$ C) $\frac{4}{3}R$ D) $\frac{3}{4}R$ E) $\frac{2}{\sqrt{3}}R$

15. (99-7-38) Muntazam oltiburchakka tashqi chizilgan aylananing uzunligi 2π ga teng. Unga ichki chizilgan doiraning yuzini hisoblang.
A) 2π B) 3π C) π D) $\frac{3\pi}{4}$ E) $2,5\pi$

16. (99-9-36) Quyidagi mulohazalardan qaysi biri noto'g'ri?
A) Muntazam uchburchak medianasining 1/3 qismi unga ichki chizilgan aylananing radiusiga teng.
B) To'g'ri burchakli uchburchakning gipotenuzasiga tushirilgan medianasi, unga tashqi chizilgan aylananing radiusiga teng.
C) Muntazam oltiburchakning katta diagonali unga tashqi chizilgan aylananing diemetriga teng.
D) Rombning diagonallari o'zaro perpendikulyardir.
E) O'xshash uchburchaklar yuzlarining nisbati ularning perimetrlari nisbati kabidir.

17. (00-6-43) Aylanaga tashqi chizilgan to'rtburchakning uchta ketma-ket tomonlari nisbati 1:2:3 kabi. Agar to'rtburchakning perimetri 24 ga teng bo'lsa, uning eng kichik tomonini toping.
A) $3,6$ B) 4 C) 3 D) $4,5$ E) $2,5$

18. (00-7-43) Muntazam oltiburchakning tomoni $4\sqrt{3}$ ga teng. Shu oltiburchakka ichki va tashqi chizilgan aylanalar orasidagi yuzani aniqlang.
A) 12π B) 10π C) 11π D) 13π E) 8π

19. (01-10-41) O'nsakkizburchakning yuzi 4 ga, unga ichki chizilgan doiraning yuzi π ga teng. O'nsakkizburchakning perimetrini toping.
A) 6 B) 9 C) 12 D) 16 E) 8

20. (01-10-42) Doiraga ichki chizilgan muntazam uchburchakning perimetri unga ichki chizilgan kvadratning perimetridan 5 ga kam. Shu doiraga ichki chizilgan muntazam oltiburchakning perimetrini toping.
A) $12\sqrt{3}+18\sqrt{2}$ B) $24\sqrt{2}+18\sqrt{3}$
C) $18\sqrt{2}+24\sqrt{3}$ D) $15\sqrt{3}+24\sqrt{2}$
E) $24\sqrt{3}+12\sqrt{2}$

21. (01-12-4) Tomonlari 1; 2; 3; 4 bo'lgan to'rtburchakka ichki va tashqi aylana chizilgan. Uning kichgina diagonalini toping.
A) $\sqrt{\frac{140}{11}}$ B) $\sqrt{\frac{55}{7}}$ C) $2\sqrt{2}$ D) $2\sqrt{\frac{15}{7}}$ E) $2,5$

22. (02-6-47) Muntazam yigirmaburchakning yuzi 8 ga, unga ichki chizilgan doiraning yuzi 2π ga teng. Muntazam yigirmaburchakning perimetrini toping.
A) 16 B) $4\sqrt{2}$ C) $12\sqrt{3}$ D) $8\sqrt{2}$ E) $6\sqrt{2}$

23. (02-6-48) Doiraga ichki chizilgan muntazam uchburchakning yuzi unga ichki chizilgan kvadratning yuzidan 18,5 ga kam. Shu doiraga ichki chizilgan muntazam oltiburchakning yuzini toping.
A) $8\sqrt{3}+15$ B) $9\sqrt{3}+6\sqrt{2}$ C) $12\sqrt{3}+13,5$
D) $13\sqrt{3}+12,5$ E) $24\sqrt{3}+27$

24. (02-8-27) To'rtburchakning uchta ketma-ket tomonlarining uzunliklari 2; 3 va 4 ga, unga ichki chizilgan aylananing radiusi 1,2 ga teng bo'lsa, to'rtburchakning yuzini toping.
A) $7,2$ B) $8,6$ C) $7,8$ D) $6,8$ E) $8,2$

25. (03-3-59) Muntazam yigirmaburchakning yuzi 16 ga, unga ichki chizilgan doiraning yuzi 4π ga teng. Yigirmaburchakning perimetrini toping.
A) 12 B) 16 C) 18 D) 20 E) 24

26. (03-12-36) Tomonining uzunligi 1 ga teng muntazam sakkizburchakka ichki chizilgan doiraning yuzini toping.
A) $\pi\frac{2\sqrt{3}+1}{4}$ B) $\pi\frac{3+2\sqrt{2}}{4}$ C) $\pi\frac{6+4\sqrt{2}}{9}$
D) $\pi\frac{3+2\sqrt{2}}{16}$ E) $\pi\frac{2+3\sqrt{3}}{2}$

3.8 Koordinatalar sistemasi.

Uchlari $A(x_1,y_1,z_1)$ va $B(x_2,y_2,z_2)$ nuqtalarda bo'lgan kesmani qaraymiz.

1. AB kesma o'rtasining koordinatalari $C(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}, \frac{z_1+z_2}{2})$.

2. AB kesmaning uzunligi $AB=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2+(z_2-z_1)^2}$.

3. Uchlari $A(x_1,y_1)$, $B(x_2,y_2)$, $C(x_3,y_3)$ nuqtalarda yotgan uchburchak medianalari kesishgan nuqta koordinatalari $(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3})$.

(98-10-29) $A(9,7)$; $B(6,-1)$ va $C(4,9)$ nuqtalar ABC uchburchakning uchlari. BC tomonga tushirilgan mediyananing uzunligini toping.
A) 4,5 B) 4 C) 6 D) 5 E) 5,5

Yechish: BC tomonning o'rtasini D bilan belgilaylik. AD mediyananing uzunligini topamiz. Uchlari (x_1,y_1) va (x_2,y_2) nuqtalarda bo'lgan kesma o'rtasining koordinatalari

$$(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2})$$

formula bilan topilar edi. Shuning uchun $D(x,y)$ nuqtaning koordinatalari

$$x=\frac{6+4}{2}=5,\quad y=\frac{-1+9}{2}=4$$

bo'ladi. U holda

$$AD^2=\sqrt{(x-9)^2+(y-7)^2}=\sqrt{4^2+3^2}=5$$

Javob: $AD=5$ (D).

1. (96-3-107) $A(x;0;0)$ nuqta $B(1;2;3)$ va $C(-1;3;4)$ nuqtalardan teng uzoqlikdaligi ma'lum bo'lsa, x ni toping.
A) -1 B) -2 C) -3 D) 3 E) 4

2. (96-7-41) $B(1;-2)$ va $C(-2;-6)$ nuqtalar orasidagi masofaning yarmini toping.
A) $\frac{\sqrt{65}}{2}$ B) 3,5 C) $\frac{\sqrt{10}}{2}$ D) 2,5 E) $\frac{\sqrt{5}}{2}$

3. (96-9-42) $A(x;0;0)$ nuqta $B(0;1;2)$ va $C(3;1;0)$ nuqtalardan teng uzoqlikdaligi ma'lum bo'lsa, x ni toping.
A) $\frac{5}{6}$ B) $\frac{6}{5}$ C) $-\frac{6}{5}$ D) $-\frac{5}{6}$ E) 1

4. (96-12-103) $A(0;y;0)$ nuqta $B(1;2;3)$ va $C(-1;3;4)$ nuqtalardan teng uzoqlikdaligi ma'lum bo'lsa, y ni toping.
A) -6 B) 5 C) -5 D) 7 E) 6

5. (96-13-49) $A(0;y;0)$ nuqta $B(0;2;2)$ va $C(3;1;0)$ nuqtalardan baravar uzoqlikdaligi ma'lum bo'lsa, y ni toping.
A) 1 B) 1,5 C) $-1,5$ D) 2 E) -1

6. (97-7-41) $M(3;-2)$ va $N(-1;1)$ nuqtalar orasidagi masofaning $\frac{2}{3}$ qismini toping.
A) 1,5 B) $\frac{2\sqrt{2}}{3}$ C) $\frac{2\sqrt{5}}{3}$ D) $1\frac{2}{3}$ E) $3\frac{1}{3}$

7. (97-3-41) $C(-2;3)$ va $D(1;6)$ nuqtalar orasidagi masofaning yarmini toping.
A) $\frac{\sqrt{10}}{2}$ B) 1,5 C) $\sqrt{3}$ D) $\frac{3}{\sqrt{2}}$ E) 2

8. (97-10-41) $A(3;-2)$ va $B(1;6)$ nuqtalar orasidagi masofaning uchdan birini toping.
A) $1\frac{1}{3}$ B) $\frac{2\sqrt{5}}{3}$ C) $\frac{4\sqrt{2}}{3}$ D) $\frac{2\sqrt{17}}{3}$ E) $2\frac{2}{3}$

9. (98-7-50) x ning qanday qiymatida $M(x;0;0)$ nuqta $M_1(1;2;-3)$ va $M_2(-2;1;3)$ nuqtalardan baravar uzoqlashgan?
A) 0 B) 1 C) -2 D) -1 E) -3

10. (98-11-29) Agar $A(1;0)$, $B(1;3)$ va $C(4;3)$ bo'lsa, ABC uchburchakning turi qanday bo'ladi?
A) teng yonli B) to'g'ri burchakli
C) teng yonli to'g'ri burchakli D) teng tomonli
E) turli tomonli

11. (98-12-50) OZ o'qida shunday M nuqtani topingki, undan $A(2;-3;1)$ nuqtagacha bo'lgan masofa 7 ga teng bo'lsin.
A) $M_1(0;0;7)$ va $M_2(0;0;-5)$
B) $M(0;0;7)$ C) $M(0;0;-5)$
D) $M_1(0;0;-2)$ va $M_2(0;0;6)$
E) $M_1(0;0;2)$ va $M_2(0;0;-2)$

12. (00-10-19) $A(0;1)$ va $B(5;6)$ nuqtalar orasidagi masofani toping.
A) 5 B) $5\sqrt{5}$ C) 6 D) $5\sqrt{2}$ E) 4,5

13. (96-3-41) Uchlari $A(-3;2)$ va $B(4;1)$ nuqtalarda bo'lgan AB kesma o'rtasining koordinatalarini toping.
A) $(-0,5;1,5)$ B) $(1,5;-0,5)$ C) $(1,5;0,5)$
D) $(0,5;-1,5)$ E)$(0,5;1,5)$

14. (96-11-42) Uchlari $A(3;-1)$ va $B(2;4)$ nuqtada bo'lgan AB kesmaning o'rtasidagi nuqtaning koordinatalarini toping.
A) $(2,5;1,5)$ B) $(-2,5;1,5)$ C) $(2,5;-1,5)$
D) $(2,5;3)$ E) $(3;2,5)$

15. (96-12-43) Uchlari $A(2;-2)$ va $B(3;1)$ nuqtadalarda bo'lgan AB kesma o'rtasidagi nuqtaning koordinatalarini toping.
A) $(-2,5;0,5)$ B) $(0,5;2,5)$ C) $(-0,5;2,5)$
D) $(2,5;-0,5)$ E) $(2,5;0,5)$

16. (97-8-23) ABCD parallelogramm C uchining koordinatalari $(5;8)$, $O(4;5)$ esa parallelogramm diagonallarining kesishish nuqtasi.Parallelogramm A uchining koordinatalarini toping.
A) $(2;3)$ B) $(3;2)$ C) $(1;4)$ D) $(4;1)$ E) $(3;1)$

17. (98-3-49) Agar kesmaning bir uchi $A(1;-5;4)$, o'rtasi $C(4;-2;3)$ nuqtada bo'lsa, ikkinchi uchining koordinatalari qanday bo'ladi?
A) $(6;5;3)$ B) $(7;-1;2)$ C) $(7;1;2)$
D) $(5;4;6)$ E) $(7;3;1)$

18. (98-4-34) Uchburchakning uchlari $(1;2)$; $(3;4)$ va $(5;-1)$ nuqtalarda joylashgan. Shu uchburchak medianalarining kesishgan nuqtasi koordinatalarini toping.
A) $(2;3)$ B) $(3;2)$ C) $(3;3)$
D) $(3;\frac{5}{3})$ E) $(\frac{10}{3};\frac{7}{3})$

19. (98-9-53) Bir uchi $(8;2)$ nuqtada, o'rtasi $(4;-12)$ nuqtada bo'lgan kesmaning ikkinchi uchi koordinatalarini toping.
A) $(1;-13)$ B) $(0;-24)$ C) $(0;-26)$
D) $(0;26)$ E) $(0;13)$

20. (98-10-96) Uchlari $A(1;-2;4)$ va $B(3;-4;2)$ nuqtalarda bo'lgan kesma o'rtasining koordinatalarini toping.
A) $(2;-4;3)$ B) $(3;-3;3)$ C) $(2;-3;3)$
D) $(2;-3;4)$ E)$(3;-3;4)$

21. (98-12-104) Uchburchakning uchlari $(2;2)$; $(3;3)$ va $(1;4)$ nuqtalarda joylashgan. Shu uchburchak medianalari kesishgan nuqtasining koordinatalarini toping.
A) $(2;3)$ B) $(2,5;3,5)$ C) $(3,5;3)$
D) $(2;3,5)$ E) $(1,5;2,5)$

22. (96-3-106) OXZ tekisligiga nisbatan $A(1;2;3)$ nuqtaga simmetrik bo'lgan nuqtani toping.
A) $(-1;2;3)$ B) $(-1;-2;3)$ C) $(1;2;-3)$
D) $(1;-2;3)$ E)$(-1;-2;-3)$

23. (96-9-41) Koordinatalar boshiga nisbatan $A(1;2;3)$ nuqtaga simmetrik bo'lgan nuqtani toping.
A) $(-1;2;3)$ B) $(-1;-2;3)$ C) $(1;2;-3)$
D) $(1;-2;3)$ E)$(-1;-2;-3)$

24. (96-12-110) OXY tekisligiga nisbatan $(1;2;3)$ nuqtaga simmetrik bo'lgan nuqtani toping.
A) $(-1;2;3)$ B) $(-1;-2;3)$ C) $(1;2;-3)$
D) $(1;-2;3)$ E)$(-1;-2;-3)$

25. (96-13-48) Oyz tekisligiga nisbatan $(1;2;3)$ nuqtaga simmetrik bo'lgan nuqtani toping.
A) $(-1;2;3)$ B) $(-1;-2;3)$ C) $(1;2;-3)$
D) $(1;-2;3)$ E)$(-1;-2;-3)$

26. (97-1-40) Quyidagilardan qaysi biri XZ tekisligiga nisbatan $K(2;4;-5)$ nuqtaga simmetrik bo'lgan nuqta?
A) $(-2;4;5)$ B) $(2;-4;5)$ C) $(2;-4;-5)$
D) $(-2;-4;5)$ E)$(-2;4;-5)$

27. (97-6-40) Quyidagilardan qaysi biri yz tekisligiga nisbatan $P(3;-2;4)$ nuqtaga simmetrik bo'lgan nuqta?
A) $(3;2;4)$ B) $(3;2;-4)$ C) $(-3;2;-4)$
D) $(3;-2;-4)$ E)$(-3;-2;4)$

28. (97-11-40) Quyidagilardan qaysi biri xy tekisligiga nisbatan $M(7;-3;1)$ nuqtaga simmetrik bo'lgan nuqta?
A) $(-7;3;1)$ B) $(-7;3;-1)$ C) $(7;3;-1)$
D) $(7;-3;-1)$ E)$(-7;-3;-1)$

29. (98-2-54) Quyidagi nuqtalardan qaysi biri yz tekislikda yotadi?
A) $(2;-3;0)$ B) $(2;0;-5)$ C) $(1;0;-4)$
D) $(0;9;-7)$ E)$(1;0;0)$

30. (98-9-51) Quyidagi nuqtalardan qaysi biri XZ tekislikda yotadi?
A) $(-4;3;0)$ B) $(0;-7;0)$ C) $(2;0;-8)$
D) $(2;-4;6)$ E)$(0;-4;5)$

31. (01-2-54) Oy o'qqa nisbatan $(2;-3;5)$ nuqtaga simmetrik bo'lgan nuqtani toping.
A) $(-2;3;-5)$ B) $(-2;3;5)$ C) $(-2;-3;-5)$
D) $(-2;-3;5)$ E) $(2;3;5)$

32. (01-3-6) Agar ABC uchburchakda $A(8;-5)$, $B(2;5)$ va $C(-7;-9)$ bo'lsa, medianalar kesishgan nuqtaning koordinatalarini aniqlang.
A) $(2;-3)$ B) $(1;-3)$ C) $(2;-2)$
D) $(1;-2)$ E) $(\frac{3}{2};-3)$

33. (01-8-50) Uchlari $A(4;5;1)$, $B(2;3;0)$ va $C(2;1;-1)$ nuqtalarda joylashgan uchburchakning BD medianasi uzunligini toping.
A) 1 B) $\sqrt{2}$ C) $\sqrt{3}$ D) 2 E) $\sqrt{5}$

34. (01-9-5) $A(2;-1;0)$ va $B(-2;3;2)$ nuqtalar berilgan. Koordinata boshidan AB kesma o'rtasigacha bo'lgan masofani toping.
A) $\sqrt{2}$ B) $-\sqrt{2}$ C) $2\sqrt{2}$ D) 2 E) 1

35. (02-1-75) $A(-3;8;3\sqrt{33})$ nuqtadan Ox o'qqacha bo'lgan masofani toping.
A) 17 B) 18 C) 19 D) 21 E) 23

36. (03-3-47) Koordinatalari butun sonlardan iborat nechta nuqta uchlari $A(-1,5;-0,5)$, $B(-1,5;2,5)$, $C(1,5;2,5)$ va $D(1,5;-0,5)$ nuqtalarda bo'lgan to'g'ri to'rtburchakning ichida yotadi?
A) 9 B) 3 C) 4 D) 6 E) 8

37. (03-7-52) Uchlari $A(3;-2;1)$, $B(3;0;2)$ va $C(1;2;5)$ nuqtalarda bo'lgan uchburchakning BD medianasi va AC tomoni orasidagi burchakning kattaligini toping.
A) 45^0 B) 30^0 C) 60^0
D) $arccos\frac{\sqrt{2}}{3}$ E) $arccos\frac{\sqrt{3}}{3}$

38. (03-9-39) Koordinatalari butun sonlardan iborat nechta nuqta uchlari $A(-1,5;-0,5)$, $B(-1,5;2,5)$, $C(1,5;2,5)$ va $D(1,5;-0,5)$ nuqtalarda bo'lgan to'g'ri to'rtburchakning ichida yotadi?
A) 15 B) 12 C) 9 D) 8 E) 6

3.9 VEKTORLAR.

3.9.1 Vektorning koordinatalari.

1. $A(a_1,a_2,a_3)$ va $B(b_1,b_2,b_3)$ nuqtalar uchun $\overline{AB}=(b_1-a_1,b_2-a_2,b_3-a_3)$.

2. $\vec{a}(x_1,y_1,z_1)$ va $\vec{b}(x_2,y_2,z_2)$ vektorlar uchun:
$\vec{a}(x_1,y_1,z_1)\pm\vec{b}(x_2,y_2,z_2)=$
$=\vec{c}(x_1\pm x_2,y_1\pm y_2,z_1\pm z_2)$.

3. $l\vec{a}(x_1,y_1,z_1)=\vec{a}(lx_1,ly_1,lz_1)$;

4. Vektorlarni qo'shishning uchburchak usuli:
$\vec{AB}+\vec{BC}=\vec{AC}$.

5. Vektorlarni qo'shishning parallelogramm usuli:
ABCD parallelogramm uchun $\vec{AB}+\vec{AD}=\vec{AC}$.

6. ABC uchburchak AD medianasi uchun $\vec{AD}=\frac{1}{2}(\vec{AB}+\vec{AC})$.

(97-11-35) $\vec{a}(0;-4)$; $\vec{b}(-2;2)$ vektorlar berilgan. Agar $\vec{b}=3\vec{a}-\vec{c}$ bo'lsa, $\vec{c}$ vektorning koordinatalarini toping.
A) $(2;-14)$ B) $(3;-6)$ C) $(-2;10)$
D) $(-2;-10)$ E) $(2;-10)$

Yechish: $\vec{b}=3\vec{a}-\vec{c}$ tenglikdan $\vec{c}$ vektorni topamiz.

$$\vec{c}=3\vec{a}-\vec{b}=(0;-12)-(-2;2)=(2;-14).$$

Javob: $(2;-14)$ (A).

1. (96-10-45) $\vec{m}(-3;1)$ va $\vec{n}(5;-6)$ vektorlar berilgan. $\vec{a}=\vec{n}-3\vec{m}$ vektorning koordinatalarini toping.
A) $(14;-9)$ B) $(4;-3)$ C) $(14;-3)$
D) $(9;3)$ E) $(-5;6)$

2. (96-1-42) $\vec{b}(0;-2)$; $\vec{c}(-3;4)$ vektorlar berilgan. $\vec{a}=3\vec{b}-2\vec{c}$ vektorning koordinatalarini toping.
A) $(0;8)$ B) $(3;-6)$ C) $(6;-8)$
D) $(6;-14)$ E) $(-6;-8)$

3. (96-3-50) $B(4;2;0)$ nuqta $\vec{a}(-2;3;-1)$ vektorning oxiri bo'lsa, bu vektor boshining koordinatalarini toping.
A) $(-6;1;1)$ B) $(6;1;1)$ C) $(6;-1;1)$
D) $(6;-1;-1)$ E) $(-6;-1;1)$

4. (96-9-94) $\vec{a}(2;-3)$ va $\vec{b}(-2;-3)$ vektorlar berilgan. $\vec{m}=\vec{a}-2\vec{b}$ vektorning koordinatalarini ko'rsating.
A) $(6;3)$ B) $(-3;6)$ C) $(-2;-9)$
D) $(2;-3)$ E) $(0;3)$

5. (96-11-52) $\vec{a}(1;-2;3)$ vektorning oxiri $B(2;0;4)$ nuqta bo'lsa, bu vektorning boshini toping.
A) $(1;2;1)$ B) $(-1;2;1)$ C) $(1;-2;1)$
D) $(1;2;-1)$ E) $(-1;2;-1)$

6. (96-12-54) $B(0;4;2)$ nuqta $\vec{a}(2;-3;1)$ vektorning oxiri bo'lsa, bu vektor boshining koordinatalarini toping.
A) $(2;7;1)$ B) $(-2;7;1)$ C) $(-2;-7;1)$
D) $(-2;7;-1)$ E) $(2;7;-1)$

7. (97-1-35) $\vec{a}(4;1)$ va $\vec{b}(-2;2)$ vektorlar berilgan. Agar $\vec{a}=\vec{c}+3\vec{b}$ bo'lsa, $\vec{c}$ vektorning koordinatalarini toping.
A) $(-2;5)$ B) $(2;-5)$ C) $(-10;4)$
D) $(10;-5)$ E) $(-6;4)$

8. (97-6-35) $\vec{c}(-5;0)$ va $\vec{b}(-1,4)$ vektorlar berilgan. Agar $\vec{c}=2\vec{a}-\vec{b}$ bo'lsa, $\vec{a}$ vektorning koordinatalarini toping.
A) $(-2;2)$ B) $(-3;2)$ C) $(1;0)$
D) $(2;2)$ E) $(3;-2)$

9. (97-7-66) $A(3;-2;5)$ va $B(-4;5;-2)$ nuqtalar berilgan. $\vec{BA}$ vektorning koordinatalarini toping.
A) $(7;-7;-7)$ B) $(-1;3;3)$ C) $(-7;7;-7)$
D) $(-7;-7;7)$ E) $(7;-7;7)$

10. (97-9-60) $A(-3;0;7)$ va $B(5;-4;3)$ nuqtalar berilgan. $\vec{BA}$ vektorning koordinatalarini toping.
A) $(-8;-4;4)$ B) $(-8;4;4)$ C) $(2;-4;10)$
D) $(8;-4;-4)$ E) $(8;-4;4)$

11. (98-1-47) Agar $\vec{a}=2\vec{i}+3\vec{j}$ va $\vec{b}=2\vec{j}$ bo'lsa, $\vec{p}=2\vec{a}-3\vec{b}$ vektorning koordinatalarini ko'rsating.
A) $(-4;12)$ B) $(-4;0)$ C) $(4;0)$
D) $(2;-6)$ E) $(-2;4)$

12. (98-2-53) To'rtburchakning uchi $M(2;-4)$; $N(-4;0)$; $P(2;-2)$ uchlari berilgan. Agar $\vec{MN}=4\vec{OP}$ bo'lsa, O uchining koordinatalarini toping.
A) $(-7;1)$ B) $(3,5;-3)$ C) $(-7;-1)$
D) $(7;1)$ E) $(6;-1)$

13. (98-4-37) $\vec{a}(-2;1;4)$ vektor va $M(1;0;-1)$ nuqta berilgan. Agar $2\vec{a}+3\vec{MN}=0$ bo'lsa, N nuqtaning koordinatalarini toping.
A) $-\frac{1}{3}$; $\frac{2}{3}$; $\frac{3}{5}$ B) $\frac{2}{3}$; $-\frac{7}{3}$; $-\frac{11}{3}$
C) $\frac{2}{3}$; $-\frac{3}{7}$; $-\frac{11}{3}$ D) $\frac{7}{3}$; $-\frac{2}{3}$; $-\frac{11}{3}$
E) $-\frac{2}{3}$; $\frac{3}{7}$; $-\frac{3}{4}$

14. (98-8-47) Agar $\vec{a}=-2\vec{i}+\vec{j}$ va $\vec{b}=2\vec{i}$ bo'lsa, $\vec{c}=-3\vec{a}+2\vec{b}$ vektorning koordinatalarini ko'rsating.
A) $(10;-3)$ B) $(-6;4)$ C) $(-2;3)$
D) $(4;-4)$ E) $(-10;3)$

15. (00-1-54) $\vec{a}(8;6)$ vektor $\vec{b}$ va $\vec{c}$ vektorlarga yoyilgan. Agar $\vec{a}=\mu\vec{b}+\lambda\vec{c}$, $\vec{c}(10;-3)$ va $\vec{b}(-2;1)$ bo'lsa, $\mu\cdot\lambda$ ning qiymatini aniqlang.
A) 120 B) 115 C) 110 D) 100 E) 105

16. (01-4-13) $M(x,y)$ nuqtaning koordinatalari $2x+4,5y-2\sqrt{x}-3\sqrt{y}+1=0$ tenglikni qanoatlantiradi. Agar $\alpha\vec{OM}$ vektor va OX o'qining musbat yo'nalishi orasidagi burchak bo'lsa, $tg\alpha$ ning qiymatini toping.
A) $\frac{2}{3}$ B) $\frac{4}{9}$ C) $\frac{\sqrt{3}}{3}$ D) $\frac{8}{9}$ E) $\frac{9}{16}$

17. (01-5-43) $\vec{m}\{-1;2\}$, $\vec{p}\{4;-2\}$ va $\vec{t}\{2;-3\}$ vektorlar berilgan. $\vec{a}=\vec{m}+2\vec{t}$ vektorni $\vec{m}$ va $\vec{p}$ vektorlar orqali ifodalang.
A) $\vec{a}=-\frac{5}{3}\vec{m}+\frac{1}{3}\vec{p}$ B) $\vec{a}=-\vec{m}+\frac{1}{2}\vec{p}$
C) $\vec{a}=3\vec{m}-4\vec{p}$ D) $\vec{a}=2\vec{m}+4\vec{p}$
E) $\vec{a}=-\frac{1}{2}\vec{m}+\vec{p}$

18. (01-12-20) Ushbu $\vec{a_1}(1;2)$, $\vec{a_2}(2;3)$, $\vec{a_3}(3;4),...$ vektorlar ketma-ketligining dastlabki nechta hadi koordinatalarining yig'indisi 120 ga teng bo'ladi?
A) 11 B) 10 C) 9 D) 8 E) 7

19. (02-3-77) $\vec{a}(2;3)$, $\vec{b}(3;-2)$ va $\vec{c}(4;19)$ vektorlar uchun $\vec{c}=m\vec{a}+n\vec{b}$ tenglik o'rinli bo'lsa, $m\cdot n$ ko'paytmaning qiymatini toping.
A) -10 B) -12 C) 6 D) -8 E) 10

20. (02-11-47) Agar $A(-5;2;8)$, $\vec{AB}(-3;4;1)$ va $\vec{BD}(-2;4;1)$ bo'lsa, ABCD parallelogramm C uchining koordinatalari yig'indisini toping.
A) 8 B) 10 C) 11 D) 12 E) 13

21. (03-3-45) $\vec{m}(-1;-1)$, $\vec{n}(-1;1)$, $\vec{p}(-5;3)$ va $\vec{q}(-5;2)$ vektorlarning qaysilari $\vec{a}(-3;2)$ va $\vec{b}(2;-1)$ vektorlardan yasalgan parallelogrammning diagonallari bo'ladi?
A) $\vec{m};\vec{n}$ B) $\vec{m};\vec{p}$ C) $\vec{m};\vec{q}$ D) $\vec{n};\vec{p}$ E) $\vec{p};\vec{q}$

22. (03-9-37) $\vec{a}(-3;2;-4)$ va $\vec{b}(4;3;-2)$ lar teng yonli uchburchakning $C(-6;4;3)$ uchidan tushirilgan vektorlar. Shu uchburchakning C uchidan CD balandlik tushirilgan. D nuqtaning koordinatalari yig'indisini toping.
A) -1 B) 1 C) $-2,5$ D) 2,5 E) 3

3.9.2 Vektorning uzunligi.

1. $\vec{a}(x_1, y_1, z_1)$, $|\vec{a}| = \sqrt{{x_1}^2 + {y_1}^2 + {z_1}^2}$;
2. $|\vec{a} + \vec{b}|^2 + |\vec{a} - \vec{b}|^2 = 2(|\vec{a}|^2 + |\vec{b}|^2)$.

(97-10-50) Agar $\vec{a}(2;0;1)$ va $\vec{b}(1;-2;3)$ bo'lsa, $\vec{n} = \vec{a} + 2\vec{b}$ vektorning uzunligini toping.
A) 9 B) $6\sqrt{2}$ C) 16 D) 13 E) $5\sqrt{3}$

Yechish: Avval $\vec{n}$ vektorni topamiz.

$$\vec{n} = \vec{a} + 2 \cdot \vec{b} = (2;0;1) + 2 \cdot (1;-2;3) =$$

$$= (2;0;1) + (2;-4;6) = (4;-4;7).$$

Endi bu vektorning uzunligini topamiz.

$$|\vec{n}| = \sqrt{4^2 + (-4)^2 + 7^2} = \sqrt{16 + 16 + 49} = \sqrt{81} = 9$$

. Javob: 9 (A).

1. (96-3-40) $\vec{a}(1; \frac{4}{3})$ vektor berilgan. $3 \cdot \vec{a}$ vektorning modulini toping.
A) 4,5 B) 3,5 C) 5 D) 5,5 E) 2,5

2. (96-7-50) Agar $\vec{a}(1;2;3)$ va $\vec{b}(4;-2;9)$ bo'lsa, $\vec{c} = \vec{a} + \vec{b}$ vektorning uzunligini toping.
A) $5\sqrt{2}$ B) $4\sqrt{3}$ C) 13 D) 11 E) 8

3. (96-11-41) $\vec{a}(2; \frac{15}{4})$ vektor berilgan. $4 \cdot \vec{a}$ vektorning modulini toping.
A) 13 B) 17 C) 18 D) 15 E) 12

4. (96-12-42) $\vec{a}(\frac{3}{2}; 2)$ vektor berilgan. $2 \cdot \vec{a}$ vektorning modulini toping.
A) 5 B) 4 C) 7 D) $1\frac{1}{3}$ E) $2\frac{1}{3}$

5. (97-3-50) Agar $\vec{a}(6;2;1)$ va $\vec{b}(0;-1;2)$ bo'lsa, $\vec{c} = 2\vec{a} - \vec{b}$ vektorning uzunligini toping.
A) 13 B) $4\sqrt{13}$ C) 15 D) $6\sqrt{2}$ E) 9

6. (97-5-29) $\vec{a}(5;1)$ va $\vec{b}(-2;3)$ vektorlar berilgan. $|\vec{a} + \vec{b}|$ ni hisoblang.
A) 5 B) 3 C) 4 D) 2 E) 1

7. (97-7-50) Agar $\vec{a}(-1;2;8)$ va $\vec{b}(3;-2;1)$ bo'lsa, $\vec{m} = \vec{b} - \vec{a}$ vektorning uzunligini toping.
A) 8 B) $9\sqrt{2}$ C) $12\sqrt{3}$ D) 12 E) 9

8. (97-9-29) $\vec{a}(7;3)$ va $\vec{b}(5;2)$ vektorlar berilgan. $|\vec{a} + \vec{b}|$ ni hisoblang.
A) 19 B) 5 C) 8 D) 13 E) 12

9. (97-12-23) $\vec{a}(x;1;2)$ vektorning uzunligi 3 ga teng. x ning qiymatini toping.
A) 2 B) ± 2 C) 0 D) 1 E) -1

10. (98-1-49) z ning qanday qiymatlarida $\vec{c} = 2\vec{i} - 9\vec{j} + z\vec{k}$ vektorning uzunligi 11 ga teng bo'ladi?
A) $z = 6$ B) $z = \pm 6$ C) $z = 4$
D) $z = \pm 5$ E) $z = 7$

11. (98-8-49) y ning qanday qiymatlarida $\vec{b} = 12\vec{i} - y\vec{j} + 15\vec{k}$ vektorning uzunligi 25 ga teng?
A) 14 B) 16 C) 14 va -14
D) 2 E) 16 va -16

12. (98-9-52) Agar $\vec{p}(2,5;-1)$ va $\vec{q}(-2;2)$ bo'lsa, $\vec{m} = 4\vec{p} + 2\vec{q}$ vektorning uzunligini toping.
A) 12 B) 8 C) 14 D) 6 E) 10

13. (99-1-36) Agar $\vec{a}(-6;8)$ berilgan bo'lib, $|k\vec{a}| = 5$ bo'lsa, k ni toping.
A) $\pm\frac{1}{2}$ B) $-\frac{5}{6}$ C) $\frac{5}{8}$ D) $\pm\frac{5}{14}$ E) $\frac{1}{20}$

14. (99-2-52) $A(1;0;1)$; $B(-1;1;2)$ va $C(0;2;-1)$ nuqtalar berilgan. Koordinatalar boshi O nuqtada joylashgan. Agar $\vec{AB} + \vec{CD} = 0$ bo'lsa, $\vec{OD}$ vektorning uzunligini toping.
A) 4 B) 2 C) 9 D) 3 E) 6

15. (99-3-43) m ning qanday qiymatlarida $\vec{a}(m; m+1; 2)$ vektorning uzunligi 3 dan kichik bo'ladi?
A) $-2 < m < 2$ B) $-2 < m < 1$
C) $-1 < m < 3$ D) $-1 < m < 2$
E) $-1 < m < 1$

16. (99-6-19) $\vec{a}(3;2)$ va $\vec{b}(0;-1)$ vektorlar berilgan. $-2\vec{a} + 4\vec{b}$ vektorning modulini toping.
A) 10 B) 6 C) 8 D) 3 E) 5

17. (99-8-58) $A(2;4)$; $B(3;6)$ va $C(6;14)$ nuqtalar berilgan. $|\vec{AB} + \vec{AC}|$ ni hisoblang.
A) 13 B) 12 C) 10 D) 14 E) $13\sqrt{2}$

18. (00-2-34) Agar $\overrightarrow{a} \neq 0$ bo'lsa, $|(x-1)\vec{a}| < |2\vec{a}|$ tengsizlik x ning qanday qiymatlarida o'rinli bo'ladi?
A) $(-1;3)$ B) $(0;2)$ C) $(1;2)$
D) $(-3;-1)$ E) $(-\infty;-1)$

19. (00-5-69) $\vec{a}(-2;6;3)$ vektorlarga yo'nalishdosh bo'lgan birlik vektorning koordinatalarini toping.
A) $(\frac{2}{7}; \frac{6}{7}; \frac{3}{7})$ B) $(-1;-3;-1)$ C) $(-\frac{1}{3}; 1; \frac{1}{2})$
D) $(-\frac{2}{3}; 2; 1)$ E) $(-\frac{2}{7}; \frac{6}{7}; \frac{3}{7})$

20. (00-6-45) Agar

$$|\vec{AB}| = |\vec{AC}| = |\vec{AB} + \vec{AC}| = 4$$

bo'lsa, $|\vec{CB}|$ ning qiymatini toping.
A) $4\sqrt{2}$ B) $4\sqrt{3}$ C) $2\sqrt{3}$ D) 4,5 E) $\frac{3\sqrt{3}}{2}$

21. (00-10-56) Muntazam uchburchak ichidan olingan nuqtadan uchburchak tomonlarigacha bo'lgan masofalar mos holda $\vec{a}(1;2;3)$, $\vec{b}(1;2;1)$ va $\vec{c}(2;3;1)$ vektorlarning absolyut qiymatlariga teng bo'lsa, uchburchakning balandligini toping.
A) $2\sqrt{14} + \sqrt{6}$ B) 18 C) $\sqrt{6} + \sqrt{14}$
D) 16 E) $25\sqrt{2}$

22. (00-10-59) $\vec{a}(3;4)$ vektor yo'nalishidagi birlik vektorni toping.
A) $\vec{a}(0,6;0,8)$ B) $\vec{a}(6;16)$ C) $\vec{a}(1;0)$
D) $\vec{a}(0;1)$ E) $\vec{a}(2;16)$

23. (01-2-52) $A(1;1;1)$, $B(3;0;1)$ va $C(0;3;1)$ nuqtalarni tutashtirish natijasida hosil bo'lgan ABC uchburchakning BAC burchagi bissektrisasi bo'yicha yo'nalgan birlik vektorning koordinatalarini aniqlang.
A) $(\frac{1}{2}; \frac{1}{2}; 0)$ B) $(\frac{\sqrt{3}}{2}; 0; \frac{\sqrt{3}}{2})$ C) $(\frac{1}{3}; \frac{1}{3}; 0)$
D) $(\frac{1}{\sqrt{2}}; \frac{1}{\sqrt{2}}; 0)$ E) $(\frac{1}{\sqrt{2}}; 0; \frac{1}{\sqrt{2}})$

24. (01-2-55) $\vec{a}(4;-12;z)$ vektorning moduli 13 ga teng. z ning qiymatini toping.
A) 3 B) 4 C) -3 D) 5 E) ± 3

25. (01-4-14) $\vec{x}$ va $\vec{y}$ vektorning uzunliklari 11 va 23 ga, bu vektorlar ayirmasining uzunligi 30 ga teng. Shu vektorlar yig'indisining uzunligini toping.
A) 34 B) 64 C) 42 D) 20 E) 50

26. (01-5-32) ABC teng yonli uchburchakda M nuqta AC asosining o'rtasi. Agar $AB = 5$ va $BM = 4$ bo'lsa, $|\vec{MB} - \vec{MC} + \vec{BA}|$ ning qiymatini toping.
A) 6 B) 3 C) 9 D) 5 E) $4,5$

27. (01-5-35) ABCD to'gri to'rtburchakda $AD = 12$, $CD = 5$, O-diagonallarning kesishish nuqtasi. $|\vec{AB} + \vec{AD} - \vec{DC} - \vec{OD}|$ ni toping.
A) $6,5$ B) 13 C) 17 D) 7 E) 6

28. (01-11-50) $\vec{AB}(-3;0;2)$ va $\vec{AC}(7;-2;2)$ vektorlar ABC uchburchakning tomonlaridir. Shu uchburchakning AN medianasi uzunligini toping.
A) $2,5$ B) $1,5$ C) $3\sqrt{6}$ D) $3\sqrt{2}$ E) 3

29. (02-1-71) $\vec{m}(4;-4)$ va $\vec{n}(-1;8)$ vektorlar berilgan. $|\vec{m} - \vec{n}| = ?$
A) 9 B) 12 C) 13 D) 15 E) 16

30. (02-5-46) $\vec{a}(m;\sqrt{5};4)$ vektorning uzunligi 5 dan katta bo'ladigan m ning barcha qiymatlarini toping.
A) $(-\infty;-2)\cup(2;\infty)$ B) $(2;5)$
C) $(-\infty;-4)\cup(4;\infty)$
D) $(-\infty;-3)\cup(3;\infty)$ E) $(3;\infty)$

31. (02-5-47) $\vec{a}(3;1)$ va $\vec{b}(1;3)$ vektorlarga qurilgan parallelogramm diagonallarining uzunliklari yig'indisini toping.
A) $2\sqrt{2}$ B) 6 C) $6\sqrt{2}$ D) $8\sqrt{2}$ E) 8

32. (02-10-21) $\vec{a}(3;4;-12)$ vektorga qarama-qarshi yo'nalgan birlik vektorni ko'rsating.
A) $\vec{e}(-\frac{3}{13};-\frac{4}{13};\frac{12}{13})$ B) $\vec{e}(\frac{3}{13};\frac{4}{13};-\frac{12}{13})$
C) $\vec{e}(\frac{1}{3};\frac{2}{3};\frac{2}{3})$ D) $\vec{e}(-\frac{1}{3};\frac{2}{3};-\frac{2}{3})$
E) $\vec{e}(1;0;0)$

33. (02-11-46) $|\vec{a}| = 6$, $|\vec{a} + \vec{b}| = 11$ va $|\vec{a} - \vec{b}| = 7$ bo'lsa, $|\vec{b}|$ ning qiymatini hisoblang.
A) 7 B) 5 C) $2\sqrt{7}$ D) $4\sqrt{7}$ E) $11\sqrt{6}$

34. (03-3-46) $|\vec{a}| = \sqrt{137}$, $|\vec{a} + \vec{b}| = 20$ va $|\vec{a} - \vec{b}| = 18$ bo'lsa, $|\vec{b}|$ ni toping.
A) $7\sqrt{2}$ B) $7\sqrt{3}$ C) $8\sqrt{2}$ D) 12 E) 15

35. (03-7-59) Uchburchakli piramidaning uchlari $A(3;0;1)$; $B(-1;4;1)$, $C(5;2;3)$ va $D(0;-5;4)$ nuqtalarda joylashgan. O-nuqta BCD uchburchak medianalarining kesishgan nuqtasi. AO vektorning uzunligini aniqlang.
A) $2,5$ B) $\frac{7}{3}$ C) $\frac{\sqrt{53}}{3}$ D) $5\sqrt{2}$ E) $\frac{\sqrt{51}}{3}$

3.9.3 Vektorlarning skalyar ko'paytmasi.

1. $\vec{a} \cdot \vec{b} = x_1x_2 + y_1y_2 + z_1z_2$;
2. $\vec{a} \cdot \vec{b} = |\vec{a}||\vec{b}|cos\alpha$;
3. Nolga teng bo'lmagan $\vec{a}$ va $\vec{b}$ vektorlarning perpendikulyarlik sharti: $\vec{a} \cdot \vec{b} = 0$
4. (a,b) vektorga perpendikulyar va (x_0,y_0) nuqtadan o'tuvchi to'g'ri chiziq tenglamasi $a(x-x_0)+b(y-y_0)=0$.

(98-6-37) $\vec{a}$ va $\vec{b}$ birlik vektorlar orasidagi burchak 60^0 ga teng. $|\vec{a} + \vec{b}|$ ni toping.
A) $\sqrt{2}$ B) 2 C) 1 D) $\sqrt{3}$ E) 3

Yechish: $\vec{a}$ va $\vec{b}$ lar birlik vektorlar ekanidan $|\vec{a}| = 1$, $|\vec{b}| = 1$ larni hosil qilamiz.
Avval $|\vec{a} + \vec{b}|^2$ ni topamiz.

$$|\vec{a} + \vec{b}|^2 = |\vec{a}|^2 + 2\vec{a}\vec{b} + |\vec{b}|^2 = 1 + 2|\vec{a}||\vec{b}|cos60^0 + 1 =$$

$$= 1 + 2 \cdot \frac{1}{2} + 1 = 3.$$

U holda $|\vec{a} + \vec{b}| = \sqrt{3}$. **Javob:** $\sqrt{3}$ (D).

1. (96-10-53) $\vec{a}(2;-3;4)$ va $\vec{b}(-2;-3;1)$ vektorlarning skalyar ko'paytmasini toping.
A) 9 B) 17 C) 13 D) 4 E) 36

2. (96-1-50) $\vec{m}(-1;5;3)$ va $\vec{n}(2;-2;4)$ vektorlarning skalyar ko'paytmasini toping.
A) -24 B) 2 C) 0 D) -10 E) 12

3. (96-3-99) $|\vec{a}| = 3$, $|\vec{b}| = 4$, $\vec{a}$ va $\vec{b}$ vektorlar orasidagi burchak 60^0 ga teng. λ ning qanday qiymatida $(\vec{a} - \lambda \cdot \vec{b})$ vektor $\vec{a}$ ga perpendikulyar bo'ladi?
A) 1 B) 2 C) 3 D) $1,5$ E) $2,5$

4. (96-9-39) $|\vec{a}| = 4$, $|\vec{b}| = 3$, $(\vec{a} \perp \vec{b}) = 60^0$. λ ning qanday qiymatida $(2\vec{a} - \lambda \cdot \vec{b})$ vektor $\vec{b}$ ga perpendikulyar bo'ladi.
A) 1 B) $-\frac{3}{4}$ C) $-\frac{4}{3}$ D) $\frac{3}{4}$ E) $\frac{4}{3}$

5. (96-9-103) $\vec{a}(0;-4;2)$ va $\vec{b}(-2;2;3)$vektorlarning skalyar ko'paytmasini toping.
A) 14 B) 2 C) -2 D) 10 E) -14

6. (96-12-101) $|\vec{a}| = 4$, $|\vec{b}| = 3$, $(\vec{a} \perp \vec{b}) = 60^0$. λ ning qanday qiymatida $(\vec{a} + \lambda \cdot \vec{b})$ vektor $\vec{a}$ ga perpendikulyar bo'ladi?
A) -2 B) $-1,5$ C) $-\frac{8}{3}$ D) $-2,5$ E) $-0,5$

7. (96-13-41) $|\vec{a}| = 4$, $|\vec{b}| = 3$, $\vec{a}$ va $\vec{b}$ vektorlar orasidagi burchak 60^0 ga teng. k ning qanday qiymatida $(\vec{a} + k \cdot \vec{b})$ va $\vec{a}$ vektorlar perpendikulyar bo'ladi?
A) $-\frac{7}{3}$ B) $-\frac{7}{4}$ C) $\frac{7}{3}$ D) $-\frac{8}{3}$ E) -3

8. (97-4-50) $\vec{a}(0;1)$ va $\vec{b}(2;1)$ vektorlar berilgan. x ning qanday qiymatlarida $(\vec{b} + x \cdot \vec{a})$ vektor $\vec{b}$ vektorga perpendikulyar bo'ladi?
A) -4 B) -6 C) -7 D) -3 E) -5

9. (00-4-4) m ning qanday qiymatida $\vec{a}(1;m;-2)$ va $\vec{b}(m;3;-4)$ vektorlar perpendikulyar bo'ladi?
A) 2 B) -2 C) 4 D) -4 E) 3

10. (97-4-56) x ning qanday qiymatlarida $\vec{a}(2;x;x)$ va $\vec{b}(2;5;x)$ vektorlar o'zaro perpendikulyar bo'ladi?
A) $-4;1$ B) $-1;4$ C) $-4;-1$
D) $-1;3$ E) $1;3$

11. (97-5-53) n ning qanday qiymatida $\vec{a}(n;-2;1)$ va $\vec{b}(n;n;1)$ vektorlar perpendikulyar bo'ladi?
A) 3 B) 1 C) 2 D) 5 E) 4

12. (97-9-53) n ning qanday qiymatida $\vec{a}(n;-2;4)$ va $\vec{b}(n;4n;4)$ vektorlar perpendikulyar bo'ladi?
A) 2 B) 5 C) 6 D) 4 E) 3

13. (97-9-110) $\vec{a}(2;1)$ va $\vec{b}(1;2)$ vektorlar berilgan. x ning qanday qiymatlarida $x\cdot\vec{a}+\vec{b}$ vektor $\vec{b}$ vektorga perpendikulyar bo'ladi?
A) 1 B) 2 C) 4 D) $-1,25$ E) -2

14. (97-9-116) x ning qanday qiymatlarida $\vec{a}(8;4;5x)$ va $\vec{b}(2x;x;1)$ vektorlar o'zaro perpendikulyar bo'ladi?
A) $2\sqrt{5}$ B) $-\frac{2\sqrt{5}}{5}$ C) 0 D) $\pm 3\frac{\sqrt{5}}{4}$ E) $4\sqrt{5}$

15. (98-2-55) $\vec{a}(2;5)$ va $\vec{b}(m;-6)$ vektorlar m ning qanday qiymatida perpendikulyar bo'ladi?
A) 14 B) 16 C) 15 D) -15 E) -14

16. (98-7-51) n ning qanday qiymatlarida $\vec{a}(n;-2;1)$ va $\vec{b}(n;1;-n)$ vektorlar perpendikulyar bo'ladi?
A) 0 B) -2 C) 2 D) -1 E) 2 va -1

17. (98-10-30) Agar $\vec{a}(4;-10)$ va $\vec{b}(-2;x)$ vektorlar o'zaro perpendikulyar bo'lsa, x ning qiymati qanchaga teng bo'ladi?
A) $0,8$ B) $0,6$ C) $-0,8$ D) $-0,6$ E) $0,5$

18. (98-11-19) $\vec{m}(2;3;x)$ va $\vec{n}(-1;4;2)$ vektorlar perpendikulyar bo'lsa, x ning qiymati qanchaga teng bo'ladi?
A) $\sqrt{5}$ B) 5 C) 0 D) $5\sqrt{5}$ E) -5

19. (99-3-41) Agar $|\vec{a}|=3$, $|\vec{b}|=5$ bo'lsa, α ning qanday qiymatlarida $\vec{a}+\alpha\cdot\vec{b}$ va $\vec{a}-\alpha\vec{b}$ vektorlar perpendikulyar bo'ladi?
A) $-\frac{3}{5}<\alpha<\frac{3}{5}$ B) $-\frac{3}{5}$ C) $\frac{3}{5}$ D) $\pm\frac{3}{5}$ E) $\frac{5}{3}$

20. (00-10-15) Agar $\vec{m}(4;1;x)$ va $\vec{n}(-1;4;2)$ vektorlar perpendikulyar bo'lsa, x ning qiymatini toping.
A) -2 B) 2 C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) 0

21. (01-1-40) m ning qanday qiymatida $\vec{a}=m\vec{i}+3\vec{j}+4\vec{k}$ va $\vec{b}=4\vec{i}+m\vec{j}-7\vec{k}$ vektorlar perpendikulyar bo'ladi?
A) 5 B) -5 C) 4 D) -4 E) 1

22. (01-3-11) Agar $\vec{a}(1;-1;3)$ va $\vec{b}(4;3;0)$ bo'lsa, α ning qanday qiymatida $2\vec{a}+\alpha\cdot\vec{b}$ va $\vec{b}-\vec{a}$ vektorlar perpendikulyar bo'ladi.
A) $\frac{7}{11}$ B) 2,1 C) $-\frac{6}{13}$ D) 1 E) $\frac{5}{2}$

23. (01-12-11) a ning qanday qiymatlarida $\vec{a}(cos\alpha, sin\alpha)$ va $\vec{b}(0,cos\alpha)$ vektorlar perpendikulyar bo'ladi?
A) $\pi n,\quad n\in Z$ B) $\frac{\pi n}{2},\quad n\in Z$
C) $\frac{\pi}{2}$ D) π E) $\emptyset$

24. (02-10-57) $\vec{a}(2;x)$, $\vec{b}(-4;1)$ bo'lsa, x ning qanday qiymatida $\vec{a}+\vec{b}$ va $\vec{b}$ vektorlar perpendikulyar bo'ladi?
A) -9 B) 8 C) 9 D) -7 E) $-0,5$

25. (98-1-46) $\vec{a}$ va $\vec{b}$ vektorlar 45^0 li burchak tashkil qiladi va $\vec{a}\cdot\vec{b}=4$. Shu vektorlarga qurilgan uchburchakning yuzini hisoblang.
A) 4 B) $2\sqrt{2}$ C) $4\sqrt{2}$ D) 2 E) 8

26. (02-10-58) Agar $\vec{a}(2;m)$ va $\vec{b}(3;n)$ bo'lsa, m va n ning qanday natural qiymatlarida $\vec{a}+\vec{b}$ va $\vec{a}-\vec{b}$ vektorlar perpendikulyar bo'ladi?
A) $3;2$ B) $1;6$ C) $2;3$ D) $6;1$ E) $3;3$

27. (97-1-37) Agar $\vec{m}$ va $\vec{n}$ o'zaro perpendikulyar birlik vektorlar bo'lsa, $\vec{a}=2\vec{m}+\vec{n}$ vektorning uzunligini toping.
A) 2 B) 3 C) $\sqrt{5}$ D) $\sqrt{3}$ E) $2\sqrt{2}$

28. (97-4-57) $A(2;1)$ va $B(1;2)$ nuqtalar berilgan. AB to'g'ri chiziqqa perpendikulyar va B nuqtadan o'tuvchi to'g'ri chiziq tenglamasini tuzing.
A) $x-y+2=0$ B) $x+y+2=0$
C) $x-y+2=0$ D) $x-y+1=0$
E) $x+y+1=0$

29. (97-9-117) $A(4;2)$ va $B(3;1)$ nuqtalar berilgan. AB to'g'ri chiziqqa perpendikulyar va B nuqtadan o'tuvchi to'g'ri chiziq tenglamasini tuzing.
A) $x+y+3=0$ B) $x+y-3=0$
C) $x-y-4=0$ D) $x+y-4=0$
E) $x+y+4=0$

30. (98-8-46) Agar $\vec{m}$ va $\vec{n}$ vektorlar 30^0 li burchak tashkil etsa va $\vec{m}\cdot\vec{n}=\sqrt{3}$ bo'lsa, ularga qurilgan parallelogrammning yuzini hisoblang.
A) 2 B) $\frac{\sqrt{3}}{2}$ C) 1 D) $2\sqrt{3}$ E) $1,5$

31. (98-11-86) $\vec{a}$ va $\vec{b}$ birlik vektorlar orasidagi burchak 30^0. $|\vec{a}+\vec{b}|$ ni toping.
A) $\sqrt{2+\sqrt{3}}$ B) $\sqrt{3}$ C) $\sqrt{2-\sqrt{3}}$
D) 1 E) $2+\sqrt{3}$

32. (98-12-103) $\vec{a}$ va $\vec{b}$ vektorlar 120^0 burchak hosil qiladi. Agar $|\vec{a}|=3$ va $|\vec{b}|=5$ bo'lsa, $|\vec{a}-\vec{b}|$ ning qiymati qanchaga teng bo'ladi?
A) 2 B) 8 C) 7 D) 6 E) 10

33. (99-3-40) $|\vec{a}|=3$ va $|\vec{b}|=4$ hamda $\vec{a}$ va $\vec{b}$ vektorlar $\frac{\pi}{3}$ ga teng burchak tashkil qiladi. $\vec{c}=3\vec{a}+2\vec{b}$ vektorning uzunligini toping.
A) $\sqrt{217}$ B) 12 C) 17 D) $\sqrt{221}$ E) 13

34. (99-4-46) $\vec{a}$ va $\vec{b}$ vektorlar 120^0 burchak tashkil qiladi, hamda $|\vec{a}|=3$ va $|\vec{b}|=5$. $|\vec{a}-\vec{b}|$ ning qiymatini toping.
A) 7 B) $\sqrt{19}$ C) $4\sqrt{3}$ D) 8 E) 4

35. (99-9-42) $\vec{m}$, $\vec{n}$ va $\vec{p}$ birlik vektorlar berilgan. Agar $\vec{m}$ vektor $\vec{n}$ ga va $\vec{n}$ vektor $\vec{p}$ ga perpendikulyar bo'lib, $\vec{p}$ va $\vec{m}$ vektorlar orasidagi burchak 60^0 ga teng bo'lsa, $(2\vec{m}+\vec{p})\cdot(\vec{m}+2\vec{n})$ skalyar ko'paytmaning qiymatini toping.
A) 2 B) 2,2 C) 2,4 D) 2,5 E) 2,1

36. (01-1-41) Agar $|\vec{a}|=2$ va $|\vec{b}|=4$ va $\vec{a}$ va $\vec{b}$ vektorlar orasidagi burchak $\frac{\pi}{3}$ ga teng bo'lsa, $3\vec{a}-2\vec{b}$ va $5\vec{a}-6\vec{b}$ vektorning skalyar ko'paytmasini toping.
A) 364 B) 264 C) $252-56\sqrt{3}$
D) $252+56\sqrt{3}$ E) 140

37. (01-4-15) Uch o'lchovli fazoda $\vec{a}=\vec{i}+\vec{j}$ va $\vec{b}=\vec{j}+\vec{k}$ vektorlarga perpendikulyar burlik vektorning koordinatalarini toping.
A) $(1;-1;1)$ B) $(\frac{1}{\sqrt{3}};-\frac{1}{\sqrt{3}};\frac{1}{\sqrt{3}})$
C) $(-\frac{1}{\sqrt{3}};\frac{1}{\sqrt{3}};-\frac{1}{\sqrt{3}})$
D) $(\frac{1}{\sqrt{3}};-\frac{1}{\sqrt{3}};\frac{1}{\sqrt{3}})$, $(-\frac{1}{\sqrt{3}};\frac{1}{\sqrt{3}};-\frac{1}{\sqrt{3}})$
E) $(-\frac{1}{\sqrt{5}};-\frac{2}{\sqrt{5}};-\frac{1}{\sqrt{5}})$

38. (02-8-32) Agar $\overrightarrow{a}(x;1;-1)$ va $\overrightarrow{b}(1;0;1)$ vektorlar uchun $(\overrightarrow{a}+3\overrightarrow{b})^2=(\overrightarrow{a}-2\overrightarrow{b})^2$ tenglik o'rinli bo'lsa, x ni toping.
A) 0 B) 1 C) -1 D) 0,5 E) $-0,5$

39. (02-10-20) Agar $\vec{a}\perp\vec{b}$, $(\vec{c}\widehat{\ }\vec{a})=(\vec{c}\widehat{\ }\vec{b})=\frac{\pi}{3}$, $|\vec{a}|=3$, $|\vec{b}|=5$ va $|\vec{c}|=8$ bo'lsa, $\vec{a}+\vec{b}+\vec{c}$ ning uzunligini hisoblang.
A) $9\sqrt{2}$ B) 18 C) $5\frac{1}{3}$ D) 9 E) $2\sqrt{30}$

40. (02-10-56) $\vec{a}(1;2)$ va $\vec{b}(3;-5)$ vektorlardan qurilgan uchburchakning yuzini hisoblang.
A) 5,5 B) 7 C) 13 D) 6,5 E) 4,7

41. (03-5-50) $\overrightarrow{e_1}$ va $\overrightarrow{e_2}$ o'zaro perpendikulyar birlik vektorlar bo'lsa, $\left|\overrightarrow{e_1}-\frac{2(\overrightarrow{e_1}+2\overrightarrow{e_2})}{5}\right|$ ni hisoblang.
A) 1 B) 2 C) 3 D) $\frac{1}{2}$ E) 2,5

42. (03-8-58) $\vec{p}$ va $\vec{q}$ vektorlar o'zaro 60^0 li burchak tashkil etadi. Agar $|\vec{p}|=1$, $|\vec{q}|=3$ bo'lsa, $|2\overrightarrow{p}-\overrightarrow{q}|\sqrt{7}$ ni hisoblang.
A) 7 B) $2\sqrt{7}$ C) $3\sqrt{7}$ D) 14 E) 21

43. (03-9-36) Agar $|\vec{a}|=7$, $|\vec{b}|=17$ va $|\overrightarrow{a}-\overrightarrow{b}|=3\sqrt{35}$ bo'lsa, $|\overrightarrow{a}+\overrightarrow{b}|$ ning qiymatini toping.
A) 19 B) 20 C) $8\sqrt{3}$ D) $9\sqrt{2}$ E) $4\sqrt{6}$

44. (03-9-38) $\overrightarrow{AB}(-3;1;4)$, $\overrightarrow{BC}(-2;3;-7)$ va $\overrightarrow{CD}(5;-1;3)$ lar ABCD to'rtburchakning tomonlari bo'lsa, shu to'rtburchakning diagonallaridan iborat vektorlar skalyar ko'paytmasining modulini toping.
A) 5 B) 9 C) 12 D) 2 E) 16

45. (03-10-63) Ikki vektor yig'indisining uzunligi 20 ga, shu vektorlar ayirmasining uzunligi 12 ga teng. Shu vektorlarning skalyar ko'paytmasini toping.
A) 16 B) 48 C) 24 D) 64 E) 32

46. (03-12-79) Agar $|\overrightarrow{a}|=2$ va $|\overrightarrow{b}|=4$ hamda $\overrightarrow{a}$ va $\overrightarrow{b}$ vektorlar orasidagi burchak 135^0 ga teng bo'lsa, $|\overrightarrow{a}+2\overrightarrow{b}|$ ning qiymatini toping.
A) $2\sqrt{10}$ B) $4\sqrt{2}$ C) $15\sqrt{2}$
D) $\sqrt{15+4\sqrt{2}}$ E) $2\sqrt{17-4\sqrt{2}}$

3.9.4 Ikki vektor orasidagi burchak.

1. $cos\alpha=\frac{x_1x_2+y_1y_2+z_1z_2}{\sqrt{x_2^2+y_2^2+z_2^2}\cdot\sqrt{x_1^2+y_1^2+z_1^2}}$;
2. $cos\alpha=\frac{\vec{a}\cdot\vec{b}}{|\vec{a}|\cdot|\vec{b}|}$.

(96-7-40) Agar $\vec{a}(2;5)$ va $\vec{b}(-7;-3)$ vektorlar orasidagi burchakni toping.
A) 150^0 B) 135^0 C) 120^0 D) 60^0 E) 45^0

Yechish: Izlanayotgan burchak φ bo'lsin. U holda

$$cos\varphi=\frac{\vec{a}\cdot\vec{b}}{|\vec{a}|\cdot|\vec{b}|}=\frac{2\cdot(-7)+5\cdot(-3)}{\sqrt{2^2+5^2}.\sqrt{(-7^2)+(-3^2)}}=$$

$$=\frac{-14-15}{\sqrt{29}\sqrt{58}}=\frac{-29}{\sqrt{29}\sqrt{29\cdot2}}=\frac{-29}{29\sqrt{2}}=-\frac{1}{\sqrt{2}}.$$

Shuning uchun $\varphi=135^0$ bo'ladi. Javob: 135^0 (B).

1. (98-5-37) $\vec{a}(2;\sqrt{2})$ va $\vec{b}(4;2\sqrt{2})$ vektorlar orasidagi burchakni toping.
A) $\frac{\pi}{4}$ B) $\frac{\pi}{3}$ C) 0 D) $\frac{\pi}{2}$ E) $\frac{\pi}{6}$

2. (96-3-44) Uchlari $A(1;1)$, $B(-2;3)$ va $C(-1;-2)$ nuqtalarda bo'lgan uchburchakning A va B burchaklarini toping.
A) $60^0;30^0$ B) $90^0;45^0$ C) $30^0;90^0$
D) $45^0;90^0$ E) $45^0;45^0$

3. (96-11-45) Uchlari $A(-2;3)$, $B(-1;-2)$ va $C(1;1)$ nuqtalarda bo'lgan uchburchakning A va C burcharlarini toping.
A) $45^0;90^0$ B) $90^0;45^0$ C) $30^0;90^0$
D) $45^0;45^0$ E) $90^0;30^0$

4. (96-12-47) Uchlari $A(-1;5)$, $B(3;1)$ va $C(-1;-3)$ nuqtalarda bo'lgan uchburchakning A va B burchaklarini toping.
A) $60^0;30^0$ B) $90^0;45^0$ C) $30^0;45^0$
D) $45^0;45^0$ E) $45^0;90^0$

5. (97-1-36) Agar $M(1;1)$, $N(2;3)$ va $K(-1;2)$ bo'lsa, MNK uchburchakning eng katta burchagini toping.
A) 75^0 B) 90^0 C) 120^0 D) 135^0 E) 105^0

6. (97-3-40) $\vec{n}(5;-3)$ va $\vec{m}(4;1)$ vektorlar orasidagi burchakni toping.
A) 135^0 B) 120^0 C) 60^0 D) 45^0 E) 30^0

7. (97-6-36) Uchlari $O(0;0)$, $M(1;1)$, $P(0;2)$ va $K(-1;1)$ nuqtalarda bo'lgan, OMPK to'rtburchakning diagonallari orasidagi burchakni toping.
A) 90^0 B) 30^0 C) 60^0 D) 45^0 E) 75^0

8. (97-7-40) $\vec{c}(7;3)$ va $\vec{d}(-2;-5)$ vektorlar orasidagi burchakni toping.
A) 30^0 B) 45^0 C) 60^0 D) 135^0 E) 150^0

9. (97-10-40) $\vec{a}(1;0)$ va $\vec{b}(1;-1)$ vektorlar orasidagi burchakni toping.
A) 30^0 B) 45^0 C) 60^0 D) 90^0 E) 135^0

10. (98-3-43) Uchlari $A(0;0)$, $B(4;3)$ va $C(6;8)$ nuqtalarda bo'lgan uchburchakning A burchagini toping.
A) $arccos0,9$ B) $\frac{\pi}{18}$ C) $\frac{\pi}{36}$
D) $arccos0,96$ E) $arccos0,98$

11. (98-10-90) Uchlari $A(0;0)$, $B(3;4)$ va $C(8;6)$ nuqtalarda bo'lgan uchburchakning A burchagini toping.
A) $arccos0,96$ B) $arccos0,92$ C) $\frac{\pi}{24}$
D) $arccos0,9$ E) $arccos0,98$

12. (99-3-42) $\vec{a}=2\vec{i}+\vec{j}$ va $\vec{b}=-2\vec{j}+\vec{k}$ vektorlarda yasalgan parallelogrammning diagonallari orasidagi burchakni toping.
A) $arccos(\frac{1}{\sqrt{21}})$ B) $\frac{\pi}{6}$ C) $arccos(\frac{2}{\sqrt{21}})$
D) $\frac{\pi}{2}$ E) $arccos(\frac{3}{\sqrt{21}})$

13. (99-4-50) Uchburchakning uchlari $A(3;-2;1)$, $B(3;0;2)$ va $C(1;2;5)$ nuqtalarda joylashgan. Shu uchburchakning BD medianasi va AC asosi orasidagi burchakni toping.
A) 30^0 B) 60^0 C) 45^0 D) $arccos\frac{1}{3}$ E) 75^0

14. (99-5-56) $\vec{a}(1;2;1)$; $\vec{b}(2;-1;0)$; α esa $\vec{a}+\vec{b}$ va $\vec{a}-\vec{b}$ vektorlar orasidagi burchak. $ctg^2\alpha$ ni hisoblang.
A) $\frac{1}{5}$ B) $\frac{1}{25}$ C) $\frac{1}{60}$ D) $\frac{1}{120}$ E) $\frac{1}{80}$

15. (99-7-36) $\vec{a}(1;2)$ va $\vec{b}(2;1)$ vektorlar orasidagi burchakning sinusini toping.
A) $\frac{3}{5}$ B) $\frac{4}{5}$ C) $\frac{4}{7}$ D) $\frac{1}{6}$ E) $\frac{5}{7}$

16. (00-4-3) $\vec{a}(-4;2;4)$ va $\vec{b}(\sqrt{2};-\sqrt{2};0)$ vektorlar berilgan bo'lsa, $2\vec{a}$ va $\frac{\vec{b}}{2}$ vektorlar orasidagi burchakni toping.
A) $arccos\frac{2}{3}$ B) $\frac{3\pi}{4}$ C) $arccos\frac{5}{6}$ D) $\frac{\pi}{3}$ E) $\frac{\pi}{2}$

17. (00-2-33) $\vec{i}$, $\vec{j}$ va $\vec{k}$ koordinata o'qlari bo'ylab yo'nalgan birlik vektorlar va $\vec{a}=5\vec{i}+\sqrt{2}\vec{j}-3\vec{k}$ bo'lsa, $\vec{a}$ va $\vec{i}$ vektorlar orasidagi burchakning kosinusini toping.
A) $\frac{5}{6}$ B) $\frac{2}{3}$ C) $\frac{3}{4}$ D) $\frac{1}{2}$ E) $\frac{6}{7}$

18. (00-6-47) Uchlari $A(2;3;0)$, $B(3;2;1)$ va $C(3;4;1)$ nuqtalarda bo'lgan teng yonli uchburchakning asosidagi burchagini toping.
A) $arccos\frac{2}{3}$ B) $arccos\frac{1}{3}$ C) $arccos\frac{1}{\sqrt{3}}$
D) $\frac{\pi}{6}$ E) $\frac{\pi}{3}$

19. (00-9-63) α ushbu $\vec{x}=2\vec{i}+5\vec{j}-\vec{k}$ va $\vec{y}=\vec{i}-\vec{j}-3\vec{k}$ vektorlar orasidagi burchak. $cos^2\frac{\alpha}{2}$ ning qiymatini toping.
A) 0 B) $\frac{1}{2}$ C) 1 D) $\frac{3}{2}$ E) $\frac{1}{4}$

20. (01-6-47) $\vec{AB}(3;4)$ va $\vec{AD}(4;3)$ vektorlar parallelogrammning tomonlari bo'lsa, uning diagonallari orasidagi burchakni toping.
A) 30^0 B) 45^0 C) 60^0 D) 90^0 E) 75^0

21. (01-8-52) Agar $\vec{a}(-4;2;4)$ va $\vec{b}(2;-2;0)$ bo'lsa, $2\vec{a}$ va $\frac{1}{2}\vec{b}$ vektorlar orasidagi burchakni toping.
A) 45^0 B) 60^0 C) 120^0 D) 135^0 E) 150^0

22. (02-2-43) $A(1;-2;2)$, $B(1;4;0)$, $C(-4;1;1)$ va $D(-5;-5;3)$ nuqtalar berilgan. $\vec{AC}$ va $\vec{BD}$ vektorlar orasidagi burchakni toping.
A) 90^0 B) 60^0 C) 30^0 D) 45^0 E) $arccos\frac{2}{3}$

23. (96-3-43) $\vec{a}$ va $\vec{b}$ nokollinear vektorlar berilgan. $|\vec{a}|=|\vec{b}|=3$ bo'lsa, $(\vec{a}+\vec{b})$ bilan $(\vec{a}-\vec{b})$ qanday burchak tashkil etadi?
A) 30^0 B) 45^0 C) 90^0 D) 60^0 E) 75^0

24. (96-11-44) $\vec{a}$ va $\vec{b}$ nokollinear vektorlar berilgan. $|\vec{a}|=|\vec{b}|=4$ bo'lsa, $(\vec{a}+\vec{b})$ bilan $(\vec{a}-\vec{b})$ qanday burchak tashkl etadi?
A) 30^0 B) 45^0 C) 60^0 D) 75^0 E) 90^0

25. (96-12-46) $\vec{a}$ va $\vec{b}$ nokollinear vektorlar berilgan. $|\vec{a}|=|\vec{b}|=2$ bo'lsa, $(\vec{a}+\vec{b})$ bilan $(\vec{a}-\vec{b})$ qanday burchak tashkil etadi?
A) 45^0 B) 90^0 C) 75^0 D) 60^0 E) 30^0

26. (97-6-37) Agar $\vec{c}-2\vec{b}$ va $4\vec{b}+5\vec{c}$ vektorlar perpendikulyar bo'lsa, $\vec{b}$ va $\vec{c}$ birlik vektorlar orasidagi burchakni toping.
A) 30^0 B) 45^0 C) 60^0 D) 120^0 E) 90^0

27. (97-11-36) Uchlari $A(1;2)$, $B(1;4)$ va $C(3;2)$ nuqtalarda bo'lgan uchburchakning katta burchagini toping.
A) 110^0 B) 90^0 C) 120^0 D) 135^0 E) 150^0

28. (97-11-37) Agar $\vec{m}$ va $\vec{n}$ vektorlar 120^0 li burchak tashkil etuvchi birlik vektorlar bo'lsa, $2\vec{m}+4\vec{n}$ va $\vec{m}-\vec{n}$ vektorlar orasidagi burchakni toping.
A) 120^0 B) 90^0 C) 135^0 D) 150^0 E) 60^0

29. (00-7-44) Agar $(\vec{m}-2\vec{n})^2+(\vec{m}+\vec{n})^2=73$, $|\vec{m}|=2\sqrt{2}$ va $|\vec{n}|=3$ bo'lsa, $\vec{m}$ va $\vec{n}$ vektorlar orasidagi burchakni toping.
A) 120^0 B) 130^0 C) 128^0 D) 150^0 E) 135^0

30. (02-8-33) Agar $(\vec{a}-\vec{b})^2+(2\vec{a}-\vec{b})^2=56$, $|\vec{a}|=2$ va $|\vec{b}|=3$ bo'lsa, $\vec{a}$ va $\vec{b}$ vektorlar orasidagi burchakni toping.
A) 120^0 B) 150^0 C) 30^0 D) 60^0 E) 90^0

31. (02-9-45) $\vec{a}+\vec{b}$ vektor $\vec{a}$ va $\vec{b}$ vektorlar orasidagi burchakni teng ikkiga bo'ladi. $\vec{a}+\vec{b}$ va $\vec{a}-\vec{b}$ vektorlar orasidagi burchakni toping.
A) $\frac{\pi}{2}$ B) $\frac{\pi}{4}$ C) $\frac{\pi}{3}$ D) $\frac{\pi}{6}$ E) $\frac{2\pi}{3}$

32. (02-9-46) Uchlari $O(0;0)$, $A(-1;3)$, $B(2;4)$ va $C(3;1)$ nuqtalarda joylashgan to'rtburchakning yuzini hisoblang.
A) $10\sqrt{2}$ B) 10 C) 20 D) $2\sqrt{5}$ E) $4\sqrt{10}$

33. (03-6-77) $\vec{a}(-2;4)$ va $\vec{b}(6;3)$ vektorlar orasidagi burchakning kosinusini toping.
A) 1 B) $\frac{1}{2}$ C) $\frac{\sqrt{3}}{2}$ D) $\frac{\sqrt{2}}{2}$ E) 0

34. (03-11-23) Koordinatalar tekisligida $A(6;8)$ nuqtani koordinatalar boshi atrofida α burchakka burganda, $B(8;6)$ nuqtaga o'tdi. $cos\alpha$ ning qiymatini toping.
A) $\frac{24}{25}$ B) $\frac{1}{12}$ C) $\frac{3}{8}$ D) $\frac{\sqrt{3}}{2}$ E) $\frac{1}{2}$

35. (03-12-39) Uchlari $M(-3;3;1)$; $N(3;-5;1)$ va $E(-4;-1;-2)$ nuqtalarda bo'lgan uchburcharning MN tomoni EF medianasi orasidagi burchakni toping.
A) 45^0 B) $arccos0,64$ C) 60^0
D) $arccos0,48$ E) $arccos0,75$

36. (03-12-80) Parallelogrammning uchta ketma-ket $A(-3;-2;0)$; $B(3;-3;1)$ va $C(5;0;2)$ uchlari berilgan. $\vec{AC}$ va $\vec{BD}$ vektorlar orasidagi burchakni toping.
A) 60^0 B) 150^0 C) 135^0 D) 120^0 E) 90^0

3.9.5 Vektorlarning kollinearligi.

$a(x_1,y_1,z_1)$ va $b(x_2,y_2,z_2)$ vektorlarning kollinearlik sharti:

1. $\frac{x_2}{x_1}=\frac{y_2}{y_1}=\frac{z_2}{z_1}$;
2. $\vec{a}=\lambda\vec{b}$, λ-son, $\lambda\neq 0$.

(00-9-5) $\vec{a}(3;x;6)$ va $\vec{b}(6;6;y)$ vektorlar kollinear, xy ko'paytmaning qiymatini toping.
A) 32 B) 48 C) 52 D) 36 E) 42

Yechish: Ma'lumki $\vec{a}(a_1,a_2,a_3)$ va $\vec{b}(b_1,b_2,b_3)$ vektorlar kollinear bo'lishi uchun $\frac{a_1}{b_1}=\frac{a_2}{b_2}=\frac{a_3}{b_3}$ bo'lishi kerak. Shuning uchun

$$\frac{6}{3}=\frac{6}{x}=\frac{y}{6}$$

tenglikni hosil qilamiz. Bu yerdan $xy=36$ ekani kelib chiqadi. Javob: 36 (D).

1. (00-5-65) a ning qanday qiymatida $A(2;1)$,$B(3;-2)$ va $C(0;a)$ nuqtalar bitta to'g'ri chiziqda yotadi?
A) 4 B) 5 C) 6 D) 8 E) 7

2. (97-5-47) ABDC trapetsiyaning asoslari $AB=12$ va $CD=8$. M va N lar DA va CB tomonlarning o'rtalari bo'lsin. $\overrightarrow{AB}=l\overrightarrow{NM}$ bo'lsa, l ni toping.
A) $1,2$ B) $-1,2$ C) $1,5$ D) $-1,5$ E) 2

3. (97-9-47) ABDC trapetsiyaning asoslari $AB=13$ va $CD=7$. M va N lar CB va DA tomonlarning o'rtalari bo'lsin. $\vec{DC}=\lambda\vec{MN}$ bo'lsa, λ ni toping.
A) $0,6$ B) $-0,6$ C) $0,7$ D) $-0,7$ E) $0,8$

4. (98-5-43) x ning qanday qiymatlarida $\vec{a}(3;1;6)$ va $\vec{b}(6;3;x)$ vektorlar parallel bo'ladi?
A) barcha qiymatlarida
B) $\emptyset$ C) 18 D) 12 E) 6

5. (98-6-45) $\vec{a}(3;-6;6)$ vektorga kollinear va $\vec{a}\cdot\vec{b}=27$ tenglikni qanoatlantiruvchi $\vec{a}$ vektorni toping.
A) $\vec{a}(1;-2;-2)$ B) $\vec{a}(1;2;3)$ C) $\vec{a}(\frac{1}{2};-1;1)$
D) $\vec{a}(1;-2;2)$ E) $\vec{a}(2;-2;1)$

6. (98-11-35) Qaysi $\vec{m}$ va $\vec{n}$ larda $\vec{a}(-2;m;-2)$ va $\vec{b}(-1;3;n)$ vektorlar kollinear bo'ladi?
A) $3;-1$ B) $3;1$ C) $6;-1$ D) $6;1$ E) $3;6$

7. (98-11-94) $\vec{a}(3;6;-n)$ va $\vec{b}(-2;m;4)$ vektorlar kollinear bo'lsa, n va m nechaga teng?
A) $n=6$, $m=-4$ B) $n=-6$, $m=-4$
C) $n=-4$, $m=6$ D) $n=6$, $m=4$
E) $n=6$, $m=-2$

8. (98-12-51) n ning qanday qiymatlarida $\vec{a}(2;n;6)$ va $\vec{b}(1;2;3)$ vektorlar kollinear bo'ladi?
A) 4 B) -4 C) 2 D) 1 E) 0

9. (99-1-48) $\vec{a}(2;-4)$, $\vec{b}(1;2)$, $\vec{c}(1;-2)$ va $\vec{d}(-2;-4)$ vektorlardan qaysilari kollinear vektorlar?
A) $\vec{a},\vec{c};\vec{b},\vec{c}$ B) $\vec{b},\vec{c}$ C) $\vec{a},\vec{d}$
D) $\vec{a},\vec{b}$ E) kollinearlari yo'q

10. (99-6-20) n $(n>0)$ ning qanday qiymatida $\vec{a}(2n;3)$ va $\vec{b}(6;n)$ vektorlar kollinear bo'ladi?
A) 1 B) 3 C) 2 D) 4 E) 6

11. (99-7-42) x ning qanday qiymatlarida $\vec{a}(2;x;4)$ va $\vec{b}(4;2;8)$ vektorlar parallel bo'ladi?
A) 2 B) $1,5$ C) $\emptyset$ D) $-\infty<x<\infty$ E) 1

12. (99-9-41) $\vec{a}(2;x;10)$ va $\vec{b}(y;4;5)$ vektorlar kollinear bo'lsa, $x\cdot y$ ko'paytmaning qiymatini toping.
A) 10 B) 4 C) 12 D) 6 E) 8

13. (00-4-5) m ning qanday qiymatida $\vec{a}(2;3;-4)$ va $\vec{b}(m;-6;8)$ vektorlar parallel bo'ladi?
A) 2 B) 4 C) -4 D) 3 E) 5

14. (00-10-30) m va n ning qanday qiymatida $\vec{a}(-1;m;2)$ va $\vec{b}(-2;-4;n)$ vektorlar kollinear bo'ladi?
A) $-2;4$ B) $-2;-4$ C) $2;4$
D) $2;-4$ E) $-4;4$

15. (01-7-53) Agar $\vec{a}$ vektor $\vec{b}=3\vec{i}-2\vec{j}+\vec{k}$ vektorga kollinear va $\vec{a}\cdot\vec{b}=7$ bo'lsa, $\vec{a}$ vektorning uzunligini toping.
A) 2 B) $\frac{\sqrt{14}}{2}$ C) $\frac{\sqrt{7}}{2}$ D) 1 E) $3\frac{\sqrt{2}}{2}$

16. (02-9-44) $\vec{a}(1;2;-1)$ va $\vec{b}(2;2;0)$ vektorlar berilgan. $\vec{c}(x;y;-6)$ vektor $2\vec{b}-3\vec{a}$ vektorga kollinear. $|\vec{c}|$ ning qiymatini toping.
A) $2\sqrt{14}$ B) 8 C) $2\sqrt{13}$ D) 13 E) $\sqrt{158}$

17. (02-10-76) t ning qanday qiymatlarida $A(3;8)$, $B(9;t)$ va $C(-5;0)$ nuqtalar bir to'g'ri chiziqda yotadi?
A) 14 B) 13 C) 12 D) 15 E) 16

18. (03-4-47) $\vec{b}$ vektor $\vec{a}(1;2;2)$ vektorga kollinear hamda bu vektorlarning skalyar ko'paytmasi 36 ga teng. $\vec{b}$ vektorning uzunligini toping.
A) 3 B) 4 C) 12 D) 6 E) 5

4 - Bob STREOMETRIYA.

4.1 Fazoda to'g'ri chiziqlar va tekisliklar.

(97-10-49) Bir nuqtadan tekislikka uzunliklari 4 va 8 bo'lgan ikkita og'ma tushirilgan. Og'malar proyeksiyalarining nisbati 1:7 ga teng. Berilgan nuqtadan tekislikkacha bo'lgan masofani toping.
A) 3 B) $2\sqrt{3}$ C) $\sqrt{15}$ D) $2,5$ E) $1,8$

Yechish: Har bir og'ma, uning proyeksiyasi va nuqtadan tekislikka tushirilgan perpendikulyar to'g'ri burchakli uchburchak hosil qiladi. Agar birinchi proyeksiyasining uzunligi x bo'lsa, ikkinchi proyeksiyaning uzunligi $7x$ bo'ladi. Nuqtadan tekislikkacha masofa H bo'lsin. U holda Pifagor teoremasiga ko'ra
$\begin{cases} 4^2 - x^2 = H^2 \\ 8^2 - (7x)^2 = H^2 \end{cases}$ sistemani hosil qilamiz. Bu yerdan $16 - x^2 = 64 - 49x^2$ tenglamani, uni yechib esa $x = 1$ ekanini topamiz. U holda $H^2 = 16 - x^2 = 15$ va $H = \sqrt{15}$. Javob: $\sqrt{15}$ (C).

1. (96-10-52) Perpendikulyar bilan og'ma orasidagi burchak 60^0 ga teng. Perpendikulyarning uzunligi 20 ga teng. Og'maning uzunligini toping.
   A) $20\sqrt{2}$ B) $10\sqrt{3}$ C) 40 D) $20\sqrt{3}$ E) $\frac{40}{\sqrt{3}}$

2. (96-1-49) Tekislikka o'tkazilgan perpendikulyar bilan og'ma orasidagi burchak 30^0, perpendikulyarning uzunligi esa 10 ga teng. Og'maning uzunligini toping.
   A) 20 B) $10\sqrt{3}$ C) $20\sqrt{3}$ D) $\frac{20}{\sqrt{3}}$ E) $20\sqrt{2}$

3. (96-3-38) Bitta nuqtadan tekislikka og'ma va perpendikulyar o'tkazilgan. Og'maning uzunligi 10, perpendikulyarniki 6 sm. Og'maning tekislikdagi proyeksiyasi necha sm?
   A) 4 B) 2 C) 8 D) 5 E) 3

4. (96-3-49) α tekislik va uni kesib o'tmaydigan $AB =$ 13 sm kesma berilgan. Agar kesmaning uchlaridan α tekislikkakacha bo'lgan masofalar $AA_1 = 5$ sm, $BB_1 = 8$ sm bo'lsa, AB kesma yotuvchi to'g'ri chiziqning α tekislik bilan tashkil qilgan burchak sinusini aniqlang?
   A) $\frac{5}{13}$ B) $\frac{8}{13}$ C) $\frac{2}{13}$ D) $\frac{3}{13}$ E) $\frac{4}{13}$

5. (96-6-45) Quyidagi mulohazalarning qaysi biri noto'g'ri?
   A) Agar ikki to'g'ri chiziq bitta tekislikka perpendikulyar bo'lsa, bu to'g'ri chiziqlar paralleldir.
   B) Agar tekislikda yotmaydigan to'g'ri chiziq tekislikdagi birorta to'g'ri chiziqqa parallel bo'lsa, tekislik va to'g'ri chiziq o'zaro paralleldir.
   C) Agar tekislikka tushirilgan og'ma tekislikda yotuvchi to'g'ri chiziqqa perpendikulyar bo'lsa, uning proyeksiyasi ham to'g'ri chiziqqa perpendikulyar bo'ladi.
   D) Tekislikda yotuvchi ikki to'g'ri chiziqqa perpendikulyar bo'lgan, to'g'ri chiziq tekislikka ham perpendikulyar bo'ladi.
   E) Ikkita to'g'ri chiziqning har biri uchinchi to'g'ri chiziqqa parallel bo'lsa, bu to'g'ri chiziqlar parallel.

6. (96-7-49) Bir nuqtadan tekislikka ikkita og'ma o'tkazilgan. Og'malarning uzunliklari 2 : 1 nisbatda, ularning proyeksiyalari 7 va 1 ga teng. Berilgan nuqtadan tekislikkacha bo'lgan masofani toping.
   A) 4 B) $5\sqrt{3}$ C) $4\sqrt{2}$ D) 8 E) $\sqrt{15}$

7. (96-9-102) Tekislikka tushirilgan og'ma bilan perpendikulyar orasidagi burchak 60^0, og'maning uzunligi $20\sqrt{3}$. Perpendikulyarning uzunligini toping.
   A) 10 B) 40 C) $10\sqrt{3}$ D) $5\sqrt{3}$ E) 20

8. (96-11-39) Bitta nuqtadan tekislikka og'ma va perpendikulyar o'tkazilgan. Og'maning uzunligi 5, perpendikulyarniki 4 sm. Og'maning tekislikdagi proyeksiyasi necha sm?
   A) 2 B) 3 C) $2,5$ D) 1 E) $3,5$

9. (96-11-51) α tekislik va uni kesib o'tmaydigan $AB = 9$ sm kesma berilgan. Agar kesmaning uchlaridan α tekislikkakacha bo'lgan masofalar $AA_1 = 7$ sm, $BB_1 = 11$ sm bo'lsa, AB kesma yotuvchi to'g'ri chiziqning α tekislik bilan tashkil qilgan burchak sinusini aniqlang?
   A) $\frac{5}{9}$ B) $\frac{1}{3}$ C) $\frac{2}{9}$ D) $\frac{3}{11}$ E) $\frac{4}{9}$

10. (96-12-40) Bitta nuqtadan tekislikka og'ma va perpendikulyar o'tkazilgan. Og'maning uzunligi 5, perpendikulyarniki 3 sm. Og'maning tekislikdagi proyeksiyasi necha sm?
    A) 2 B) $2\frac{1}{3}$ C) $1,5$ D) 4 E) $2,5$

11. (96-12-51) α tekislik va uni kesib o'tmaydigan $AB = 11$ sm kesma berilgan. Agar kesmaning uchlaridan α tekislikkakacha bo'lgan masofalar $AA_1 = 4$ sm, $BB_1 = 7$ sm bo'lsa, AB kesma yotuvchi to'g'ri chiziqning α tekislik bilan tashkil qilgan burchak sinusini aniqlang?
    A) $\frac{3}{11}$ B) $\frac{4}{11}$ C) $\frac{5}{11}$ D) $\frac{6}{11}$ E) $\frac{7}{11}$

12. (97-1-64) Muntazam ABC uchburchakning AC tomoni orqali tekislik o'tkazilgan. Uchburchakning BD medianasi tekislik bilan 60^0 li burchak tashkil etadi. AB to'g'ri chiziq bilan tekislik orasidagi burchakning sinusini toping.?
    A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{3}{4}$ D) $\frac{\sqrt{3}}{2}$ E) $\frac{\sqrt{2}}{2}$

13. (97-1-65) ABC uchburchakning to'g'ri burchakli B uchidan uchburchak tekisligiga perpendikulyar to'g'ri chiziq b o'tkazilgan. $AB = 3$, $BC = 4$. b va AC to'g'ri chiziqlar orasidagi masofani toping.
    A) 1 B) $1,2$ C) $1,5$ D) $2,4$ E) $2,5$

14. (97-2-45) Quyidagi mulohazalarning qaysi biri noto'g'ri?
    A) Agar tekislik ikkita parallel tekisliklardan biriga perpendikulyar bo'lsa, u holda bu tekislik ikkinchi tekislikka ham perpendikulyar bo'ladi.
    B) Tekislikda yotuvchi kesishuvchi ikki to'g'ri chiziqqa perpendikulyar bo'lgan to'g'ri chiziq tekislikka ham perpendikulyar bo'ladi.
    C) Fazodagi ikki to'g'ri chiziq, uchinchi to'g'ri

chiziqqa perpendikulyar bo'lsa, ular o'zaro parallel bo'ladi.
D) Agar tekislikdagi to'g'ri chiziq tekislikka tushirilgan og'maga perpendikulyar bo'lsa, bu to'g'ri chiziq og'maning proyeksiyasiga ham perpendikulyar bo'ladi.
E) Ikki parallel tekislikni uchinchi tekislik bilan kesganda, hosil bo'lgan to'g'ri chiziqlar o'zaro parallel bo'ladi.

15. (97-3-49) Bir nuqtadan tekislikka uzunliklari 23 va 33 bo'lgan ikkita og'ma tushirilgan. Agar og'malar proyeksiyalarining nisbati $2:3$ kabi bo'lsa, berilgan nuqtadan tekislikkacha bo'lgan masofani toping.
A) 12 B) $6\sqrt{5}$ C) 11 D) 9 E) $6\sqrt{2}$

16. (97-5-51) AB kesmaning A oxiridan tekislik o'tkazilgan. Shu kesmaning B oxiridan va C nuqtasidan tekislikni B_1 va C_1 nuqtalarda kesuvchi parallel to'g'ri chiziqlar o'tkazilgan. Agar $CC_1 = 15$ va $AC : BC = 2 : 3$ bo'lsa, BB_1 kesmaning uzunligini toping.
A) 10 B) $25,5$ C) $37,5$ D) $30,5$ E) 30

17. (97-5-52) Nuqtadan tekislikka ikkita og'ma o'tkazilgan. Agar og'malar $1:2$ ga teng nisbatda bo'lib, ularning proyeksiyalari 1 va 7 ga teng bo'lsa, og'malarning uzunligini toping.
A) $2;4$ B) $3;6$ C) $4;8$ D) $5;10$ E) $1;2$

18. (97-6-66) ABC muntazam uchburchakning AC tomoni orqali α tekislik o'tkazilgan. Uchburchakning BD balandligi tekislik bilan 30^0 li burchak tashkil qiladi. AB to'g'ri chiziq bilan α tekislik orasidagi burchakning sinusini toping?
A) $\frac{\sqrt{3}}{2}$ B) $\frac{\sqrt{3}}{4}$ C) $\frac{1}{4}$
D) $\frac{1}{2}$ E) to'g'ri javob yo'q

19. (97-6-67) ABC uchburchakning to'g'ri burchakli uchi C dan uchburchakka perpendikulyar "a" to'g'ri chiziq o'tkazilgan. $AC = 15$, $BC = 20$. a va AB to'g'ri chiziqlar orasidagi masofa topilsin.
A) 10 B) 12 C) 16 D) 20 E) $12,5$

20. (97-7-49) Bir nuqtadan tekislikka ikkita og'ma tushirilgan. Agar og'malar uzunliklarining nisbati $5:6$ ga, og'malarga mos proyeksiyalarning uzunliklari 4 va $3\sqrt{3}$ ga teng bo'lsa, berilgan nuqtadan tekislikkacha bo'lgan masofani toping.
A) $2,5$ B) 3 C) $2\sqrt{3}$ D) $1,8$ E) $3\sqrt{2}$

21. (97-8-45) Quyidagi mulohazalarning qaysi biri noto'g'ri?
A) Agar bir tekislikda yotgan ikki to'g'ri chiziq, ikkinchi tekislikda yotgan ikki to'g'ri chiziqqa mos ravishda parallel bo'lsa, bu tekisliklar paralleldir.
B) Agar ikki to'g'ri chiziq, uchinchi to'g'ri chiziqqa parallel bo'lsa, ular o'zaro paralleldir.
C) Tekislikda yotgan to'g'ri chiziq og'maning proyeksiyasiga perpendikulyar bo'lsa, og'maning o'ziga ham perpendikulyar bo'ladi.
D) To'g'ri chiziq tekislikda yotgan ikki kesishuvchi to'g'ri chiziqqa perpendikulyar bo'lsa, bu to'g'ri chiziq tekislikka ham perpendikulyar bo'ladi.
E) Og'ma va uning tekislikdagi proyeksiyasi orasidagi burchaklardan eng kichigiga og'ma va tekisliklar orasidagi burchak deyiladi.

22. (97-9-51) AB kesmaning A oxiridan tekislik o'tkazilgan. Shu kesmaning B oxiridan va C nuqtasidan tekislikni B_1 va C_1 nuqtalarda kesuvchi parallel to'g'ri chiziqlar o'tkazilgan. Agar $AB = 8$ va $CC_1 : AC = 3 : 4$ bo'lsa, BB_1 kesmaning uzunligini toping.
A) 3 B) 5 C) 4 D) 6 E) 8

23. (97-9-52) Nuqtadan tekislikka ikkita og'ma o'tkazilgan. Og'malar $3:5$ ga teng nisbatda bo'lib, ularning proyeksiyalari $\sqrt{33}$ va 17 ga teng bo'lsa, og'malarning uzunligini toping.
A) $2;10$ B) $3;5$ C) $3;15$ D) $5;25$ E) $12;20$

24. (97-12-44) Quyidagi mulohazalarning qaysi biri noto'g'ri?
A) Agar fazoda ikki to'g'ri chiziq uchinchi to'g'ri chiziqqa parallel bo'lsa, ular o'zaro paralleldir.
B) Tekislikda og'maning asosidan uning proyeksiyasiga perpendikulyar qilib o'tkazilgan to'g'ri chiziq og'maning o'ziga ham perpendikulyar bo'ladi.
C) Fazodagi uchta nuqta orqali faqat bitta tekislik o'tkazish mumkin.
D) To'g'ri chiziq yoki parallel to'g'ri chiziqlar kesmalarining nisbati parallel proyeksiyalashda o'zgarmaydi. (proyeksiyalanadigan kesmalar proyeksiyalash yo'nalishiga parallel emas).
E) Tekislikdan tashqarida yotgan to'g'ri chiziq bu tekislikdagi biror to'g'ri chiziqqa parallel bo'lsa, bu to'g'ri chiziq va tekislik o'zaro paralleldir.

25. (98-1-50) Tekislikdan a masofada joylashgan nuqtadan tekislikka ikkita og'ma tushirildi. Og'malarning har biri bilan tekislik orasidagi burchak 45^0 ga teng. Agar og'malar orasidagi burchak 60^0 ga teng bo'lsa, og'malarning uchlari orasidagi masofa qancha?
A) $2a$ B) $a\sqrt{3}$ C) $a\sqrt{2}$ D) $1,5a$ E) $2a\sqrt{2}$

26. (98-3-48) Uzunliklari 10 va 15 bo'lgan ikki kesmaning uchlari o'zaro parallel tekisliklarda yotadi. Birinchi kesmaning tekislikdagi proyeksiyasi $\sqrt{19}$ sm bo'lsa, ikkinchi kesmaning proyeksiyasi necha sm bo'ladi?
A) 12 B) 11 C) 10 D) 13 E) 9

27. (98-5-42) α va β tekisliklar 45^0 burchak ostida kesishadi. α tekislikdagi A nuqtadan β tekislikkacha bo'lgan masofa 2 ga teng. A nuqtadan tekisliklarning kesishish chizig'igacha bo'lgan masofani toping.
A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $\sqrt{3}$ D) 1 E) $2\sqrt{3}$

28. (98-7-49) Berilgan nuqtadan tekislikka ikkita og'ma va perpendikulyar tushirildi. Og'malarning proyeksiyalari 27 va 15 ga teng hamda ulardan biri ikkinchisidan 6 ga uzun bo'lsa, perpendikulyarning uzunligini toping.
A) 30 B) 39 C) 45 D) 33 E) 36

29. (98-8-50) Tekislikdan b masofada joylashgan nuqtadan tekislikka ikkita og'ma tushirilgan. Bu og'malar tekislik bilan 30^0 va 45^0li, o'zaro to'g'ri burchak tashkil qiladi.Og'malarning oxirlari orasidagi masofani toping.
A) $\frac{2b\sqrt{2}}{3}$ B) $2b\sqrt{3}$ C) $\frac{b\sqrt{11}}{2}$ D) $b\sqrt{5}$ E) $b\sqrt{6}$

30. (98-10-95) Nuqtadan tekislikka uzunliklari 10 va 15 sm bo'lgan og'malar tushirilgan. Birinchi og'maning tekislikdagi proekyiyasi 7 sm bo'lsa, ikkinchi og'maning proyeksiyasi qancha sm bo'ladi?
A) $\sqrt{170}$ B) $\sqrt{171}$ C) $\sqrt{172}$
D) $\sqrt{173}$ E) $\sqrt{174}$

31. (98-12-49) To'g'ri burchakli uchburchakning gipotenuzasi 12 ga teng. Bu uchburchakning uchlaridan 10 ga teng masofada uchburchak tekisligidan tashqarida nuqta berilgan. Shu nuqtadan uchburchak tekisligigacha bo'lgan masofani toping.
A) 8 B) 6 C) 10 D) $\sqrt{44}$ E) 12

32. (99-2-51) AB kesma α tekislikni kesib o'tadi. Uning uchlari tekislikdan 2 va 4 ga teng masofada joylashgan. Kesmaning tekislikdagi proyeksiyasi 6 ga teng. Kesma va tekislik orasidagi burchakni toping.
A) 45^0 B) 60^0 C) $arctg\frac{1}{3}$ D) 30^0 E) $arctg\frac{3}{5}$

33. (99-4-51) Berilgan nuqtadan tekislikka uzunliklarining ayirmasi 6 ga teng bo'lgan ikkita og'ma tushirilgan. Og'malarning tekislikdagi proyeksiyalari 27 va 15 ga teng. Berilgan nuqtadan tekislikkacha masofani toping.
A) 32 B) 36 C) 44 D) $30\sqrt{2}$ E) 39

34. (99-7-41) α va β tekisliklar orasidagi burchak 60^0 ga teng. α tekislikdagi A nuqtadan tekisliklarning kesishish chizig'igacha bo'lgan masofa 3 ga teng. A nuqtadan β tekislikkacha bo'lgan masofani toping.
A) 2 B) 1 C) 3 D) $1,5\sqrt{3}$ E) 2,5

35. (00-5-60) Uchburchakning tomonlari 10, 17 va 21 ga teng. Uchburchakning katta burchagi uchidan uchburchak tekisligiga perpendikulyar o'tkazilgan bo'lib, uning uzunligi 15 ga teng. Bu perpendikulyarning tekislik bilan kesishmagan uchidan uchburchakning katta tomonigacha bo'lgan masofani aniqlang.
A) 17 B) 16 C) 18 D) 20 E) 19

36. (00-6-48) Muntazam ABC uchburchakning C uchi muntazam ABD uchburchakning markaziga proyeksiyalanadi. ABC va ABD uchburchaklar orasidagi burchakni toping.
A) 60^0 B) $arccos\frac{1}{3}$ C) 45^0
D) 30^0 E) $arccos\frac{1}{\sqrt{3}}$

37. (00-7-51) AB kesma α tekislikni O nuqtada kesib o'tadi. Agar $AO : OB = 3 : 2$ bo'lib, B nuqtadan α tekislikkacha bo'lgan masofa 8 ga teng bo'lsa, A nuqtadan α tekislikkacha bo'lgan masofani toping.
A) 11 B) 12 C) 10 D) 9 E) 13

38. (00-9-8) To'g'ri to'rtburchakning yuzi 72 ga teng. Uning tekislikdagi ortogonal proyeksiyasi kvadratdan iborat. Tekislik va to'g'ri to'rtburchak yotgan tekislik orasidagi burchak 60^0 ga teng. Kvadratning perimetrini toping.
A) 30 B) 26 C) 20 D) 28 E) 24

39. (00-9-9) Teng yonli ABC uchburchakning (AB=AC) A uchidan uchburchak tekisligiga uzunligi 16 ga teng bo'lgan AD perpedikulyar o'tkazildi. D nuqtadan BC tomongacha bo'lgan masofa $2\sqrt{113}$ ga teng. ABC uchburchakning BC tomoniga o'tkazilgan balandligi qanchaga teng?
A) 6 B) 8 C) 12 D) 10 E) 14

40. (00-10-51) Ikki parallel tekislik orasiga olingan kesmalarning nisbati 2 : 3 kabi bo'lib, tekisliklar bilan nisbati 2 ga teng bo'lgan burchaklar tashkil etadi. Shu burchaklardan kattasining kosinusini toping.
A) $\frac{\sqrt{3}}{2}$ B) $\frac{5}{7}$ C) $\frac{1}{3}$ D) $\frac{\sqrt{2}}{2}$ E) $\frac{1}{8}$

41. (01-2-46) ABCD kvadratning O markazi orqali kvadrat tekisligiga OF perpendikulyar o'tkazilgan. Agar $FB = 5$, $BC = 6$ bo'lsa, BCF va ABCD tekisliklar orasidagi burchakni aniqlang.
A) 30^0 B) 60^0 C) $arctg0,6$
D) $arccos0,75$ E) $arcsin0,8$

42. (02-1-74) Teng tomonli uchburchakning tomonlari 3 m. Uchburchak tekisligidan tashqarida uning uchlaridan 2 m masofada yotuvchi nuqtadan uchburchak tekisligigacha bo'lgan masofani toping.
A) 1 B) $\sqrt{3}$ C) 1,5 D) $\sqrt{2}$ E) 1,8

43. (02-2-41) Bir nuqtadan berilgan to'g'ri chiziqqa perpendikulyar va 2 ta og'ma o'tkazilgan. Agar og'malarning uzunliklari 41 va 50 ga, ularning to'g'ri chiziqdagi proyeksiyalari nisbati 3 : 10 ga teng bo'lsa, perpendikulyarning uzunligini aniqlang.
A) 40 B) 32 C) 38 D) 36 E) 34

44. (03-2-57) Muntazam ABC uchburchak to'g'ri burchakli ABC_1 uchburchakka proyeksiyalanadi. Shu uchburchaklarning tekisliklari orasidagi burchakni toping.
A) 30^0 B) 45^0 C) 60^0
D) $arccos\frac{\sqrt{3}}{4}$ E) $arccos\frac{\sqrt{3}}{3}$

45. (03-6-78) Berilgan nuqtadan tekislikka uzunliklari 13 va 37 sm bo'lgan ikkita og'ma o'tkazilgan. Og'malarning tekislikdagi proyeksiyalarining nisbati 1 : 7 kabi bo'lsa, tekislikgan berilgan nuqtagacha bo'lgan masofani toping.
A) 12 B) 11,5 C) 11 D) 1,5 E) 9

46. (03-12-42) Teng yonli trapetsiya diagonallarining kesishgan nuqtasi O dan uzunligi 15 ga teng ON perpendikulyar tushirildi. Trapetsiyaning diagonali 12 ga teng va kichik asosi katta asosidan ikki marta qisqa. N nuqta trapetsiya katta asosining uchidan qanday masofada joylashgan?
A) 17 B) 18 C) 20 D) 21 E) 24

4.2 Ko'pyoqlar

4.2.1 Kub

1. $d_1 = a\sqrt{2}$ - yog'ining diagonali.
2. $S_{to'la} = 6a^2$
3. $d = a\sqrt{3}$ - kubning diagonali.
4. Kubning hajmi: $V = a^3$

1. (96-3-108) Kub uchun nechta simmetriya tekisligi mavjud?
   A) 8 B) 9 C) 7 D) 10 E) 6
2. (96-6-8) Kubning barcha qirralari yig'indisi 96. Uning hajmini toping.
   A) 256 B) 216 C) 384 D) 64 E) 512
3. (97-2-8) Kubning yon yog'ining yuzi 16 ga teng. Kubning hajmini toping.
   A) 60 B) 62 C) 66 D) 64 E) 68
4. (97-4-60) Tomoni 4 ga teng bo'lgan kubning uchidan shu uch bilan umumiy nuqtaga ega bo'lmagan yog'ining simmetriya markazigacha bo'lgan masofani toping.
   A) $2\sqrt{6}$ B) $2\sqrt{3}$ C) $2\sqrt{2}$ D) 3 E) 2
5. (97-8-8) Kubning barcha qirralari yig'indisi 48 ga teng. Kub sirtining yuzini toping.
   A) 96 B) 24 C) 36 D) 48 E) 56
6. (97-12-8) Kub to'la sirtining yuzi 96 ga teng. Kubning hajmini toping.
   A) 60 B) 62 C) 64 D) 66 E) 68
7. (98-7-52) Kubning diagonali $\sqrt{3}$ ga teng. Uning hajmini toping.
   A) $9\sqrt{3}$ B) 9 C) $3\sqrt{3}$ D) 1 E) $6\sqrt{3}$
8. (98-12-52) Diagonali $\sqrt{3}$ ga teng bo'lgan kub sirtining yuzini toping.
   A) 6 B) 3 C) 9 D) $4,5$ E) 1
9. (99-8-63) Kubning ikkita qarama-qarshi yoqlarining diagonallari orqali o'tkazilgan kesimning yuzi $16\sqrt{2}$ ga teng. Kubning qirrasini toping.
   A) 4 B) $2\sqrt{2}$ C) $4\sqrt{2}$ D) 8 E) $2\sqrt{3}$
10. (00-4-27) Agar kubning qirrasi 10% ga kamaytirilsa, uning hajmi necha foiz kamayadi?
    A) 10 B) 30 C) 33 D) $33,3$ E) $27,1$
11. (00-4-51) Kub yog'ining yuzi 2 marta orttirilsa, uning hajmi necha marta ko'payadi?
    A) 2 B) 8 C) 4 D) $\sqrt{8}$ E) $\sqrt[3]{4}$
12. (02-2-56) Agar kub diagonal kesimining yuzi $2\sqrt{2}$ ga teng bo'lsa, uning hajmini toping.
    A) $2\sqrt{2}$ B) $\sqrt{7}$ C) $4\sqrt{2}$ D) $5\sqrt{2}$ E) $3\sqrt{2}$
13. (03-8-60) Kubning diagonali d ga teng bo'lsa, uning hajmi nimaga teng?
    A) $\frac{d^3\sqrt{3}}{9}$ B) $\frac{d^3}{3}$ C) $\frac{d^3}{\sqrt{6}}$ D) $\frac{d^3}{6}$ E) $\frac{d^3}{3\sqrt{3}}$
14. (03-12-51) Qirrasi 1 m bo'lgan kub qirrasi 1 sm bo'lgan kublarga ajratildi va ular bir qatorga yig'ildi. Hosil bo'lgan qatorning uzunligini toping.
    A) 10 m B) 100 sm C) 10 km
    D) 500 m E) 1 km

4.2.2 Parallelepiped.

1. $S_{to'la} = 2S_{as} + S_{yon}$.
2. $V = S_{as}H$.
3. $V = S_{per}l$, S_{per}-perpendikulyar kesim yuzi, l – yon qirrasi.
4. To'g'ri burchakli parallelepiped uchun $V = abc$, $d^2 = a^2 + b^2 + c^2$, $S_t = 2(ab + bc + ac)$, bu erda a,b,c-parallelepipedning chiziqli o'lchovlari.

1. (96-10-54) To'g'ri burchakli parallelepiped asosining tomonlari 7sm va 24 sm. Parallelepipedning balandligi 8 sm. Diagonal kesimining yuzini toping.
   A) 168 B) 1344 C) 100 D)200 E) 672
2. (96-9-43) Chiziqli o'lchovlari 3;4 va $2\sqrt{14}$ sm bo'lgan to'g'ri burchakli parallelepipedning diagonali necha sm?
   A) 8 B) 7 C) 10 D)9 E) 6
3. (96-9-92) To'rtburchakli muntazam prizma asosining yuzi 144 sm^2, balandligi 14 sm. Shu prizma diagonalini toping.
   A) $12\sqrt{2}$ B) 18 C) 22 D)16 E) 24
4. (96-12-104) Asosi kvadrat bo'lgan to'g'ri burchakli parallelepiped uchun nechta simmetriya tekisligi mavjud?
   A) 9 B) 7 C) 3 D)5 E) 4
5. (96-13-50) Ixtiyoriy to'g'ri burchakli parallelepiped uchun kamida nechta simmetriya tekisligi mavjud?
   A) 4 B) 2 C) 3 D)5 E) 1
6. (97-1-39) To'g'ri parallelepiped asosining tomonlari 8 va 4 ga teng bo'lib, ular 60^0 li burchak tashkil etadi. Parallelepipedning kichik diagonali $8\sqrt{3}$ ga teng bo'lsa, shu diagonalning asos tekisligi bilan tashkil etgan burchagini toping.
   A) 60^0 B) 30^0 C) $arctg2$
   D)$arccos(\frac{1}{\sqrt{3}})$ E) 45^0
7. (97-6-39) To'g'ri parallelepipedning asosining tomonlari 3 va 5 ga teng bo'lib, ular 60^0 li burchak tashkil etadi. Parallelepipedning yon qirrasi $7\sqrt{2}$ ga teng bo'lsa, katta diagonali bilan asos tekisligi orasidagi burchakni toping.
   A) 45^0 B) $arctg\sqrt{2}$ C) 30^0 D)60^0 E) $arctg2$
8. (97-6-42) Muntazam to'rtburchakli prizma asosining tomoni $\sqrt{2}$ ga, diagonali bilan yon yog'i orasidagi burchak esa 30^0 ga teng. Prizmaning hajmini toping.
   A) $8\sqrt{2}$ B) 4 C) 16 D)$4\sqrt{2}$ E) 6

9. (97-11-39) To'g'ri parallelepiped asosining tomonlari 6 va $\sqrt{3}$ ga teng bo'lib, 30^0 li burchak tashkil qiladi. Parallelepipedning kichik diagonali $\sqrt{42}$ ga teng. Shu diagonalning asos tekisligi bilan hosil qilgan burchagini toping.
A) $arctg\sqrt{2}$ B) 45^0 C) 60^0 D)30^0 E) $arccos\frac{1}{4}$

10. (98-5-44) To'rtburchakli muntazam prizmaning diagonali 22 ga, asosining yuzi 144 ga teng. Prizmaning balandligini toping.
A) 20 B) 14 C) 16 D)26 E) 18

11. (98-10-97) To'rtburchakli muntazam prizmaning balandligi 4 ga, diagonali $\sqrt{34}$ ga teng. Prizmaning yon sirtini toping.
A) 34 B) 38 C) 42 D)46 E) 48

12. (99-3-50) Muntazam to'rtburchakli prizmaning balandligi 3 ga, hajmi 48 ga teng. Pastki va ustki asoslarining qarama-qarshi yon yoqlarida yotuvchi qirralari orqali tekislik o'tkazildi. Shu kesimning yuzini toping.
A) 15 B) 20 C) 25 D)12 E) 8

13. (99-8-65) Muntazam to'rtburchakli prizmaning diagonali 4 ga teng bo'lib, yon yog'i bilan 30^0 li burchak tashkil qiladi. Prizmaning yon sirtini toping.
A) $16\sqrt{2}$ B) 16 C) 18 D)$18\sqrt{2}$ E) $14\sqrt{2}$

14. (99-9-43) Muntazam to'rtburchakli prizmaning yon sirti 160 ga, to'la sirti 210 ga teng. Shu prizma asosining diagonalini toping.
A) $6\sqrt{2}$ B) $8\sqrt{2}$ C) $7\sqrt{2}$ D)$5\sqrt{2}$ E) $9\sqrt{2}$

15. (99-9-45) To'g'ri prizma asosining o'tkir burchagi $\alpha = 60^0$ bo'lgan rombdan iborat. Agar α burchak 2 marta orttirilsa va prizmaning barcha qirralari uzunligi o'zgarmasa, prizmaning hajmi qanday o'zgaradi?
A) 2 marta ortadi B) 2 marta kamayadi
C) $\frac{\sqrt{3}}{2}$ marta ortadi D) o'zgarmaydi
E) $\frac{\sqrt{3}}{2}$ marta kamayadi

16. (00-2-41) Ikkita to'g'ri burchakli parallelepipedning o'lchovlari mos ravishda 5; 8; a va 10; 3; $(2a-4)$ ga teng. a ning qanday qiymatlarida bu parallelepipedlar tengdosh bo'ladi?
A) 12 B) 10 C) 6 D) 4 E) 8

17. (00-4-2) To'g'ri burchakli parallelepiped asosining tomonlari 6 va 13 ga, balandligi 8 ga teng. Asosining katta tomoni va parallelepipedning diagonallari kesishgan nuqtasi orqali o'tuvchi tekislik hosil qilgan kesimning yuzini toping.
A) 136 B) 124 C) 140 D) 128 E) 130

18. (99-5-46) O'lchovlari $11 \times 20 \times 16$ bo'lgan to'g'ri burchakli parallelepipedga eng ko'pi bilan tomoni 3 ga teng bo'lgan kublardan nechtasini joylashtirish mumkin (barcha kublarning qirralari parallelepipedning qirralariga parallel).
A) 137 B) 138 C) 130 D) 120 E) 90

19. (00-8-17) To'g'ri parallelepiped asosining tomonlari $2\sqrt{2}$ va 5 sm bo'lib, o'zaro 45^0 li burchak tashkil qiladi. Parallelepipedning kichik diagonali 7 sm. Uning hajmi necha sm^3 bo'ladi?.
A) 60 B) 120 C) 80 D)90 E) 100

20. (00-9-50) O'lchovlari $21 \times 27 \times 9$ bo'lgan to'g'ri burchakli parallelepipedga eng ko'pi bilan qirrasi 5 ga teng bo'lgan kublardan nechtasini joylashtirish mumkin (kubning barcha qirralari parallelepipedning qirralariga parallel).
A) 20 B) 25 C) 30 D) 40 E) 41

21. (97-11-42) Muntazam to'rtburchakli prizma yon yog'ining diagonali $\sqrt{6}$ ga teng. Prizmaning diagonali yon yog'i bilan 30^0 li burchak tashkil etadi. Prizmaning hajmini toping.
A) $2\sqrt{2}$ B) 4 C) $4\sqrt{3}$ D)8 E) $1\frac{1}{3}$

22. (98-2-56) Muntazam to'rtburchakli prizma asosining tomoni 4 ga, balandligi $4\sqrt{6}$ ga teng. Prizmaning diagonali asos tekisligi bilan 30^0 qanday burchak hosil qiladi?
A) 30^0 B) 45^0 C) 35^0 D)75^0 E) 60^0

23. (01-2-48) To'g'ri parallelepiped asosining tomonlari 3 va 4 ga,ular orasidagi burchak 120^0 ga, yon qirrasi $\sqrt{12}$ ga teng. Parallelepipedning kichik diagonali uzunligini toping.
A) 5 B) 6 C) 8 D)7 E) 10

24. (01-4-18) Muntazam to'rtburchakli prizma asosining tomoni 3 ga, prizma balandligi 4 ga teng. Prizma parallel yon yoqlarining o'zaro ayqash diagonallari orasidagi o'tkir burchakni toping.
A) $arctg\frac{3}{4}$ B) $arctg\frac{2}{3}$ C) $arccos0,8$
D)$arcsin0,96$ E) $arccos0,64$

25. (01-6-53) To'g'ri burchakli parallelepiped asosining tomonlari va balandligining qiymatlari 4 : 3 : 5 kabi nisbatda. Parallelepipedning diagonali va asos tekisligi orasidagi burchakni toping.
A) 45^0 B) 30^0 C) 60^0 D)$arctg4$ E) $arctg\frac{4}{3}$

26. (01-8-51) To'g'ri parallelepipedning asosi rombdan iborat bo'lib, uning diagonallari nisbati 2 : 3 kabi. Parallelepipedning diagonallari 10 va 17 ga teng bo'lsa, uning hajmini toping.
A) 360 B) 240 C) 720 D)480 E) 300

27. (02-2-45) To'g'ri burchakli parallelepipedning to'la sirti 1818 ga teng va qirralari nisbati 3 : 7 : 8 kabi. Eng kichik qirraning uzunligini toping.
A) 9 B) 8 C) 6 D) 4 E) 7

28. (02-9-58) To'rtburchakli muntazam prizma asosining yuzi Q ga teng. Uning yog'lari diagonallari nisbati 1 : 3 kabi.Shu prizmaning hajmini toping.
A) $3Q\sqrt{Q}$ B) $Q\sqrt{15Q}$ C) $\frac{Q\sqrt{17Q}}{2}$
D) $4Q\sqrt{Q}$ E) $Q\sqrt{17Q}$

29. (02-9-59) To'g'ri burchakli parallelepipedning hajmi 16 ga, yon qirrasi 4 ga teng. Uning diagonal kesimi kvadratdan iborat. Shu parallelepiped asosining diagonallari orasidagi o'tkir burchagini

toping.
A) 90^0 B) 75^0 C) 60^0 D) 45^0 E) 30^0

30. (03-2-18) To'g'ri prizmaning asosi rombdan iborat. Diagonal kesimlarining yuzlari esa 9 ga va 12 ga teng. Shu prizma yon sirtining yuzini toping.
A) 15 B) 30 C) $7,5$ D) $6\sqrt{7}$ E) 36

31. (03-6-79) Ikkita to'g'ri burchakli parallelepiped mos ravishda 4;6;h va 8;2;$(2h-1)$ o'lchamlarga ega. h ning qanday qiymatida parallelepipedlarning hajmlari teng bo'ladi?
A) 4 B) 2 C) $\frac{1}{8}$ D) $\frac{4}{5}$ E) 1

32. (03-6-83) Agar to'g'ri burchakli parallelepipedning bo'yi va enini 10% ga orttirib, balandligi 10% ga kamaytirilsa, uning hajmi qanday o'zgaradi?
A) $8,1\%$ ga kamayadi B) $9,1\%$ ga kamayadi
C) o'zgarmaydi D) $8,9\%$ ga ortadi
E) $9,1\%$ ga ortadi

33. (03-10-46) Zalning uzunligi, eni va balandliklarining nisbati $5:3:1$ kabi. Zalning uzunligi uning enidan 8 m ko'p. Zalning hajmini (m^3) toping.
A) 930 B) 840 C) 960 D) 790 E) 920

34. (03-11-51) To'g'ri parallelepipedning asosi yuzasi 30 ga teng bo'lgan rombdan iborat.Parallelepipedning diagonal kesimlarining yuzalari 96 va 40 ga teng bo'lsa, uning hajmini toping.
A) 240 B) 244 C) 320 D)180 E) 232

4.2.3 Prizma.

1. $S_{yon} = Pl$, P perpendikulyar kesimi perimetri, l-yon qirrasining uzunligi.
2. $V = S_{as}H$.
3. $V = S_{per}l$, S_{per}-perpendikulyar kesim yuzi, l-yon qirrasi.
4. n burchakli prizmaning $3n$ ta qirrasi va $n+2$ ta yog'i bor.

(97-7-51) Uchburchakli to'g'ri prizma asosining tomonlari 15; 20 va 25 ga, yon qirrasi asosining balandligiga teng. Prizmaning hajmini toping.
A) 600 B) 750 C) 1800 D) 1200 E) 1440

Yechish: Prizma asosi to'g'ri burchakli uchburchak bo'ladi, chunki

$$20^2 + 15^2 = 25^2$$

yani Pifagor teoremasi bajarilayapti. Gepotenuzaga tushirilgan balandlik uchburchakning eng kichik balandligi bo'ladi. To'g'ri burchakli uchburchak uchun

$$S = \frac{1}{2}ab, S = \frac{1}{2}ch$$

yuza formulalari o'rinli ekanidan $\frac{1}{2}\cdot 20\cdot 15 = \frac{1}{2}\cdot 25\cdot h$ tenglikni, undan esa $h = \frac{20\cdot 15}{25} = 12$ ekanini topamiz. Masalaning shartiga ko'ra prizmaning H balandligi asosining kichik balandligiga, yani $h = 12$ ga teng.

$$S_{as} = \frac{1}{2}\cdot 20\cdot 15 = 150$$

bo'lgani uchun

$$V = S_{asos}\cdot H = 150\cdot 12 = 1800$$

ni hosil qilamiz. Javob: 1800 (C).

1. (00-1-59) Kubning ostki asosining bir tomoni va ustki asosining unga qarama- qarshi tomonni orqali o'tkazilgan tekislik uni ikkita uchburchakli prizmaga ajratadi. Shu prizmalardan birining hajmi 256 ga teng.Prizmaning to'la sirtini toping.
A) 364 B) 374 C) 372 D) 380 E) 384

2. (97-2-57) Asoslarining yuzlari $S_1 > S_2 > S_3 > S_4$ shartni qanaotlantiradigan tengdosh prizmalarning balandliklari h_1, h_2, h_3 va h_4 quyidagi munosabatlardan qaysi birini qanoatlantiradi?
A) $h_1 > h_2 > h_3 > h_4$
B) $h_4 < h_3 < h_1 < h_2$
C) $h_4 > h_3 > h_2 > h_1$
D) $h_1 > h_4 > h_3 > h_2$
E) $h_4 > h_2 > h_1 > h_3$

3. (97-8-58) Balandliklari $h_1 < h_2 < h_3 < h_4$ shartni qanaotlantiradigan tengdosh prizmalar asoslarning yuzlari S_1, S_2, S_3 va S_4 uchun quyidagi munosabatlardan qaysi biri o'rinli?
A) $S_1 < S_2 < S_3 < S_4$
B) $S_1 > S_3 > S_2 > S_4$
C) $S_1 > S_2 > S_3 > S_4$
D) $S_1 < S_3 < S_2 < S_4$
E) $S_1 > S_2 > S_4 > S_3$

4. (96-6-57) To'rtta tengdosh prizma balandliklari uchun $h_1 > h_2 > h_3 > h_4$ munosabat o'rinli. Prizmalar asoslarning yuzlari uchun quyidagi munosabatlardan qaysi biri to'g'ri?
A) $S_4 > S_3 > S_2 > S_1$
B) $S_4 < S_3 < S_2 < S_1$
C) $S_3 < S_4 < S_2 < S_1$
D) $S_2 > S_1 > S_3 > S_4$
E) $S_1 < S_2 < S_4 < S_3$

5. (96-7-51) Uchburchakli to'g'ri prizma asosining tomonlari 13; 14 va 15 ga, yon qirrasi asosining o'rtacha balandligiga teng. Prizmaning hajmini toping.
A) 336 B) 504 C) 1008 D) 978 E) 1236

6. (97-1-42) To'g'ri prizmaning asosi gipotenuzasi $12\sqrt{2}$ ga teng bo'lgan teng yonli to'g'ri burchakli uchburchakdan iborat. Kateti orqali o'tgan yon yog'ining diagonali esa 13 ga teng. Prizmaning hajmini toping.
A) 360 B) 120 C) 720 D) 240 E) 480

7. (97-3-51) Uchburchakli to'g'ri prizmaning asosi tomonlari 29; 25 va 6 ga, yon qirrasi esa asosining katta balandligiga teng. Prizmaning hajmini toping.
A) 1425 B) 878 C) 400 D) 1200 E) 600

8. (97-10-51) Asosining tomonlari 10; 17 va 21 bo'lgan uchburchakli to'g'ri prizmaning yon qirrasi asosining kichik balandligiga teng. Prizmaning hajmini

toping.
A) 224 B) 672 C) 840 D) 368 E) 1680

9. (97-12-57) Og'ma prizmaning perpendikulyar kesimi tomonlari 6 va 3 ga teng bo'lgan to'g'ri to'rtburchakdan iborat. Prizmaning hajmi 54 ga teng. Prizmaning yon qirrasini toping.
A) 4 B) 5 C) 3 D) $3,5$ E) $4,5$

10. (98-1-51) To'g'ri prizmaning balandligi 50 ga, asosining tomonlari 13, 37 va 40 ga teng. Prizmaning to'la sirtini toping.
A) 2730 B) 3900 C) 4500 D) 4740 E) 4980

11. (98-3-50) Prizmaning asosi tomoni $2\sqrt{5}$ bo'lgan muntazam oltiburchakdan, yon yoqlari kvadratlardan iborat. Prizmaning katta diagonalini toping.
A) $4\sqrt{5}$ B) 10 C) $3\sqrt{5}$ D) 12 E) 11

12. (98-6-41) Og'ma prizmaning yon qirrasi 20 ga teng va asos tekisligi bilan 30^0 li burchak hosil qiladi. Prizmaning balandligini toping.
A) 12 B) $10\sqrt{3}$ C) 10 D) $10\sqrt{2}$ E) 15

13. (98-8-51) Uchburchakli to'g'ri prizma asosining tomonlari 36; 29 va 25 ga, to'la sirti esa 1620 ga teng. Prizmaning balandligini toping.
A) 20 B) $12,6$ C) 10 D) 18 E) 15

14. (98-11-93) Uchburchakli to'g'ri prizma asosining tomonlari 3; 4 va 5 ga teng. Prizmaning hajmi 18 ga teng bo'lsa, uning balandligi qanchaga teng bo'ladi?
A) 12 B) 6 C) 9 D) 3 E) 2

15. (99-7-43) Uchburchakli muntazam prizmaning balandligi 8 ga, asosining yuzi $9\sqrt{3}$ ga teng. Prizma yon tomonining diagonalini toping.
A) $2\sqrt{22}$ B) 10 C) $3\sqrt{11}$ D) 11 E) 12

16. (99-8-64) To'g'ri prizmaning asosi burchaklaridan biri 80^0 bo'lgan teng yonli trapetsiyadan iborat. Prizmaning yon yoqlari hosil qiladigan eng katta ikki yoqli burchakni aniqlang.
A) 100^0 B) 80^0 C) 120^0 D) 90^0 E) 150^0

17. (00-3-83) Muntazam uchburchakli prizmaning hajmi $27\sqrt{3}$ ga, asosiga tashqi chizilgan aylananing radiusi esa 2 ga teng. Prizmaning balandligini toping.
A) 12 B) 8 C) 6 D) 15 E) 9

18. (00-9-62)* Muntazam uchburchakli prizmaning hajmi 16 ga teng. Asosidagi tomonning uzunligi qanday bo'lganda, prizmaning to'la sirti eng kichik bo'l-adi?
A) 3 B) 4 C) 2 D) 6 E) $3\sqrt{2}$

19. (01-4-34) To'g'ri prizmaning balandligi 5 ga teng bo'lib, asosi trapetsiyadan iborat. Trapetsiyaning asoslari 16 va 44 ga, yon tomonlari 17 va 25 ga teng bo'lsa, prizmaning hajmi qanchaga teng.
A) 2250 B) $\frac{2250}{\sqrt{2}}$ C) $\frac{2250}{\sqrt{3}}$ D)1125 E) $2250\sqrt{2}$

20. (01-12-12) 60 ta qirrasi bo'lgan prizmaning nechta yog'i bo'ladi?
A) 20 B) 21 C) 22 D) 24 E) 25

21. (02-3-66) To'g'ri prizmaning asosi teng yonli uchburchak bo'lib, uning asosi 6 ga va asosga yopishgan burchakning sinusi 0,6 ga teng. Agar prizma asoslari yuzlarining yig'indisi uning yon sirtiga teng bo'lsa, prizmaning hajmini toping.
A) $6\frac{3}{4}$ B) $\frac{15}{2}$ C) $5,75$ D) $7,2$ E) $8,4$

22. (02-8-34) Prizmaning jami qirralari 36 ta bo'lsa, uning nechta yon yog'i bor?
A) 12 B) 16 C) 9 D) 10 E) 14

23. (02-8-36) Uchburchakli to'g'ri prizmaning barcha qirralari bir xil uzunlikka ega va to'la sirti $8 + 16\sqrt{3}$ ga teng. Prizma asosining yuzini toping.
A) 4 B) $2\sqrt{6}$ C) $2\sqrt{3}$ D) 3 E) 8

24. (03-7-75) Uchburchakli muntazam prizmaning hajmi ϑ ga teng. Asosining tomoni qanday bo'lganda, prizmaning to'la sirti eng kichik bo'ladi?
A) $\sqrt[3]{2\vartheta}$ B) $\sqrt{4\vartheta}$ C) $\sqrt[3]{4\vartheta}$ D) $\sqrt{2\vartheta}$ E) $\sqrt[3]{\vartheta}$

25. (03-10-60) Muntazam to'rtburchakli prizmaning hajmi 60 ga, yon sirti 120 ga teng. Prizma asosining simmetriya markazidan ustki asosining uchigacha bo'lgan masofani toping.
A) $\sqrt{182}$ B) $\sqrt{215}$ C) $\sqrt{227}$ D) $\sqrt{239}$ E) $\sqrt{252}$

26. (03-11-52) Muntazam oltiburchakli prizmaning eng katta diagonali 8 ga teng va u yon qirrasi bilan 30^0 li burchak hosil qiladi. Prizmaning hajmini toping.
A) 72 B) 64 C) 76 D) 80 E) 84

4.3 Piramida.

4.3.1 To'la sirtining yuzi.

1. Piramida to'la sirtining yuzi:
$S_{to'la} = S_{asos} + S_{yon}$,

2. Agar piramidaning asosidagi ikki yoqli burchaklari teng bo'lsa, $S_{asos} = S_{yon}cos\alpha$, α-asosodagi ikki yoqli burchak.

3. Muntazam piramida uchun: $S_{yon} = \frac{Ph}{2} = \frac{anh}{2}$, h-apofemasi;

(98-11-91) Uchburchakli piramida asosining tomonlari 6;8 va 10 ga teng. Piramidaning yon qirralari asosi tekisligi bilan bir xil burchak hosil qiladi. Agar piramidaning balandligi 4 ga teng bo'lsa, yon qirrasi qanchaga teng bo'ladi?
A) $\sqrt{41}$ B) 3 C) 4 D) 5 E) 7

Yechish: Piramida yon qirralari asosi tekisligi bilan bir xil burchak hosil qilgani uchun piramidaning balandligi uning asosiga tashqi chizilgan aylana markaziga tushadi. Piramidaning asosi to'g'ri burchakli uchburchak bo'ladi, chunki $6^2+8^2 = 10^2$ tenglik (Pifagor teoremasi) bajarilayapti. Ma'lumki to'g'ri burchakli uchburchakka tashqi chizilgan aylana markazi gepotenuzaning o'rtasida yotadi. Shunday qilib, piramidaning H

balandligi c gipotenuzaning o'rtasiga tushadi ekan. Endi piramidaning yon qirrasi l ni topamiz.Pifagor teoremasiga ko'ra $l^2 = H^2 + (\frac{c}{2})^2 = 4^2 + 5^2 = 41$. Demak, $l = \sqrt{41}$. Javob: $\sqrt{41}$ (A).

1. (96-1-51) Muntazam to'rtburchakli piramidaning balandligi 6 sm, apofemasi esa $6,5$ sm. Piramida asosining perimetrini toping.
   A) 10 B) 12 C) 24 D) 20 E) 8

2. (97-4-61) Muntazam piramida yon sirtining yuzi 48 ga, apofemasi 8 ga teng. Piramida asosining perimetrini toping.
   A) 6 B) 12 C) 8 D) 10 E) 14

3. (97-8-55) Muntazam piramida yon sirtining yuzi 96 ga, asosining perimetrini 24 ga teng. Piramidaning apofemasini toping.
   A) 16 B) 10 C) 6 D) 8 E) 12

4. (97-9-16) Muntazam uchburchakli piramidaning balandligi 4 ga, asosining balandligi esa 4,5 ga teng. Piramidaning yon qirrasini toping.
   A) 6 B) $6,5$ C) 5 D) $5,5$ E) $5,3$

5. (97-12-61) Muntazam uchburchakli piramidaning balandligi 4 ga, asosining balandligi esa 4,5 ga teng. Piramidaning yon qirrasini toping.
   A) 6 B) $6,5$ C) 5 D) $5,5$ E) $5,3$

6. (98-6-42) Piramidaning asosi tomonlari 6 va 8 ga teng bo'lgan to'g'ri to'rtburchakdan iborat. Piramidaning har bir yon qirrasi $5\sqrt{5}$ ga teng bo'lsa, uning balandligini toping.
   A) 5 B) 10 C) 100 D) 25 E) 20

7. (98-11-47) Muntazam to'rtburchakli piramidaning balandligi 24 ga, asosining tomoni esa 14 ga teng. Uning apofemasini toping.
   A) 18 B) 27 C) 25 D) 32 E) 28

8. (99-5-47) Muntazam tetraedrning uchrashmaydigan (ayqash) qirralari orasidagi burchakni toping.
   A) 160^0 B) 90^0 C) 45^0 D) 120^0
   E) aniqlab bo'lmaydi

9. (99-8-61) Muntazam piramidaning asosi ichki burchaklarining yig'indisi 720^0 ga, tomoni 6 ga teng bo'lgan ko'pburchakdan iborat. Agar piramidaning yon qirrasi 10 ga teng bo'lsa, piramidaning balandligini toping.
   A) 8 B) 6 C) 9 D) 7 E) $6,2$

10. (00-2-42) Qirrasi 4 ga teng bo'lgan muntazam tetraedrning to'la sirti qanday yuzaga ega bo'ladi?
    A) $16\sqrt{3}$ B) $8\sqrt{3}$ C) $24\sqrt{2}$
    D) $16\sqrt{2}$ E) $18\sqrt{3}$

11. (00-8-18) Oktaedrning qirrasi a ga teng. Uning to'la sirtini hisoblang.
    A) $2a^2\sqrt{3}$ B) $a^2\sqrt{3}$ C) $\frac{2\sqrt{3}}{3}a^2$
    D) $4a^2\sqrt{3}$ E) $\frac{\sqrt{3}}{2}a^2$

12. (00-9-6) Muntazam DABC tetraedrda M; N; K va P nuqtalar mos pavishda DC; BC; AB va DA qirralarining o'rtalari. Agar tetraedrning qirrasi 4 ga teng bo'lsa, $\vec{MN} \cdot \vec{PK} + \vec{AB} \cdot \vec{BC}$ vektorlar skalyar ko'paytmasining yig'indisini toping.
    A) 12 B) 8 C) 6 D) -4 E) 4

13. (00-9-55) Muntazam tetraedrning qirrasi 1 ga teng. Uning asosiga tashqi chizilgan aylananing markazidan uning yon yog'igacha bo'lgan masofani toping.
    A) $\frac{2\sqrt{3}}{6}$ B) $\frac{\sqrt{6}}{9}$ C) $\frac{2\sqrt{2}}{5}$ D) $\frac{3\sqrt{6}}{8}$ E) $\frac{5\sqrt{6}}{6}$

14. (00-10-43) Muntazam to'rtburchakli piramidaning balandligi 12 ga, asosining tomoni 10 ga teng. Piramidaning apofemasini hisoblang.
    A) 15 B) 13 C) 14 D) 16 E) $14,5$

15. (96-6-59) Muntazam piramidaning yon sirti 24 ga, asosining yuzi 12 ga teng. Piramidaning yon yog'i bilan asos tekisligi orasidagi burchakni toping.
    A) 45^0 B) 30^0 C) 60^0 D) 35^0 E) 40^0

16. (96-7-53) To'rtburchakli muntazam piramida asosining yuzi 36 ga, yon sirtining yuzi esa 60 ga teng. Piramidaning hajmini toping.
    A) 64 B) 120 C) 144 D) 72 E) 48

17. (96-11-96) Piramidaning asosidagi barcha ikki yoqli burchaklari 60^0 ga teng. Piramida yon sirtining yuzi 36 ga teng bo'lsa, asosining yuzi qanchaga teng bo'ladi?
    A) 36 B) 18 C) $18\sqrt{2}$ D) $18\sqrt{3}$ E) 24

18. (01-1-59) Muntazam to'rtburchakli piramidaning uchidagi tekis burchagi 60^0 ga teng. Shu piramidaning yon qirrasi va asosi orasidagi burchakni toping.
    A) 15^0 B) 30^0 C) 45^0 D) 60^0 E) 75^0

19. (01-9-56) Asosining tomoni 2 ga teng bo'lgan muntazam uchburchakli piramidaning to'la sirti $7\sqrt{3}$ dan kichik emas va $13\sqrt{3}$ dan katta emas. Shu piramidaning apofemasi qanday oraliqda yotadi?
    A) $[2;3]$ B) $[\sqrt{3};3\sqrt{3}]$ C) $[2\sqrt{3};4\sqrt{3}]$
    D) $[3;4]$ E) $[2\sqrt{3};3\sqrt{3}]$

20. (01-12-54) Apofemasi 5 ga teng bo'lgan muntazam to'rtburchakli piramidaning to'la sirti 11 dan katta va 24 dan kichik. Piramida asosi tomonining uzunligi qanday oraliqda yotadi?
    A) $(0,5;1,5)$ B) $(1;2)$ C) $(1,5;2,5)$
    D) $(2;3)$ E) $(1;3)$

21. (02-3-65) Qirrasi 6 ga teng bo'lgan kubning ustki asosining markazi quyi asosning uchlari orqali tutashtirilgan. Hosil bo'lgan piramidaning yon sirtini toping.
    A) $36\sqrt{5}$ B) $18\sqrt{5}$ C) $48\sqrt{3}$
    D) $36\sqrt{3}$ E) $72\sqrt{5}$

22. (02-3-67) Muntazam to'rtburchakli piramida asosining tomoni 5 ga, to'la sirti 85 ga teng. Piramida yon yog'ining asos tekisligiga og'ish burchagini

toping.
A) $arccos\frac{5}{12}$ B) 45^0 C) 30^0 D) 75^0 E) 60^0

23. (02-4-51) Piramidaning asosi to'g'ri burchakli uchburchak bo'lib, uning gipotenuzasi uzunligi 10 ga teng. Piramidaning yon qirralari 13 ga teng bo'lsa, uning balandligini toping.
A) 11 B) 12 C) 10 D) 13 E) 9

24. (02-4-52) Piramidaning asosi gipotenuzasi uzunligi 2 bo'lgan to'g'ri burchakli uchburchakdan iborat. Piramidaning qirralari asos tekisligi bilan α burchak tashkil qiladi. Agar uning balandligi 5 ga teng bo'lsa, $tg\alpha$ ning qiymatini toping.
A) 1 B) 2 C) 3 D) 4 E) 5

25. (02-7-25) Piramida asosi to'g'ri burchakli uchburchakdan iborat. Uchburchakning katetlari 3 va 4 ga teng. Piramidaning yon yoqlari asos tekisligi bilan 60^0 li burchaklar hosil qiladi. Piramidaning to'la sirtini toping.
A) 18 B) 20 C) 15 D) 24 E) 30

26. (02-10-80) Asosdagi ikki yoqli burchaklari 60^0 ga teng bo'lgan piramidaning asosi tomoni 6 ga, o'tkir burchagi 30^0 ga teng rombdan iborat. Piramidaning to'la sirtini toping.
A) 54 B) 27π C) 36π D) 36 E) 90

27. (03-1-43) Qirrasi 28 ta bo'lgan piramidaning yon yoqlari nechta?
A) 12 B) 14 C) 15 D) 18 E) 16

28. (03-5-62) Muntazam uchburchakli piramidaning balandligi asosining tomonidan ikki marta kichik. Piramidaning yon yog'ining asos tekisligi bilan qanday burchak tashkil etadi?
A) 60^0 B) 30^0 C) 15^0 D) 45^0 E) 75^0

29. (03-6-80) Qirrasi 6 ga teng muntazam tetraedrning to'la sirti nimaga teng?
A) $12\sqrt{3}$ B) $18\sqrt{3}$ C) $27\sqrt{3}$
D) $36\sqrt{3}$ E) $72\sqrt{3}$

30. (03-9-65) Uchburchakli muntazam piramida asosining tomoni 10 ga teng. Yon yog'i asos tekisligi bilan 45^0 li burchak hosil qiladi. Piramidaning balandligini toping.
A) $\frac{5}{\sqrt{3}}$ B) $5\sqrt{3}$ C) $4\sqrt{3}$ D) $5\sqrt{2}$ E) $4\sqrt{2}$

31. (03-10-61) To'rtburchakli piramidaning barcha yon qirralari asos tekisligi bilan 60^0 li burchak tashkil qiladi. Uning asosi teng yonli trapetsiyadan iborat. Trapetsiyaning burchaklaridan biri 120^0 ga teng. Trapetsiyaning diagonallari uning o'tkir burchagining bissektrisalaridir. Piramidaning balandligi $4\sqrt{3}$ ga teng. Trapetsiyaning katta asosini toping.
A) $4\sqrt{3}$ B) 8 C) $8\sqrt{3}$ D) 12 E) $3\sqrt{6}$

32. (03-11-48) Muntazam uchburchakli piramidaning yon qirrasi 10 ga, asosining tomoni 12 ga teng. Piramidaning balandligini toping.
A) $2\sqrt{13}$ B) $\sqrt{13}$ C) 2 D) $2\sqrt{7}$ E) $3\sqrt{13}$

33. (03-12-40) Muntazam piramidaning yon sirti to'la sirtining 80 foizini tashkil etadi. Piramidaning yon yoqlari va asos tekisligi orasidagi burchakni toping.
A) 60^0 B) $arccos\frac{1}{4}$ C) $arccos\frac{1}{5}$
D) $arccos\frac{2}{3}$ E) 45^0

Piramidaning hajmi

1. Piramidaning hajmi: $V = \frac{1}{3}S_{as}H$.

2. Agar piramidaning yon qirralari asos tekisligi bilan bir xil burchak tashkil etsa, u holda piramidaning balandligi uning asosiga tashqi chizilgan aylananing markaziga tushadi.

3. Agar piramidaning yon yoqlari asos tekisligi bilan bir xil burchak tashkil etsa, u holda piramidaning balandligi uning asosiga ichki chizilgan aylananing markaziga tushadi.

1. (97-7-65) Qirrasi 5 ga teng kub ABC uchburchak tekisligi bilan ikki bo'lakka bo'lingan. Kichik bo'lakning hajmini toping.
A) $20\frac{5}{6}$ B) $62\frac{1}{2}$ C) $41\frac{2}{3}$ D) $31\frac{1}{4}$ E)$12\frac{1}{2}$

2. (97-9-58) Qirrasi 6 ga teng kub ABC uchburchak tekisligi bilan ikki bo'lakka bo'lingan. Kichik bo'lakning hajmini toping.
A) 25 B) 36 C) 49 D) 64 E)108

3. (99-8-62) Hajmi 36 ga teng bo'lgan muntazam to'rt-burchakli piramidaning asosidagi ikki yoqli

burchagi 45^0. Piramida asosining tomonini toping.
A) 6 B) 8 C) 4 D) 12 E) 10

4. (96-11-53) To'rtburchakli muntazam piramida asosining tomoni 4 marta kattalashtirildi, balandligi esa 4 marta kichiklashtirildi. Hosil bo'lgan piramida hajmining dastlabki piramida hajmiga nisbatini toping.
A) 1 : 16 B) 16 : 1 C) 1 : 1 D) 1 : 4 E) 4 : 1

5. (96-12-55) To'rtburchakli muntazam piramida asosining tomoni 3 marta kattalashtirildi, balandligi esa 3 marta kichiklashtirildi. Hosil bo'lgan piramida hajmining dastlabki piramida hajmiga nisbatini toping.
A) 3 : 1 B) 1 : 3 C) 9 : 1 D) 1 : 9 E) 1 : 1

6. (97-3-53) To'rtburchakli muntazam piramidaning hajmi 48 ga balandligi 4 ga teng. Piramida yon sirtining yuzini toping.
A) 120 B) 144 C) 60 D) 96 E)72

7. (97-7-53) Hajmi 48 bo'lgan to'rtburchakli muntazam piramida asosining tomoni 6 ga teng. Piramida yon sirtining yuzini toping.
A) 144 B) 60 C) 72 D) 120 E)96

8. (98-4-36) Qirrasi 1 ga teng bo'lgan kub yoqlarining markazlari tutashtirildi. Hosil bo'lgan jismning hajmini toping.
A) $\frac{1}{6}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) $\frac{1}{4}$ E)$\frac{1}{8}$

9. (97-10-53) Hajmi 1296 bo'lgan to'rtburchakli muntazam piramida asosining tomoni 18 ga teng. Piramida yon sirtining yuzini toping.
A) 540 B) 1080 C) 360 D) 900 E)450

10. (99-2-53) Paralelepiped ostki asosining diagonali va ustki asosining unga qarama - qarshi uchi orqali tekislik o'tkazilgan. Bu tekislik parallelepepedni ikkita jismga ajratadi. Shu jismlardan biri piramidadan iborat. Parallelepiped hajmining piramida hajmiga nisbatini toping.
A) 5 : 1 B) 6 : 1 C) 3 : 1 D) 4 : 1 E)9 : 1

11. (99-4-49) Uchburchakli piramidaning yon qirralari o'zaro perpendikulyar hamda mos ravishda $4; 6$ va 8 ga teng. Piramidaning hajmini toping.
A) 64 B) 48 C) 32 D) 24 E)aniqlab bo'lmaydi

12. (99-9-44) SABC piramidaning SBC yon yog'ining yuzi 60 ga teng. Bu yon yoq A uchidan 8 ga teng masofada joylashgan. Piramidaning hajmini toping.
A) 170 B) 150 C) 120 D) 180 E) 160

13. (00-8-16) Uchburchakli piramidaning yon qirralari o'zaro perpendikulyar hamda uzunliklari a,b va c ga teng. Piramidaning hajmini toping.
A) $\frac{1}{6}abc$ B) $\frac{1}{3}abc \cdot sin\alpha$ C) $\frac{1}{3}a^2b$
D) $\frac{1}{3}abc$ E) $\frac{1}{6}a^2c$

14. (98-2-57) Muntazam to'rtburchakli piramidaning balandligi 9 ga, diagonal kesimning yuzi 36 ga teng. Piramidaning hajmini toping.
A) 84 B) 96 C) 48 D) 72 E) 112

15. (96-3-51) To'rtburchakli muntazam piramida asosining tomoni 2 marta kattalashtirildi, balandligi esa 2 marta kichiklashtirildi. Hosil bo'lgan piramida hajmining dastlabki piramida hajmiga nisbatini toping.
A) 1 : 1 B) 2 : 1 C) 4 : 1 D) 1 : 4 E) 1 : 2

16. (00-8-20) Qirrasining uzunligi α ga teng bo'lgan muntazam tetraedrning hajmini toping.
A) $\frac{1}{12}a^3\sqrt{2}$ B) $\frac{1}{24}a^3$ C) $\frac{1}{12}a^3\sqrt{3}$
D) $\frac{1}{24}a^3\sqrt{3}$ E) $\frac{1}{24}a^3\sqrt{2}$

17. (96-6-58) Piramidaning yon qirralari o'zaro teng. Qo'yidagi figuralardan qaysi biri piramidaning asosi bo'la olmaydi?
A) kvadrat B) to'g'ri to'rtburchak
C) uchburchak D) romb
E) muntazam ko'pburchak

18. (97-1-43) Quyida keltirilgan parallelelogrammlarning qaysilari barcha yon yoqlari asos tekisligi bilan bir xil burchak tashkil qiladigan piramidaning asosi bo'lishi mumkin?
A) ixtiyoriy parallelogramm
B) faqat kvadrat
C) romb yoki kvadrat
D) faqat to'g'ri to'rtburchak
E) kvadrat yoki to'gri to'rtburchak

19. (97-2-58) Piramidaning yon yoqlari asosi bilan bir xil burchak tashkil etadi. Quyidagi ko'pburchaklardan qaysi biri piramidaning asosi bo'lolmaydi?
A)Romb B) uchburchak C) kvadrat D) to'g'ri to'rtburchak E) muntazam oltiburchak

20. (97-8-59) Piramidaning yon qirralari asosi tekisligi bilan bir xil burchak tashkil etadi. Quyidagi ko'pbur-chaklardan qaysi biri piramidaning asosi bo'lolmaydi?
A) uchburchak B) muntazam oltiburchak
C) to'g'ri to'rtburchak D) kvadrat E) romb

21. (97-12-56) Piramidaning uchidan asosining tomonlariga tushirilgan balandliklari o'zaro teng. Quyidagi figuralarning qaysi biri piramidaning asosida yota olmaydi?
A) romb B) muntazam oltiburchak C) uchburchak D) to'g'ri to'rtburchak E)kvadrat

22. (98-6-47) Uchburchakli piramidaning asosidagi barcha ikki yoqli burchaklar 30^0 ga teng. Agar piramidaning balandligi 6 ga teng bo'lsa, uning asosiga ichki chizilgan doiraning radiusini toping.
A) 2 B) 6 C) $2\sqrt{3}$ D) 3 E)$6\sqrt{3}$

23. (99-8-60) Katetlari 12 va 16 sm bo'lgan to'g'ri burchakli uchburchakning uchlaridan bir xil 26 sm uzoqlikda joylashgan nuqta uchburchak tekisligidan qanday masofada (sm) yotadi?
A) 22 B) 20 C) 24 D) 18 E)16

24. (00-2-46) Uchburchakli piramida asosining tomonlari 9, 10 va 17 ga teng. Piramidaning barcha yon yoqlari asos tekisligi bilan 45^0 li burchak tashkil etsa, uning hajmini toping.
A) 24 B) 36 C) 32 D) 21 E)33

25. (01-1-61) Hajmi $8\sqrt{3}$ ga teng bo'lgan muntazam tetraedrning balandligini toping.
A) $2\sqrt{3}$ B) $3\sqrt{3}$ C) $4\sqrt{3}$ D) 3 E)4

26. (01-4-17) Uchburchakli og'ma prizma asosining medianasi va shu mediana bilan kesishmaydigan qirraning o'rtasi orqali bu prizmadan piramida ajratadigan kesim o'tkazildi. Agar prizmaning hajmi 30 ga teng bo'lsa, piramidaning hajmini toping.
A) 3 B) 5 C) $1,5$ D) $2,5$ E)$4,5$

27. (01-6-55) Muntazam oltiburchakli ABCDEF $A_1B_1C_1D_1E_1F_1$ $(AA_1||BB_1, ..., FF_1||AA_1)$ prizmaning EC dioganali va D_1 uchi orqali o'tkazilgan tekislik shu prizmadan ajratgan D_1ECD piramidaning hajmi 24 ga teng. Berilgan prizmaning hajmini toping.
A) 436 B) 428 C) 426 D) 432 E)430

28. (01-11-54) Muntazam oltiburchakli piramidaning hajmi 13,5 ga, balandligi esa $\sqrt{3}$ ga teng. Shu piramida yon qirrasining asos tekisligi bilan hosil qilgan burchagini toping.
A) 60^0 B) 45^0 C) 30^0 D) $arctg\frac{2}{3}$ E) $arctg\frac{3}{4}$

29. (02-3-68) Uchburchakli piramidaning asosi tomonlari 4; 4 va 2 ga teng bo'lgan uchburchakdan iborat. Piramidaning barcha yon yoqlari asos tekisligi bilan 60^0 li burchak tashkil etadi. Piramidaning hajmini toping.
A) $\sqrt{3}$ B) $2\sqrt{3}$ C) 3 D) 6 E) $\frac{3}{2}$

30. (02-5-50) Muntazam to'rtburchakli piramidaning yon qirrasi $3\sqrt{2}$ ga, yon qirra va asos tekisligi orasidagi burchak 45^0 ga teng. Piramidaning hajmini toping.
A) $12\sqrt{2}$ B) 18 C) $9\sqrt{2}$ D) 24 E) $15\sqrt{2}$

31. (02-12-64) Muntazam oltiburchakli piramidaning hajmi 324 ga, balandligi $6\sqrt{3}$ ga teng. Shu piramidaning yon qirrasi va asos tekisligi orasidagi burchakni toping.
A) 45^0 B) 30^0 C) 75^0 D) 15^0 E) 60^0

32. (03-1-49) Muntazam o'nikkiburchakli piramidaning apofemasi $2\sqrt{2}$ ga teng, barcha yon yoqlari asos tekisligiga 45^0 burchak ostida og'ishgan. Uning hajmini toping.
A) $56-30\sqrt{2}$ B) $64-32\sqrt{3}$ C) $68-48\sqrt{2}$
D) $64-32\sqrt{2}$ E) $48-24\sqrt{3}$

33. (03-4-55) Piramidaning asosi kvadratdan iborat. Kvadratning dagonali 6 ga teng. Piramidaning yon qirralaridan biri uning asosiga perpendikulyar. Piramidaning katta yon qirrasi va asos tekisligi orasidagi burchak 45^0 ga teng. Piramidaning hajmini toping.
A) 32 B) 34 C) 38 D) 40 E) 36

34. (03-7-46) To'rtburchakli muntazam piramidaning balandligi 15 ga, diagonal kesimining yuzi 120 ga teng. Shu piramidaning hajmini toping.
A) 640 B) 1280 C) 980 D) 600 E) 720

35. (03-7-76) Muntazam uchburchakli piramidaning yon qirrasi l ga teng va tekisligi bilan α burchak hosil qiladi. Piramidaning hajmini toping.
A) $l^3\sqrt{2}tg\alpha$ B) $\frac{l^3\sqrt{3}}{4}sin2\alpha$ C) $\frac{l^3\sqrt{3}}{8}sin2\alpha$
D) $\frac{l^3\sqrt{3}}{8}sin2\alpha\cdot cos\alpha$ E) $\frac{l^3\sqrt{3}}{4}tg\alpha\cdot cos\alpha$

36. (03-8-59) Qirrasi a ga teng bo'lgan muntazam tetraedrning hajmini toping.
A) $\frac{a^3\sqrt{2}}{12}$ B) $\frac{a^3}{9\sqrt{3}}$ C) $\frac{a^3\sqrt{3}}{12}$ D) $\frac{a^3\sqrt{2}}{9}$ E) $\frac{a^3\sqrt{3}}{8}$

37. (03-11-49) Muntazam to'rtburchakli piramidaning hajmi 20 ga, balandligi esa 1 ga teng. Piramidaning apafemasi uzunligini toping.
A) 4 B) $4\sqrt{2}$ C) $3\sqrt{2}$ D) 6 E) 8

38. (03-12-41) Parallelepipedning bir uchidan chiquvchi uchta qirralarining o'rtalari orqali o'tkazilgan tekislik undan hajmi 6 ga teng bo'lgan piramida kesib ajratadi. Parallelepipedning hajmini toping.
A) 120 B) 144 C) 180 D) 288 E) 276

Kesik piramida

1. Piramida asosiga parallel tekislik bilan kesilgan. Berilgan va hosil qilingan piramidalar asoslarining tomonlari a, a_1, balandliklar H, H_1, asoslarining yuzlari S, S_1, bo'lsin.

$$\frac{a_1}{a}=\frac{H_1}{H},\ \frac{S_1}{S}=\left(\frac{H_1}{H}\right)^2,\ \frac{V_1}{V}=\left(\frac{H_1}{H}\right)^3$$

2. Kesik piramidaning hajmi: $V=\frac{1}{3}(S_1+\sqrt{S_1S}+S)H$ (H-kesik piramida balandligi)

3. Muntazam kesik piramida yon sirti $S_{yon}=\frac{1}{2}(a+b)nl$, l- apofemasi.

1. (96-3-110) Muntazam to'rtburchakli kesik piramida asoslarining tomonlari 14 va 10 sm, diagonali 18 sm. Kesik piramidaning balandligi necha sm?
A) 6 B) 7 C) 8 D) 5 E) 9

2. (96-9-44) Muntazam to'rtburchakli kesik piramida asoslarining tomonlari 3 va 7 sm, diagonali 10 sm. Kesik piramidaning balandligi necha sm?
A) 5 B) $5\sqrt{2}$ C) $4\sqrt{2}$ D) 4 E) $6\sqrt{2}$

3. (96-12-83) Muntazam to'rtburchakli kesik piramida asoslarining tomonlari 4 va 8 sm, diagonali 12 sm. Kesik piramidaning balandligi necha sm?
A) 3 B) $6\sqrt{2}$ C) 5 D) $4,5$ E) $3,5$

4. (96-13-52) Muntazam to'rtburchakli kesik piramida asoslarining tomonlari 3 va 5 sm, diagonali 9 sm. Kisik piramidaning balandligi necha sm?
A) 6 B) 7 C) 5 D) 8 E) $6,5$

5. (99-1-40) To'rtburchakli muntazam kesik piramida asoslarining tomonlari 8 va 2 ga teng. Balandligi 4 ga teng. Uning to'la sirtini toping.
A) 168 B) 169 C) 168,1 D) 170 E) 171

6. (00-5-64) Muntazam to'rtburchakli kesik piramida asoslarining diagonallari 6 va 10 ga, balandligi $\sqrt{14}$ ga teng. Piramidaning apofemasini toping.
A) 3 B) $3\sqrt{2}$ C) 5 D) $4\sqrt{2}$ E) 4

7. (01-3-20) Piramidaning balandligi 8 ga teng. Piramida uchidan 4 ga teng masofada asosga parallel tekislik o'tkazilgan va hosil bo'lgan kesim yuzi 27 ga teng. Piramida hajmining uning balandligiga nisbatini aniqlang.
A) 48 B) 21 C) 92 D) 36 E) 54

8. (02-2-44) Muntazam to'rtburchakli kesik piramidaning diagonallari o'zaro perpendikulyar va ularning har bir 8 ga teng. Piramidaning balandligini toping.
A) $4\sqrt{2}$ B) $2\sqrt{2}$ C) 4 D) 6 E) $3\sqrt{2}$

9. (02-7-24) Muntazam to'rtburchakli piramidaning balandligi 8 ga, asosining tomoni 12 ga teng. Piramida yon yog'iga parallel bo'lib, asosining markazi orqali o'tgan kesimi yuzini hisoblang.
A) 45 B) 60 C) 72 D) 30 E) 50

10. (02-8-37) Kesik piramida asoslarining yuzlari 96 va 24 ga, unga mos keluvchi butun piramidaning balandligi 16 ga teng. Kesik piramidaning hajmini toping.
A) 448 B) 436 C) 472 D) 384 E) 424

11. (03-9-60) Muntazam to'rtburchakli kesik piramidaning balandligi 16 ga, asoslarining tomonlari 24 va 40 ga teng. Kesik piramidaning diagonalini toping.
A) 48 B) 24 C) 36 D) 40 E) 27

12. (03-12-59) Muntazam kesik piramida ustki asosining yuzi ostki asosining yuzidan uch marta kam. Piramidaning barcha yon yoqlari ostki asosiga 60^0 burchak ostida og'ishgan. Piramida ostki asosining yuzi piramida yon sirtining necha foizini tashkil etadi?
A) 60 B) 50 C) 40 D) 80 E) 75

4.4 Aylanish jismlari

4.4.1 Silindr

R- silindr asosining radiusi, H- balandligi bo'lsin.

1. $S_{yon} = 2\pi RH$.
2. Silindr yon sirtining yoyilmasi - asosi $2\pi R$ ga, balandligi H ga teng bo'lgan to'g'ri to'rtburchak.
3. $S_{to'la} = 2\pi R(R + H)$.
4. $V = \pi R^2 H$.

(96-9-99) Silindr yon sirtining yuzi 24π ga, hajmi esa 48π ga teng. Silindrning balandligini toping.
A) 2 B) 4 C) 8 D) 3 E) 6

Yechish: Silindr asosining radiusi r ga, balandligi esa H ga teng bo'lsin. Masalaning shartidan

$$\begin{cases} 2\pi r \cdot H = 24\pi, \\ \pi r^2 \cdot H = 48\pi \end{cases}$$

sistemani hosil qilamiz. Ikkinchi tenglikni birinchisiga hadma-had bo'lib, $\frac{r}{2} = 2$, $r = 4$ ekanini hosil qilamiz. J: $H = 3$ (D).

1. (98-1-52) Silindrning balandligi H ga teng. Uning yon sirti yoyilganda yasovchi diagonali bilan 60^0 li burchak tashkil qiladi. Silindrning hajmini toping.
A) $\frac{3H^3}{4\pi}$ B) $6\pi H^3$ C) $\frac{3H^3}{2\pi}$ D) $\frac{4\pi H^3}{3}$ E) $\frac{9H^3}{4\pi}$

2. (98-5-45) O'q kesimining yuzi 10 ga teng bo'lgan silindr yon sirtining yuzini toping.
A) 10π B) 20π C) 30π D) 15π E) 12π

3. (98-6-43) Silindrning balandligi 3 ga, o'q kesimining diagonali 5 ga teng. Asosining radiusini toping.
A) 2 B) 3 C) 4 D) 5 E) 1

4. (98-8-52) Silindr yon sirtining yoyilmasi tomoni α ga teng bo'lgan kvadratdan iborat. Silindrning hajmini toping.
A) $\frac{a^3}{2\pi}$ B) $\frac{2\pi a^3}{3}$ C) $4\pi a^3$ D) πa^3 E) $\frac{a^3}{4\pi}$

5. (98-11-43) Silindrning o'q kesimi tomonlari $\frac{2}{\sqrt[3]{\pi}}$ ga teng bo'lgan kvadrat bo'lsa, uning hajmi qanchaga teng?
A) $\frac{1}{2}$ B) 2 C) $\frac{1}{4}$ D) 4 E) 6

6. (99-1-39) Silindr asosining radiusi ikki marta orttirilsa, uning hajmi necha marta ortadi?
A) 4 B) 2 C) 3 D) 6 E) 5

7. (99-2-54) Tomonlari 2 va 4 ga teng bo'lgan to'g'ri to'rtburchak o'zining katta tomoni atrofida aylanadi. Hosil bo'lgan jismning to'la sirtini toping.
A) 22π B) 23π C) 24π D) 20π E) 18π

8. (99-2-56) Silindrning yon sirti yoyilganda, uning diagonali asos tekisligi bilan 45^0 burchak tashkil qiladi. Silindrning yon sirti $144\pi^2$ ga teng. Silindrning asosining radiusini toping.
A) 5 B) 4 C) 6 D) 8 E) 7

9. (99-3-58) To'la sirtining yuzi 24π ga teng silindrning hajmi eng ko'pi bilan qanchaga teng bo'lishi mumkin?
A) 16π B) 20π C) 28π D) 18π E) 30π

10. (99-7-45) Silindrning balandligi 5 ga, uning asosiga ichki chizilgan muntazam uchburchakning tomoni $3\sqrt{3}$ ga teng. Silindrning hajmini toping.
A) 25π B) 35π C) 45π D) 40π E) 20π

11. (99-8-66) Silindrning o'q kesimi diagonali 12 ga teng bo'lgan kvadratdan iborat. Uning hajmini toping.
A) $108\sqrt{2}\pi$ B) $54\sqrt{2}\pi$ C) $36\sqrt{2}\pi$
D) $216\sqrt{2}\pi$ E) $144\sqrt{2}\pi$

12. (00-5-63) To'g'ri to'rtburchakni uning biror tomoni atrofida aylantirish natijasida silindr hosil qilingan. Silindrning hajmini shu to'rtburchak yuzi S va asos aylanasining uzunligi C orqali ifodalang.
A) $\frac{1}{3} \cdot S \cdot C$ B) $\frac{1}{2} \cdot S \cdot C$ C) $S \cdot C$
D) $2 \cdot S \cdot C$ E) $4 \cdot S \cdot C$

13. (00-10-38) Silindrning o'q kesimi tomoni $\frac{6}{\sqrt[3]{\pi}}$ ga teng kvadratdan iborat. Uning hajmini hisoblang.
A) 27 B) 9 C) 54 D) 36 E) 18

14. (01-2-49) Silindrning yon sirti uning asosi yuzidan ikki marta katta. Uning o'q kesimining yuzi Q ga teng. Silindrning hajmini toping.
A) $\pi Q\sqrt{Q}$ B) $\frac{\pi Q}{2}\sqrt{Q}$ C) $\frac{\pi Q}{4}\sqrt{2Q}$
D) $\frac{\pi Q}{3}\sqrt{Q}$ E) $\frac{3\pi}{2}Q\sqrt{Q}$

15. (01-3-16) To'la sirtining yuzi 500π ga teng bo'lgan silindrning balandligi asosining radiusidan 5 ga katta. Silindr yon sirti yuzining asos radiusiga nisbatini aniqlang.
A) 40π B) 25π C) 30π D) 50π E) 10π

16. (01-8-49) Silindrning balandligi va asosining radiusi 6 ga teng. Yuzi silindrning to'la sirtiga teng bo'lgan doiraning radiusini toping.
A) $6\sqrt{3}$ B) 8 C) 9 D) 12 E) 15

17. (01-9-55) Asosining radiusi 3 ga teng bo'lgan silindrning to'la sirti 28π dan kichik emas va 30π dan katta emas. Shu silindrning balandligi qanday oraliqda yotadi?
A) $[\frac{1}{3};2]$ B) $[1;2\frac{2}{3}]$ C) $[1;2]$ D) $[\frac{5}{3};2]$ E) $[1;\frac{5}{3}]$

18. (01-11-52) Silindrning to'la sirti 24π ga, yon sirti esa 6π ga teng. Shu silindrning hajmini toping.
A) 7π B) 11π C) 8π D) 10π E) 9π

19. (01-12-28)* Silindrning balandligi 6 ga, asosining radiusi 5ga teng. Uzunligi 10 ga teng kesma oxirlari ikkala asos aylanalarida yotadi. Bu kesma oxirlari ikkala asos aylanalarida yotadi. Bu kesmadan o'qqacha bo'lgan eng qisqa masofani toping.
A) 3 B) 4 C) 4,5 D) 5 E) 6

20. (02-2-57) Silindr o'q kesimining yuzi 4 ga teng. Yon sirtining yuzini toping.
A) 4π B) 8π C) 2π D) 7π E) $\sqrt{3}\pi$

21. (02-7-33) Silindrning balandligi 8 ga yon sirti yoyilmasining diagonali 10 ga teng. Silindr yon sirtining yuzini toping.
A) 48 B) $\frac{48}{\pi}$ C) 24 D) 48π E) 24π

22. (02-8-38) Silindr asosining yuzi 4 ga, yon sirtining yuzi $12\sqrt{\pi}$ ga teng. Silindrning balandligini toping.
A) 3 B) 4 C) 2 D) 2,8 E) 3,2

23. (02-9-57) Teng tomonli silindrning va konusning balandligi o'zaro teng. Ularning to'la sirtlari nisbatini toping.
A) 5 : 3 B) 3 : 8 C) 3 : 4 D) 3 : 2 E) 6 : 5

24. (03-2-17) Silindrning yon sirtining yoyilmasi kvadratdan iborat bo'lib, uning yuzi $\frac{8}{9}$ ga teng. Silindrning hajmini toping.
A) $\frac{4\pi\sqrt{2}}{27}$ B) $\frac{4}{27\pi^2}$ C) $\frac{4\sqrt{2}}{27\pi}$ D) $\frac{16\pi}{9}$ E) $\frac{64\pi}{81}$

25. (03-2-54) Agar silindrning yon sirti 2 marta orttirilsa, uning hajmi necha marta ortadi?
A) 2 B) 4 C)8 D) $2\sqrt{2}$ E) aniqlab bo'lmaydi

26. (03-5-61) Silindrning hajmi 120π ga, yon sirti 60π ga teng. Silindr asosining radiusini toping.
A) 4 B) 5 C) 6 D) 4,2 E) 3,8

27. (03-6-81) Tomoni 2 ga teng bo'lgan kvadratdan silindr o'ralgan. Bu silindr asosining yuzini toping.
A) $\frac{2}{\pi}$ B) $\frac{1}{2\pi}$ C)$\frac{1}{\pi}$ D) $\frac{1}{3\pi}$ E) $\frac{1}{4\pi}$

28. (03-7-54) Silindrning yon sirti yoyilganda, diagonali 12 ga teng bo'lgan to'g'ri to'rtburchakdan iborat bo'lib, bu diagonal asos tekisligi bilan 30^0 li burchak tashkil etadi. Shu silindrning hajmini toping.
A) $\frac{182\sqrt{3}}{\pi}$ B) 91π C)$\frac{91}{\pi}$ D) $\frac{162}{\pi}$ E) 182π

29. (03-8-4)* Uzunligi $\sqrt{113}$ ga teng bo'lgan AB kesmaning uchlari radiusi 6 ga, balandligi 9 ga teng silindrning pastki va yuqori asosidagi aylanalarda yotadi. Silindr markaziy o'qidan AB kesmagacha bo'lgan eng qisqa masofani toping.
A) $\sqrt{30}$ B) $\sqrt{29}$ C)$\sqrt{28}$ D) $\sqrt{27}$ E) $\sqrt{26}$

30. (03-9-64) Balandligi H ga teng silindr o'z o'qiga parallel va undan d masofada bo'lgan tekislik bilan kesilgan. Tekislik asos aylanasidan α ga teng yoyni ajratadi. Kesimining yuzini toping.
A) $2H\cdot d\cdot tg\frac{\alpha}{2}$ B) $H\cdot d\cdot sin\alpha$ C)$2d\cdot H\cdot cos\alpha$
D) $H\cdot d\cdot sin\frac{\alpha}{2}$ E) $2H\cdot sin\frac{\alpha}{2}$

4.4.2 Konus.

Konusning yon sirti, to'la sirti

R - konus asosining radiusi, H - balandligi, l - yasovchisi, α - yasovchi va asos tekisligi orasidagi burchak.

1. $S_{yon}=\pi Rl$

2. Konus yoyilmasida radiusi l ga, yoy uzunligi $2\pi R$ ga teng bo'lgan sektor hosil bo'ladi.

3. $S_{ac}=S_{yon}\cdot cos\alpha$

4. $S_{to'la}=S_{asos}+S_{yon}=\pi R(R+l)$,

1. (96-3-52) Konus asosining radiusi 0,5 ga teng. Konus yasovchisi bilan uning asos tekisligi orasidagi burchak qanday bo'lganda konus yon sirtining yuzi $0,5\pi$ ga teng bo'ladi?
A) 30^0 B) 60^0 C)45^0
D) $arccos\frac{1}{3}$ E) $arccos\frac{1}{\sqrt{3}}$

2. (96-11-54) Konus asosining radiusi $\frac{1}{\sqrt{3}}$ ga teng. Konus yasovchisi bilan uning asos tekisligi orasidagi burchak qanday bo'lganda konus yon sirtining yuzi $\frac{\pi}{\sqrt{3}}$ ga teng bo'ladi?
A) 30^0 B) 60^0 C)45^0
D) $arccos\frac{1}{3}$ E) $arccos\frac{1}{\sqrt{3}}$

3. (96-12-56) Konus asosining radiusi $\frac{\sqrt{3}}{2}$ ga teng. Konus yasovchisi bilan uning asos tekisligi orasidagi burchak qanday bo'lganda konus yon sirtining yuzi $\frac{\sqrt{3}}{2}\pi$ ga teng bo'ladi?
A) $arccos(\frac{1}{\sqrt{3}})$ B) $arccos(\frac{1}{3})$ C)45^0
D) 30^0 E) 60^0

4. (98-3-51) Konus asosining radiusi 6 ga teng, yasovchisi asos tekisligi bilan 30^0 li burchak tashkil etadi. Asos markazidan yasovchigacha bo'lgan masofani toping.
A) 4 B) 3 C)$2,5$ D) $3\sqrt{3}$ E) $2\sqrt{3}$

5. (98-9-55) Konusning yon sirti 60π ga, to'la sirti 96π ga teng. Konusning yasovchisini toping.
A) 12 B) 9 C)8 D) 10 E) 11

6. (98-10-98) Konusning yasovchisi asos tekisligi bilan 45^0 li burchak tashkil etadi. Asosning markazidan yasovchisigacha bo'lgan masofa $3\sqrt{2}$ ga teng. Konusning balandligini toping.
A) 5 B) 4 C)7 D) $6,5$ E) 6

7. (98-11-50) Konusning o'q kesimi tomoni $\frac{6}{\sqrt{\pi}}$ ga teng bo'lgan muntazam uchburchak bo'lsa, uning yon sirti yuzi qanchaga teng bo'ladi?
A) 9 B) 18 C)24 D) 28 E) 32

8. (98-11-90) Konusning yasovchisi 12 ga teng va u asos tekisligi bilan 60^0 li burchak hosil qiladi. Konus asosning radiusini toping.
A) 12 B) 6 C)3 D) 2 E) 4

9. (99-6-22) Yasovchisi asos diametriga teng bo'lgan konusning balandligi $\frac{2}{\sqrt{\pi}}$ ga teng. Konus yon sirtining yuzini toping.
A) 24 B) 16π C) 12 D) $4\sqrt{\frac{3}{\pi}}$ E) $\frac{8}{3}$

10. (99-7-44) Konus o'q kesimining yuzi 8 ga, asosining radiusi 2 ga teng. Konus yon sirtining yuzini hisoblang.
A) 6π B) $4\sqrt{5}\pi$ C)$5\sqrt{5}\pi$ D) 5π E) 7π

11. (99-8-67) Katetlari 6 va 8 ga teng bo'lgan to'g'ri burchakli uchburchakning kichik kateti atrofida aylanishidan hosil bo'lgan jismning to'la sirtini toping.
A) 144π B) 100π C)80π D) 150π E) 90π

12. (00-7-52) Konusning yon sirti tekislikka yoyilganda, yoyilmaning uchidagi burchak 30^0 ga teng bo'ldi. Konus yasovchisining asos radiusiga nisbatini toping.
A) 10 B) 12 C)11 D) 9 E) 13

13. (00-10-46) Konusning o'q kesimi tomoni $\frac{4}{\sqrt{\pi}}$ ga teng muntazam uchburchakdan iborat. Konusning yon sirtining yuzini aniqlang?
A) 6 B) 8 C)12 D) 16 E) 18

14. (01-3-17) Konusning balandligi 8 ga, asosining radiusi 6 ga teng. Konus yoyilmasining uchidagi burchakni aniqlang.
A) 216^0 B) 270^0 C)180^0 D) 312^0 E) 296^0

15. (01-9-15) Konusning o'q kesimi teng tomonli uchburchak. To'la sirti 18 ga teng. Konus asosining yuzini toping.
A) 6 B) 12 C)$3\sqrt{2}$ D) 3 E) 4

16. (01-11-51) Teng tomonli konus o'q kesimining yuzi $16\sqrt{3}$ ga teng. Shu konus yon sirtining yuzini toping.
A) 30π B) 32π C)34π D) 28π E) 26π

17. (01-12-55) Yasovchisi 4 ga teng bo'lgan konusning to'la sirti 12π dan kichik emas va 21π dan katta emas. Shu konus asosi radiusining uzunligi qanday oraliqda yotadi?
A) $[1;2]$ B) $[2;3]$ C) $[3;4]$
D) $[4;5]$ E) $[5;6]$

18. (02-1-76) Asosining radiusi R ga teng va o'q kesim to'g'ri burchakli uchburchakdan iborat konusning yon sirtini toping.
A) πR^2 B) $\sqrt{2}\pi R^2$ C) $\sqrt{3}\pi R^2$
D) $\frac{1}{2}\pi R^2$ E) $\frac{1}{3}\pi R^2$

19. (02-2-46) Doiradan markaziy burchagi 90^0 bo'lgan sektor qirqib olingach, uning qolgan qismi o'ralib konus shakliga keltirilgan. Bu konus diametrining yasovchisiga nisbatini toping.
A) $\frac{3}{2}$ B) 2 C) $\frac{5}{4}$ D) $\frac{2}{3}$ E) $\frac{4}{5}$

20. (02-2-59) Agar konus asosining yuzi M, o'q kesimining yuzi N ga teng bo'lsa, konus yon sirtining yuzini toping.
A) $\sqrt{M^2+N^2\cdot\pi^2}$ B) $\sqrt{MN}$ C) $\sqrt{\pi MN}$
D) $2\sqrt{MN}$ E) πMN

21. (02-3-69) Konusning yasovchisi 100 ga, uning asos tekisligi bilan tashkil qilgan burchagining sinusi 0,6 ga teng. Konus o'q kesimining perimetrini aniqlang.
A) 360 B) 320 C) 420 D) 340 E) 400

22. (02-7-26) Konusning yasovchisi 15 ga, yon sirti yoyilmasining uchidagi burchagi 120^0 ga teng. Konus asosining diametrini toping.
A) 10 B) 15 C) 20 D) 25 E) 18

23. (02-7-27) Konus asosining radiusi 12 ga, yasovchisi esa 40 ga teng. Shu konus yoyilmasining uchidagi burchagini toping.
A) 108^0 B) 90^0 C) 120^0 D) 75^0 E) 135^0

24. (02-8-39) Konusning o'q kesimi teng tomonli uchburchak. Agar konusning to'la sirti 243π ga teng bo'lsa, konus asosining diametrini toping.
A) 18 B) 11 C) 9 D) 21 E) 16

25. (02-9-56) Konus asosining radiusi 6 ga, balandligi 8 ga teng. Konus yoyilmasining uchidagi burchagini toping.
A) 108^0 B) 216^0 C) 150^0 D) 120^0 E) 210^0

26. (02-10-38) Konusning to'la sirti asosining yuzidan 3 marta katta bo'lsa, o'q kesimining uchidagi burchagini toping.
A) 60^0 B) $arccos\frac{7}{8}$ C) 45^0 D) 30^0 E) $22,5^0$

27. (02-12-63) Konusning o'q kesimi muntazam uchburchakdan iborat. Uchburchakning yuzi $16\sqrt{3}$ ga teng. Konusning to'la sirtini toping.
A) 48π B) 44π C) 46π D) $48\sqrt{3}\pi$ E) 42π

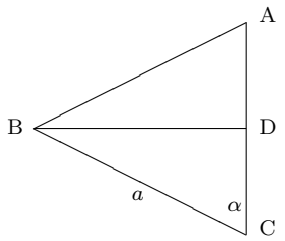
28. (03-9-58) Konus o'q kesimining ikki tomoni 4 va 9 ga teng. Shu konusning yon sirtini toping.
A) 12π B) 16π C) 18π D) 24π E) 36π

Konusning hajmi

1. $V = \frac{1}{3}\pi R^2 H$.
2. $V = \frac{1}{3}S_{yon}h$, h- konus asosining markazidan yasovchisigacha masofa.

(00-6-50) Asosi a ga, asosidagi burchagi α ga teng bo'lgan teng yonli uchburchakni yon tomoni atrofida aylantirishdan hosil bo'lgan jismning hajmini toping.
A) $\frac{\pi a^3 sin\alpha}{3}$ B) $\frac{\pi a^3 sin^2\alpha}{6cos\alpha}$ C) $\frac{\pi a^3 tg\alpha}{2}$
D) $\frac{\pi a^3 cos\alpha}{6sin^2\alpha}$ E) $\frac{\pi a^3 sin2\alpha}{12}$

Yechish: ABC teng yonli (AB=AC) uchburchakni AC yon tomoni atrofida aylantiraylik. Hosil bo'lgan jismning V hajmi ikkita konus V_1, V_2 hajmlarining yig'indisiga teng. Birinchi konusning uchi A nuqtada, ikkinchisiniki esa C nuqtada joylashgan. Har bir konus asosining radiusi ABC uchburchakning BD balandligiga teng.



BD va AC ni topamiz. $BD = asin\alpha$, $AC = \frac{a}{2cos\alpha}$. Konusning hajmi formulasiga ko'ra

$$V_1 = \frac{1}{3}\pi \cdot BD^2 \cdot AD, \quad V_2 = \frac{1}{3}\pi \cdot BD^2 \cdot DC.$$

U holda

$$V = V_1 + V_2 = \frac{1}{3}\pi \cdot BD^2 \cdot AD + \frac{1}{3}\pi \cdot BD^2 \cdot DC =$$
$$= \frac{1}{3}\pi \cdot BD^2 \cdot (AD + DC) = \frac{1}{3}\pi \cdot BD^2 \cdot AC =$$
$$= \frac{1}{3}\pi \cdot a^2 sin^2\alpha \cdot \frac{a}{2cos\alpha} = \frac{\pi a^3 sin^2\alpha}{6cos\alpha}.$$

J:$\frac{\pi a^3 sin^2\alpha}{6cos\alpha}$ (B).

1. (96-1-52) Asos aylanasining uzunligi $8\sqrt{\pi}$ ga, balandligi 9 sm ga teng bo'lgan konusning hajmini toping.
A) 16π B) 24 C) 16 D) 48 E) 144

2. (00-10-71) Asosining radiusi R ga teng bo'lgan konusning yon sirti, asosi bilan o'q kesimi yuzalarining yig'indisiga teng. Konusning hajmini toping.
A) $\frac{2\pi^2 R^3}{3(\pi^2-1)}$ B) $\frac{\pi \cdot R^3}{2(\pi^2+1)}$ C) $\frac{2(\pi^2+1)}{\pi R^3}$
D) $\frac{\pi(\pi^2+1)}{3}$ E) $\frac{3\pi R^3}{2(\pi^2+1)}$

3. (98-8-53) Konusning o'q kesimi muntazam uchburchakdan, silindrniki esa kvadratdan iborat. Agar ularning hajmlari teng bo'lsa, to'la sirtlarining nisbati nimaga teng.
A) $\sqrt{2} : \sqrt{3}$ B) $\sqrt[3]{3} : \sqrt[3]{2}$ C) $3 : 2$
D) $1 : \sqrt[3]{3}$ E) $\sqrt[3]{9} : 2$

4. (98-1-53) Konusning o'q kesimi teng tomonli uchburchakdan, silindrniki esa kvadratdan iborat. Agar ularning to'la sirtlari tengdosh bo'lsa, hajmlarining nisbatini toping.
A) $2 : 3$ B) $1 : 3$ C) $1 : \sqrt{2}$
D) $\sqrt{2} : \sqrt{3}$ E) $2\sqrt{2} : \sqrt{3}$

5. (98-5-46) Konus asosiga tomoni $3\sqrt{3}$ bo'lgan muntazam uchburchak ichki chizilgan. Konus yasovchisi 5 ga teng bo'lsa, uning hajmini toping.
A) 8π B) 48π C) 36π D) 12π E) 4π

6. (98-6-44) Konusning yasovchisi 6 ga teng va u asos tekisligi bilan 30^0 li burchak hosil qiladi. Konusning hajmini toping.
A) 9π B) $9\sqrt{3}\pi$ C) 27π D) $27\sqrt{3}\pi$ E) 81π

7. (96-3-53) Ushbu $y = |x+1|$, $x = -3$, $x = 0$ va $y = 0$ chiziqlar bilan chegaralangan figurani absissalar o'qi atrofida aylanishidan hosil bo'lgan jismning hajmini toping.
A) π B) 2π C) 3π D) 4π E) 5π

8. (96-11-55) $y = |x+2|$, $x = -3$, $x = 0$ va $y = 0$ chiziqlar bilan chegaralangan figurani absissalari o'qi atrofida aylantirish natijasida hosil bo'lgan jismning hajmini toping.
A) 2π B) 3π C) π D) 4π E) 5π

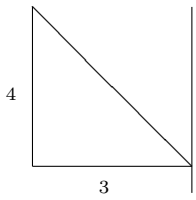
9. (96-12-57) $y = |x-1|$, $x = -1$, $x = 2$ va $y = 0$ chiziqlar bilan chegaralangan figurani absissalari o'qi atrofida aylanishidan hosil bo'lgan jismning hajmini toping.
A) 3π B) 4π C) 5π D) π E) 2π

10. (01-1-57) Muntazam uchburchakning tomoni 2 ga teng. Shu uchburchakni uchidan o'tuvchi va qarama - qarshi tomoniga parallel o'q atrofida aylantirishdan hosil bo'lgan jismning hajmini toping.
A) 6π B) 4π C) $\frac{11}{2}\pi$ D) 8π E) $\frac{9}{2}\pi$

11. (01-1-58) Konusning balandligi 10 ga, o'q kesimi uchidagi burchagi 120^0 ga teng. Konus hajmining konus yon sirtiga nisbatini toping.
A) $\frac{5}{\sqrt{3}}$ B) 2 C) $2\sqrt{3}$ D) $\sqrt{\frac{3}{2}}$ E) $\frac{5}{2}$

12. (01-8-48) Konusning balandligi 12 ga o'q kesimining perimetri 36 ga teng. Uning hajmini toping.
A) 36π B) 72π C) 100π D) 300π E) 75π

13. (98-3-52) Rasmda ko'rsatilgan uchburchakning to'g'ri chiziq atrofida aylanishidan hosil bo'lgan jismning hajmini toping.



A) 12π B) 24π C) 20π D) 16π E) 22π

14. (02-5-51) Konus asosining radiusi 2 ga, yasovchisi va asos tekisligi orasidagi burchak 60^0 ga teng. Konusning hajmini toping.
A) $\frac{8\pi}{3}$ B) $\frac{8\pi\sqrt{3}}{3}$ C) 24π D) $8\pi\sqrt{3}$ E) 8π

15. (02-11-63) Konus asosining radiusi 2 ga teng. Uning yasovchi asos tekisligi bilan 60^0 li burchak tashkil qiladi. Shu konusning hajmini toping.
A) 8π B) $8\pi\sqrt{3}$ C) 24π D) $\frac{8\pi\sqrt{3}}{3}$ E) $\frac{8\pi}{3}$

16. (03-9-57) Teng yonli uchburchakning tomonlari 10 va 22 ga teng. Shu uchburchak o'zining simmetriya o'qi atrofida aylantirilganda hosil bo'lgan aylanish jismining to'la sirtini toping.
A) 105π B) 125π C) 135π D) 150π E) 160π

17. (03-9-63) Konus hajmining π ga nisbati 9 ga teng bo'lib, uning yasovchi asos tekisligi bilan45^0 li burchak tashkil qiladi. Konusning balandligini toping.
A) 3 B) 2 C) $\sqrt{3}$ D) $1,5$ E) $\sqrt{5}$

Kesik konus

Kesik konus asoslarining radiuslari R, r balandligi H bo'lsin:

1. $S_{yon} = \pi l(R + r)$

2. $S_{to'la} = \pi(R^2 + r^2 + l(R + r))$

3. $V_k = \frac{1}{3}\pi H(R^2 + r^2 + Rr)$

4. Konus uchidan H_1 masofada konusni S_1 yuzali doira buylab kesuvchi tekislik undan V_1 hajmli konus ajratsin. U holda

$$\frac{S_1}{S} = (\frac{H_1}{H})^2, \frac{V_1}{V} = (\frac{H_1}{H})^3$$

1. (97-4-58) Konusning balandligi 6 ga teng. Konusning asosidan 4 ga teng masofada unga parallel tekislik o'tkazilgan. Hosil bo'lgan kesim yuzining konus asosi yuziga nisbatini toping.
A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{4}{9}$ D) $\frac{2}{5}$ E) $\frac{1}{9}$

2. (97-9-59) Yasovchisi 5 ga balandligi 4 ga teng bo'lgan konus asosidan 2 ga teng masofada shu asosga parallel tekislik bilan kesildi. Hosil bo'lgan kesimning yuzini hisoblang.
A) $2,25\pi$ B) $3,16\pi$ C) $2,64\pi$
D) $1,81\pi$ E) $3,26\pi$

3. (98-11-92) Kesik konus asoslarining radiuslari 1 va 5 ga teng. Agar balandligi 3 ga teng bo'lsa, uning yasovchisi qanchaga teng bo'ladi?
A) 6 B) 3 C) 4 D) 5 E) 12

4. (01-6-54) Konusning yon sirti 96π ga teng. Shu konus balandligining o'rtasidan unga perpendikulyar tekislik o'tkazish natijasida hosil bo'lgan kesik konusning yon sirtini toping.
A) 70π B) 74π C) 72π D) 68π E) 76π

5. (02-5-52) Asoslarning radiuslari 2 va 7 ga, o'q kesimining diagonali 15 ga teng bo'lgan kesik konus yon sirtining yuzini toping.
A) 112π B) 115π C) 117π D) 120π E) 125π

4.4.3 Shar va sfera

R - shar radiusi

1. $S = 4\pi R^2$ - shar sirti

2. Shar kesimnining radiusi r va shar markazidan kesimigacha masofada d uchun $r^2 + d^2 = R^2$

3. $V = \frac{4\pi R^3}{3}$ - shar hajmi

4. Balandligi H ga teng bo'lgan shar segmentining hajmi $V = \pi H^2(R - \frac{H}{3})$

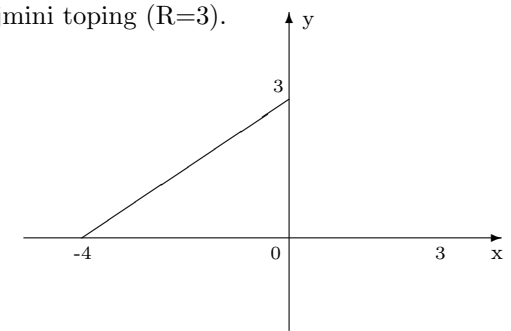
5. Markazi (a,b,c) nuqtada va radiusi R ga teng bo'lgan sfera tenglamasi

$$(x - a)^2 + (y - b)^2 + (z - c)^2 = R^2$$

(98-11-95) Uchburchakning tomonlari sharga urinadi. Sharning radiusi 4 ga teng. Shar markazidan uchburchak tekisligigacha masofa 3 ga teng bo'lsa, uchburchakka ichki chizilgan aylananing radiusi qanchaga teng bo'ladi?
A) $\sqrt{7}$ B) 1 C) 5 D) $3,5$ E) 2

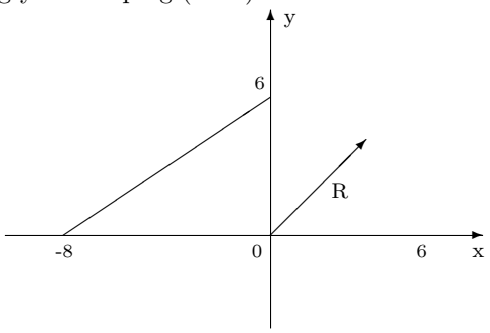
Yechish: Shar uchburchak tekisligi bilan kesilganda kesimda doira hosil bo'ladi.O'z navbatida bu doira uchburchakka ichki chizilgan doira bo'ladi. Shar markazidan uchburchak tekisligiga tushirilgan perpendikulyar shu doiraning markaziga tushadi. Bu perpendikulyarning uzunligi d, sharning radiusi R va doiraning radiusi r lar uchun Pifagor teoremasiga ko'ra $r^2 = R^2 - d^2$ bo'lgani uchun $r^2 = 4^2 - 3^2 = 7, r = \sqrt{7}$ ekanini hosil qilamiz. j:$\sqrt{7}$ (A)

1. (96-3-109) Rasmda ko'rsatilgan figurani OX o'qi atrofida aylantirishdan hosil bo'lgan jismning hajmini toping (R=3).



A) 25π B) 48π C) 35π D) 45π E) 30π

2. (96-13-51) Chizmada ko'rsatilgan figurani OX o'qi atrofida aylantirishdan hosil bo'lgan jism sirtining yuzini toping (R=6).



A) 120π B) 135π C) 130π D) 132π E) 133π

3. (98-4-40) Agar sferaning radiusi 50% orttilsa, sfera sirtining yuzi necha foizga ko'payadi?
A) 125 B) 100 C) 150 D) 75 E) 225

4. (98-6-46) Radiusi 13 ga teng bo'lgan shar tekislik bilan kesilgan. Agar shar markazidan kesimgacha masofa 10 ga teng bo'lsa, kesimning yuzini toping.
A) 69π B) $3\sqrt{6\pi}$ C) 100π D) 3 E) 9π

5. (98-7-54) Radiuslari $2; 3$ va 4 ga teng bo'lgan metall sharlar eritilib, bitta shar quyildi. Shu sharning hajmini toping.
A) 144π B) 396π C) 99π D) 116π E) 132π

6. (98-7-56) Sirtining yuzi 16π ga teng bo'lgan sharning hajmini toping.
A) $8\frac{2}{3}\pi$ B) $12\frac{1}{3}\pi$ C) $10\frac{2}{3}\pi$ D) $9\frac{2}{3}\pi$ E) 14π

7. (98-10-99) Sharning radiusi $\frac{8}{\sqrt{\pi}}$ ga teng. Radiusning oxiridan u bilan 60^0 li burchak tashkil etadigan kesuvchi tekislik o'tkazilgan. Kesimning yuzini toping.
A) 8 B) 12 C) 16 D) 14 E) 10

8. (98-11-40) Sharni bo'yash uchun 50 massa birligidan bo'yoq ishlatildi. Agar sharning diametri ikki marta oshirilsa, uni bo'yash uchun qancha bo'yoq kerak bo'ladi?
A) 100 B) 125 C) 150 D) 200 E) 250

9. (00-1-58) Shardan tashqaridagi M nuqtadan uning sirtiga MN urinma o'tkazildi. M nuqtadan sharning sirtigacha bo'lgan eng qisqa masofa 6 ga, sharning markazigacha bo'lgan masofa 15 ga teng. MN ning uzunligini toping.
A) 10 B) 16 C) 14 D) 12 E) 18

10. (00-2-43) Kovak shar devorining hajmi 252π ga, devorning qalinligi 3 ga teng. Tashqi sharning radiusini toping.
A) 5 B) 6 C) 4 D) 7 E) 8

11. (00-5-61) Ikkita sfera yuzlarining nisbati 2 ga teng. Bu sferalar diametrlarining nisbatini toping.
A) 2 B) 4 C) 8 D) $\sqrt{2}$ E) $2\sqrt{2}$

12. (00-7-50) Tenglamasi

$$x^2 + y^2 + z^2 - 4x + 10z - 35 = 0$$

bo'lgan sferaning radiusi uzunligini aniqlang.
A) 5 B) 6 C) 7 D)8 E)4

13. (00-8-19) Shar sirtining yuzi Q bo'lsa, uning hajmi nimaga teng.
A) $\frac{Q\sqrt{Q}}{6\sqrt{\pi}}$ B) $\frac{1}{3}Q\pi$ C) $\frac{3\pi}{4}\sqrt{Q}$ D) $\frac{4}{3}Q\sqrt{Q}$ E) $\frac{\sqrt{Q\pi}}{6}$

14. (00-10-35) Sharni bo'yash uchun 100 g buyoq ishlatildi. Agar sharning diametri uch marta orttirilsa, uni buyash uchun necha gr buyoq kerak bo'ladi?
A) 900 B) 300 C) 600 D) 450 E) 350

15. (01-2-47) Hajmi $\frac{9\pi}{16}$ ga teng shar sirtining yuzini aniqlang.
A) $3\frac{3}{4}\pi$ B) $2\frac{1}{4}\pi$ C) $4\frac{1}{4}\pi$ D) 9π E) 2π

16. (01-9-25) Radiusi $\sqrt[3]{2}$ bo'lgan shar, yon sirti asosining yuzidan 3 marta katta bo'lgan konusga tengdosh. Konusning balandligini toping.
A) 4 B) 3 C) 5 D) 2 E) 6

17. (01-10-46) Radiusi 5 ga teng bo'lgan shar markazidan 3 ga teng bo'lgan masofada tekislik bilan ikkita jismga ajratildi. Shu jismlardan kichigining hajmini toping.
A) $17\frac{1}{3}\pi$ B) $15\frac{2}{3}\pi$ C) $17\frac{2}{3}\pi$ D) $16\frac{1}{3}\pi$ E) $18\frac{3}{4}\pi$

18. (01-11-53) Shar katta doirasining yuzi 25π ga teng. Sharning markazidan qanday masofada o'tkazilgan tekislik shardan doirasining yuzi 9π ga teng bo'lgan kesim ajratadi?
A) $3,8$ B) $3,6$ C) $3,5$ D) 4 E) $2,8$

19. (02-7-28) Tomonlari $10; 10$ va 12 ga teng bo'lgan shar sirtiga urinadi. Uchburchak tekisligidan shar markazigacha masofa 4 ga teng bo'lsa, sharning radiusini toping.
A) 5 B) 6 C) 8 D) 4 E) 3

20. (02-7-29) Radiusi 13 ga teng bo'lgan shar sirtiga diagonallari 30 va 40 ga teng bo'lgan romb tomonlari urinadi. Romb tekisligidan shar markazigacha bo'lgan masofani aniqlang.
A) 5 B) 6 C) 7 D) 4 E) 3

21. (02-7-30) Shar radiusi 6 ga teng. Radius uchidan 30^0 burchak tashkil qiluvchi tekislik o'tkazilgan. Shar bilan tekislik hosil qilgan kesimning yuzini toping.
A) 27π B) 8π C) 64π D) 25π E) 30π

22. (02-7-31) Radiusi 15 ga va 20 ga teng bo'lgan ikki shar markazlari orasidagi masofa 25 ga teng. Shar sirtlari kesishishidan hosil bo'lgan aylananing uzunligini toping.
A) 24π B) 20π C) 25π D) 15π E) 18π

23. (02-7-32) Tomoni $12,5$ ga teng bo'lgan romb tomonlari shar sirtiga urinadi. Sharning radiusi 10 ga teng. Romb tekisligi va shar markazi orasidagi masofa 8 ga teng bo'lsa, rombning yuzini toping.
A) 150 B) $\frac{\sqrt{481}}{2}$ C) 120 D) 135 E) $130\sqrt{3}$

24. (03-7-84) Radiusi 2 ga teng bo'lgan yarim shar balandligining o'rtasidan yarim sharning asosiga parallel tekislik o'tkazilgan. Hosil bo'lgan shar qatlamining hajmini toping.
A) $\frac{10\pi}{3}$ B) $\frac{11\pi}{3}$ C) 4π D) 3π E) $\frac{13\pi}{3}$

25. (03-9-55) Sfera sirtidagi uchta nuqta orasidagi masofa $26,24$ va 10 ga, sfera sirtining yuzi esa 900π ga teng. Shu uchta nuqta orqali o'tgan tekislikdan sferaning markazigacha bo'lgan masofani toping.
A) $2\pi\sqrt{14}$ B) $2\sqrt{14}$ C) $4\sqrt{14}$ D) 56π E) 56

26. (03-11-47) Sferaning radiusi 60% uzaytirilsa, sfera sirtining yuzi necha foiz ko'payadi?
A) 156 B) 120 C) 150 D) 160 E) 144

4.5 Jismlarning kombinatsiyalari

4.5.1 Prizma va shar

1. Balandligi H ga teng bo'lgan prizmaga r radiusli shar ichki chizilgan bo'lsa,

$$H = 2r$$

2. Katta diagonali d ga teng bo'lgan parallelepipedga R radiusli shar tashqi chizilgan bo'lsa,

$$d = 2R$$

3. Hajmi V ga, to'la sirti S ga teng bo'lgan ko'pyoqqa r radiusli shar ichki chizilgan bo'lsa, u holda

$$V = \frac{1}{3}Sr$$

1. (96-1-53) To'la sirtining yuzi 72 ga teng bo'lgan kubga tashqi chizilgan sharning radiusini toping.
A) 3 B) 6 C) $3\sqrt{3}$ D) $2\sqrt{3}$ E) 4

2. (97-8-56) Hajmi 125 bo'lgan kubga ichki chizilgan shar sirtining yuzini toping.
A) 125π B) 25π C) $24,5\pi$ D) 105π E) $25,5\pi$

3. (98-12-95) Ikkita qo'shni yoqlarning markazlari orasidagi masofa $2\sqrt{2}$ ga teng bo'lgan kubga tashqi chizilgan shar sirtining yuzini toping.
A) 28π B) 36π C) 48π D) $18\sqrt{2}\pi$ E) $12\sqrt{3}\pi$

4. (96-6-60) Kubning qirrasi 6 ga teng. Kubga ichki chizilgan sharning hajmini toping.
A) 12π B) 36π C) 27π D) 18π E) 26π

5. (00-5-59) Radiusi 5 ga teng bo'lgan sharga balandligi 8 ga teng to'rtburchakli muntazam prizma ichki chizilgan. Prizmaning hajmini toping.
A) 136 B) 144 C) 169 D) 172 E) 184

6. (02-10-39) Radiusi R ga teng sharga balandligi H ga teng bo'lgan uchburchakli muntazam prizma ichki chizilgan. Prizmaning hajmini toping.
A) $\frac{3\sqrt{3}H}{16}(4R^2 - H^2)$ B) $\frac{3\sqrt{3}H}{8}(2R^2 - H^2)$
C) $\sqrt{3}H(4R^2 - H^2)$ D) $\frac{3\sqrt{2}H}{16}(4R^2 - H^2)$
E) $\frac{3H}{16}(4R^2 - H^2)$

7. (02-10-79) Radiusi $\sqrt{\frac{3}{2}}$ ga teng yarim sharga kub ichki chizilgan bo'lib, uning to'rtta uchi yarim shar asosida, qolgan to'rttasi shar sirtida yotadi. Kubning hajmini toping.
A) 1 B) $\frac{3}{2}\sqrt{\frac{3}{2}}$ C) $2,25$ D) 2 E) $1,5$

8. (02-11-61) Qirrasining uzunligi 8 ga teng bo'lgan kubning barcha uchlaridan o'tuvchi sferaning radiusini toping.
A) $3\sqrt{3}$ B) $4\sqrt{3}$ C) $5\sqrt{3}$ D) $6\sqrt{3}$ E) $8\sqrt{3}$

9. (03-1-45) Kubga tashqi chizilgan sharning hajmi $10\frac{2}{3}\pi$ ga teng. Kubning diagonaliga tegishli bo'lmagan uchlaridan diagonalgacha bo'lgan masofani toping.
A) $\frac{4\sqrt{2}}{3}$ B) $\frac{3\sqrt{2}}{4}$ C) $\frac{4\sqrt{2}}{9}$ D) $\frac{3\sqrt{3}}{8}$ E) $\frac{2\sqrt{3}}{9}$

10. (03-2-53) Kubning bir uchidan chiqqan uchta qirralarining o'rtalari orqali o'tkazilgan kesimning yuzi $16\sqrt{3}$ ga teng. Shu kubga ichki chizilgan shar sirtining yuzini hisoblang.
A) 96π B) 256π C) 144π D) 192π E) 128π

11. (03-4-53) Kubga ichki chizilgan sharning hajmi $85\frac{1}{3}\pi$ ga teng. Shu kubning to'la sirtini toping.
A) 382 B) 386 C) 385 D) 384 E) 388

12. (03-10-58) Kubga tashqi chizilgan sharning hajmi unga ichki chizilgan sharning hajmidan necha marta katta?
A) 8 B) 4 C) $4\sqrt{2}$ D) $4\sqrt{3}$ E) $3\sqrt{3}$

13. (03-10-59) To'g'ri prizmaning hajmi $\frac{32}{3}\pi$ ga teng. Prizmaning yon sirtini toping.
A) 40 B) 16 C) 24 D) 20 E) 30

4.5.2 Piramida va shar

Asosiga ichki chizilgan aylana radiusi r_1 ga,asosidagi ikki yoqli burchagi α ga teng bo'lgan muntazam piramidaga r radiusli shar ichki chizilgan bo'lsa, $r = \frac{sin\alpha}{1+cos\alpha}r_1$ Balandligi H ga,yon qirrasi l ga teng bo'lgan muntazam piramidaga R radiusli shar tashqi chizilgan bo'lsa, $l^2 = 2HR$

1. (98-12-71) Piramidaning to'la sirti 60 ga, unga ichki chizilgan sharning radiusi 5 ga teng. Piramidaning hajmini toping.
A) 120 B) 80 C) 90 D)100 E)150

2. (99-5-48) Muntazam oltiburchakli piramidaning apofemasi 5 ga, uning asosiga tashqi chizilgan doiraning yuzi 12π ga teng. Shu piramidadagi ichki chizilgan sharning radiusini toping.
A) 3 B) $3,2$ C) $1,5$ D)$2,5$ E)$2,4$

3. (99-5-50) Muntazam tetraedrning qirrasi 1 ga teng. Shu tetraedrga tashqi chizilgan sharning radiusini toping.
A) $\frac{2\sqrt{2}}{3}$ B) $\frac{\sqrt{6}}{4}$ C) $\frac{3\sqrt{2}}{8}$ D)$\frac{11\sqrt{2}}{24}$ E)$\frac{2\sqrt{3}}{5}$

4. (00-6-49) Muntazam to'rtburchakli piramida asosining tomoni 12 ga unga ichki chizilgan sharning

radiusi 3 ga teng. Piramidaning yon sirtini toping.
A) 240 B) 120 C) 480 D)360 E)280

5. (00-6-51) Uchburchakli muntazam piramidaga tashqi chizilgan sharning markazi uning balandligini 6 va 3 ga teng bo'lgan qismlarga ajratadi. Piramidaning hajmini toping.
A) $\frac{25\sqrt{3}}{4}$ B) $\frac{81\sqrt{3}}{2}$ C) $\frac{729\sqrt{3}}{4}$ D)$\frac{81\sqrt{3}}{4}$ E)$\frac{243\sqrt{3}}{4}$

6. (00-9-52) Muntazam sakkizburchakli piramidaning apofemasi 10 ga, uning asosiga ichki chizilgan doiraning yuzi 36π ga teng. Shu piramidaga ichki chizilgan sharning radiusini toping.
A) 1 B) 2 C) 3 D)4 E)5

7. (98-4-12) Piramidaning hajmi 25 ga, unga ichki chizilgan sharning radiusi $1,5$ ga teng. Piramidaning to'la sirtini toping.
A) 20 B) 15 C) 25 D)30 E)50

8. (02-11-62) Muntazam oltiburchakli piramidaning to'la sirti 2000 ga, hajmi 4800 ga teng. Shu piramidaga ichki chizilgan sharning radiusini toping.
A) 4 B) $4,5$ C) 7 D)$7,2$ E)8

9. (03-2-56) Muntazam to'rtburchakli kesik piramida kichik asosining yuzi 50 ga, katta asosining yuzi 200 ga teng. Shu piramidaga ichki chizilgan sfera sirtining yuzini toping.
A) 96π B) 125π C) 120π D)100π E)144π

4.5.3 Silindr va shar

1. Silindrga shar ichki chizilgan bo'lsa, silindrning o'qi orqali hosil bo'ladi. Bunda silindrning o'q kesimi kvadrat va sharning radiusi doiraning radiusiga teng bo'ladi. Silindrning balandligi H, asosining radiusi R, ichki chizilgan shar radiusi r bo'lsa, u holda $H = 2r,\ R = r$.

2. Diagonali d ga teng bo'lgan silindrga R radiusli shar tashqi chizilgan bo'lsa, $d = 2R$.

1. (97-12-58) O'q kesimi kvadratdan iborat silindrga ichki chizilgan sharning hajmi $\frac{9\pi}{16}$ ga teng. Silindrning yon sirtini toping.
A) $\frac{3\pi}{4}$ B) $\frac{7\pi}{4}$ C) $\frac{9\pi}{4}$ D)$\frac{5\pi}{4}$ E)3π

2. (98-2-58) Teng tomonli silindrga radiusi 3 ga teng bo'lgan shar ichki chizilgan. Silindr va shar sirtlari orasidagi jismning hajmini toping.
A) 27π B) 24π C) 18π D)12π E)21π

3. (98-6-57) Teng tomonli silindrga radiusi 3 ga teng bo'lgan shar ichki chizilgan. Silindr va shar sirtlari orasidagi jismning hajmini toping.
A) 27π B) 24π C) 18π D)12π E)21

4. (00-7-48) Teng tomonli silindrga shar ichki chizilgan. Agar sharning hajmi $10\frac{2}{3}$ ga, teng bo'lsa, silindrning yon sirtini toping.
A) 12π B) 13π C) 16π D)15π E)17π

5. (01-9-20) Silindrga shar ichki chizilgan. Silindrning hajmi 16π ga teng bo'lsa, sharning hajmini toping.
A) $\frac{32\pi}{3}$ B) $\frac{16\pi}{3}$ C) $\frac{64\pi}{3}$ D)$10\frac{1}{3}\pi$ E)16π

6. (98-5-53)* Radiusi 1 ga teng bo'lgan sferaga ichki chizilgan eng katta hajmli silindrning balandligini aniqlang.
A) $\frac{3\sqrt{3}}{4}$ B) $\frac{\sqrt{3}}{2}$ C) $\frac{2\sqrt{3}}{3}$ D)$\frac{\sqrt{2}}{3}$ E)$\frac{2\sqrt{5}}{3}$

7. (02-3-70)* Radiusi 6 sm bo'lgan metall shardan eng katta hajmli silindr yo'nalgan. Bu silindr asosining radiusi nechaga teng?
A) $2\sqrt{6}$ B) 3 C) $\sqrt{6}$ D)4 E) $4\sqrt{2}$

8. (03-1-46) Teng tomonli silindr shaklidagi g'o'ladan eng katta hajmdagi shar yo'nib olindi. G'o'laning qancha foizi chiqindiga ketgan?
A) 25 B) 30 C) $33\frac{1}{3}$ D)$37\frac{2}{5}$ E) $32\frac{2}{3}$

4.5.4 Konus va shar

1. Asosining radiusi R ga, yasovchisi bilan asos tekisligi orasidagi burchagi α ga teng bo'lgan konusga r_1 radiusli shar ichki chizilgan bo'lsa, u holda

$$r_1 = \frac{sin\alpha}{1 + cos\alpha} R.$$

2. Balandligi H ga, yasovchisi l ga teng bo'lgan konusga R_1 radiusli shar tashqi chizilgan bo'lsa, u holda

$$l^2 = 2HR_1.$$

3. Asoslarining radiuslari R, r ga, balandligi H ga, yasovchisi l ga teng bo'lgan kesik konusga r_1 radiusli shar ichki chizilgan bo'lsa, u holda

$$H = 2r_1 \quad va \quad l = R + r.$$

(97-12-59) Sharga tashqi chizilgan kesik konusning yasovchilari o'rtalaridan o'tuvchi tekislik bilan shu kesik konus hosil qilgan kesimning yuzi 4π ga teng. Kesik konusning yasovchisini toping.
A) 2 B) 4 C) 3 D) 5 E) 6

Yechish: Kesik konus yasovchilari o'rtalaridan o'tuvchi tekislik shu kesik konusni doira bo'ylab kesadi. Bu doiraning radiusi r ga teng bo'lsin. Masalaning shartiga ko'ra $\pi r^2 = 4\pi$. Bu erdan $r = 2$ ekanini topamiz. Kesik konusning o'q kesimida teng yonli trapetsiya hosil bo'ladi. Bu trapetsiyaning o'rta chizig'ini topamiz: $l = 2r = 4$. Kesik konus sharga tashqi chizilgani uchun trapetsiyaga ichki aylana chizish mumkin. Shu sababli trapetsiyaning yon tomoni x uning o'rta chizig'i l ga teng bo'ladi: $x = l = 4$. J: 4 (B).

1. (96-7-52) Sharga ichki chizilgan konusning balandligi 3 ga, asosining radiusi $3\sqrt{3}$ ga teng. Sharning radiusini toping.
A) 5 B) 6 C) $4\sqrt{3}$ D) $5\sqrt{2}$ E) $5,6$

2. (97-1-41) Sharga ichki chizilgan konusning asosi sharning eng katta doirasidan iborat. Sharning hajmi konusning hajmidan necha marta katta?
A) 2 B) 4 C) 3 D) 1,5 E) 2,5

3. (97-3-52) Konusning balandligi 6 ga, yasovchisi 10 ga teng. Konusga ichki chizilgan sharning radiusini toping.
A) 3 B) $2\frac{2}{3}$ C) 4 D) $3\sqrt{3}$ E) $2\sqrt{2}$

4. (97-7-52) Balandligi 3 ga yasovchisi 6 ga teng bo'lgan konusga tashqi chizilgan sharning radiusini toping.
A) $3\sqrt{3}$ B) 5 C) 6 D) $4\sqrt{2}$ E) $4,5$

5. (97-10-52) Yasovchisi 10 ga asosining radiusi 6 ga teng bo'lgan konusga ichki chizilgan sharning radiusini toping.
A) 3 B) 4 C) $3\sqrt{3}$ D) $2\sqrt{2}$ E) $3\frac{1}{3}$

6. (97-11-41) Sharga ichki chizilgan konusning o'q kesimi teng yonli to'g'ri burchakli uchburchakdan iborat. Konusning hajmi shar hajmining qanday qismini tashkil etadi?
A) $0,25$ B) $\frac{1}{3}$ C) $\frac{2}{3}$ D) $\frac{3}{7}$ E) $0,75$

7. (98-12-66) Kesik konusga shar ichki chizilgan. Konusning ustki asosini yuzi 36π ga, ostki asosining yuzi esa 64π ga teng. Shar sirtining yuzini toping.
A) 172π B) 100π C) 144π D) 156π E) 192π

8. (99-2-55) Radiusi 5 ga teng bo'lgan sharga ichki chizilgan konusning balandligi 4 ga teng. Konusning hajmini toping.
A) 28π B) 18π C) 24π D) 32π E) 16π

9. (99-3-49) Radiusi 2 ga teng shar konusga ichki chizilgan. Konus yasovchisi va balandligi orasidagi burchak 30^0 ga teng. Konusning yon sirtining yuzini toping.
A) 24π B) 4π C) 16π D) 18π E) 20π

10. (99-4-48) Balandligi 6 ga, yasovchisi 10 ga teng konusga ichki chizilgan sharning sirtini toping.
A) $\frac{32\pi}{3}$ B) $\frac{64\pi}{3}$ C) $\frac{256\pi}{9}$ D) $\frac{64\pi}{9}$ E) $\frac{128\pi}{9}$

11. (99-9-46) Radiusi 10 ga teng bo'lgan sferaga balandligi 18 ga teng bo'lgan konus ichki chizilgan. Konusning hajmini toping.
A) 210π B) 216π C) 220π D) 228π E) 204π

12. (00-3-84) Sharga balandligi asosining diametriga teng bo'lgan konus ichki chizilgan. Agar konus asosining yuzi 2,4 ga teng bo'lsa, shar sirtining yuzini toping.
A) 9π B) 6 C) $12,5$ D) 15 E) 10π

13. (00-9-7) Sharga ichki chizilgan konusning asosi sharning katta doirasiga teng. Konus o'q kesimining yuzi 9 ga teng. Sharning hajmini toping.
A) 30π B) 32π C) 42π D) 36π E) 48π

14. (01-2-50) O'q kesimi teng tomonli uchburchakdan iborat konusga diametri D ga teng sfera ichki chizilgan. Konusning to'la sirtini toping.
A) $\frac{3}{2}\pi D^2$ B) $\frac{5}{2}\pi D^2$ C) $\frac{3}{4}\pi D^2$
D) $\frac{5}{4}\pi D^2$ E) $\frac{9}{4}\pi D^2$

15. (01-3-29) Sharga konus shunday ichki chizilganki, konusning yasovchisi asosining diametriga teng. Konusning to'la sirti shar sirti yuzining necha foizini tashkil etadi?
A) 62 B) $56,25$ C) $54,5$ D) $60,75$ E) 48

16. (01-10-47) Kesik konus asoslarining yuzlari 9π va 25π ga teng. Agar bu konusga sharni ichki chizish mumkin bo'lsa, konusning yon sirtini toping.
A) 80π B) 36π C) 54π D) 64π E) 144π

17. (02-5-53) Yasovchisi 5 ga, asosining diametri 6 ga teng bo'lgan konusga ichki chizilgan shar sirtining yuzini toping.
A) 16π B) $\frac{64}{11}\pi$ C) 9π D) $\frac{71}{9}\pi$ E) 8π

18. (02-6-52) Kesik konusga shar ichki chizilgan. Agar kesik konus asoslarining yuzlari π va 4π ga teng bo'lsa, shu konus yon sirtining yuzini toping.
A) 6π B) 7π C) 8π D) 9π E) 10π

19. (02-8-35) Radiusi 4 ga teng bo'lgan sharga balandligi 9 ga teng bo'lgan konus tashqi chizilgan. Konus asosining radiusini toping.
A) 12 B) 9 C) 10 D) 8 E) 14

20. (02-9-60) Teng tomonli konusga shar tashqi chizilgan. Shar sirtining konusning to'la sirtiga nisbatini toping.
A) 9 : 4 B) 7 : 4 C) 16 : 9 D) 4 : 3 E) 9 : 5

21. (97-6-41) Sharga konus ichki chizilgan. Konusning yasovchisi asosining diametriga teng. Shar hajmining konus hajmiga nisbatini toping.
A) 32 : 9 B) 8 : 3 C) 16 : 9 D) 27 : 4 E) 9 : 4

22. (97-9-79) Sharga tashqi chizilgan kesik konusning yasovchilari o'rtalaridan o'tuvchi tekislik bilan shu kesik konus hosil qilingan kesimning yuzi 4π ga teng. Kesik konusning yasovchisinini toping.
A) 2 B) 4 C) 3 D) 5 E) 6

23. (01-4-16) Kesik konusning yon sirti 10π ga, to'la sirti 18π ga teng. Konusning to'la sirti unga ichki chizilgan shar sirtidan qancha ko'p?
A) 14π B) 6π C) 8π D) 10π E) 12π

24. (01-4-33)* R radiusli yarim sharga asosining markazi bilan ustma-ust tushadigan konus tashqi chizilgan. Konusning balandligi qanday bo'lganda, uning hajmi eng kichik bo'ladi?
A) $\sqrt{3}R$ B) $\frac{\sqrt{3}}{2}R$ C) $\sqrt{2}R$ D) $\frac{\sqrt{2}}{2}R$ E) $\frac{1}{\sqrt{3}}R$

25. (03-2-16) Konus asosining yuzi 9π ga, yon sirtining yuzi 15π ga teng. Shu konusga ichki chizilgan sferaning radiusini toping.
A) $1,5$ B) $1,8$ C) 2 D) $2,4$ E) $2,5$

26. (03-2-55) Teng tomonli konusga ichki va tashqi shar chizildi. Ichki chizilgan shar hajmi tashqi chizilgan shar hajmining necha foizini tashkil etadi?
A) 10 B) $12,5$ C) 20 D) 25 E) $22,5$

27. (03-6-82)* Radiusi R ga teng bo'lgan shar ichiga chizilgan eng katta hajmga ega bo'lgan konusning balandligini toping.
A) $\frac{2}{3}R$ B) $\frac{1}{3}R$ C) $1\frac{2}{3}R$ D) $\frac{\sqrt{3}}{2}R$ E) $1\frac{1}{3}R$

28. (03-7-82) Radiusi 1 ga teng bo'lgan sharga, yasovchi $\sqrt{3}$ ga teng bo'lgan konus ichki chizildi. Shu konus o'q kesimining uchidagi burchakning kattaligini toping.
A) 90^0 B) 30^0 C) 45^0 D) 60^0 E) $arccos\frac{2}{3}$

29. (03-9-56) Sfera balandligi asosining diemetriga teng bo'lgan konus ichki chizilgan. Agar sfera sirtining yuzi 125 ga teng bo'lsa, konus asosining yuzini toping.
A) 10 B) 10π C) 15 D) 20 E) 20π

4.5.5 Aralash bo'lim

1. (97-4-59) Silindr va unga tashqi chizilgan muntazam to'rtburchakli parallelepiped asosining tomoni 4 ga teng. Silindrning hajmini toping.
A) 10π B) 12π C) 16π D) 20π E) 8π

2. (97-4-62) Hajmi 432π ga teng bo'lgan silindrning o'q kesimi kvadratdan iborat. Silindrga ichki chizilgan shar sirtining yuzini toping.
A) 120π B) 134π C) 144π D) 150π E) 124π

3. (98-9-54) Uchburchakli muntazam prizmaga tashqi chizilgan silindr yon sirti yuzining unga ichki chizilgan silindr yon sirti yuziga nisbatini toping.
A) 3 B) 2 C) $1,5$ D) $2,5$ E) $1,2$

4. (00-1-57) Muntazam to'rtburchakli prizmaga silindr ichki chizilgan. Silindr hajmining prizma hajmiga nisbatini toping.
A) $\frac{\pi}{3}$ B) $\frac{\pi}{5}$ C) $\frac{\pi}{4}$ D) $\frac{2\pi}{3}$ E) $\frac{3\pi}{4}$

5. (98-6-58) Qirrasi 12 ga teng kubga konus ichki chizilgan. Agar konusning asosi kubning ostki asosiga ichki chizilgan bo'lsa, uchi esa yuqoridagi asosining markazida yotsa, konusning hajmini toping.
A) 120π B) 132π C) 126π D) 156π E) 144π

6. (98-2-59) Qirrasi 12 ga teng bo'lgan kubga konus ichki chizilgan. Konusning asosi kubning quyi asosiga ichki chizilgan, uchi esa kubning yuqoridagi asosining markazida. Konusning hajmini toping.
A) 120π B) 132π C) 126π D) 156π E) 144π

7. (00-7-49) Muntazam to'rtburchakli prizmaga konus ichki chizilgan. Konusning asosi prizmaning ostki asosida, uchi esa prizma ustki asosining markazida yotadi. Prizma hajmining konus hajmiga nisbatini toping.
A) $\frac{8}{\pi}$ B) $\frac{9}{\pi}$ C) $\frac{12}{\pi}$ D) $\frac{10}{\pi}$ E) $\frac{7}{\pi}$

8. (00-1-56) Muntazam uchburchakli piramidaga konus ichki chizilgan. Agar piramidaning yon yoqlari bilan asosi 60^0 li burchak hosil qilib, piramidaning asosiga ichki chizilgan aylananing radiusi 16 ga bo'lsa, konusning yon sirtini toping.
A) 524π B) 512π C) 536π D) 514π E) 518π

9. (01-1-60) Konus asosining radiusi 2 ga, o'q kesimining uchidagi burchagi 60^0 ga teng. Shu konusga tashqi chizilgan muntazam uchburchakli piramidaning hajmini toping.
A) 12 B) $12\sqrt{3}$ C) $18\sqrt{3}$ D) 6 E) 24

10. (02-6-49) Kubga ichki chizilgan silindrning hajmi unga ichki chizilgan konusning hajmidan π ga ortiq. Kubning hajmini toping.
A) 4 B) 6 C) 8 D) 12 E) 27

11. (03-1-44) Kubga ichki chizilgan silindrning hajmi 2π ga teng. Shu kubga tashqi chizilgan sferaning yuzini toping.
A) 12π B) 18π C) 20π D) 24π E) 27π

12. (03-4-54) Asosining radiusi 6 ga teng bo'lgan silindrga konus ichki chizilgan. Konusning asosi silindrning asosi bilan, uchi esa silindr ustki asosining markazi bilan ustma - ust tushadi. Konusning yon sirti 60π ga teng. Silindrning yon sirtini toping.
A) 92π B) 94π C) 96π D) 98π E) 90π

13. (03-7-83) Kubning ostki asosidagi tomonlarining o'rtalari ketma - ket tutashtirildi. Hosil bo'lgan to'rtburchakning uchlari kub ustki asosining markazi bilan tutashtirildi. Agar kubning qirrasi a ga teng bo'lsa, hosil bo'lgan piramidaning to'la sirtini toping.
A) $\frac{2a^2}{3}$ B) $3a^2$ C) $1,5a^2$ D) $2a^2$ E) $\frac{2a^2\sqrt{3}}{3}$

14. (03-11-50) Balandligi 16 ga, asosining radiusi 12 ga teng bo'lgan konusga balandligi 10 ga teng bo'lgan silindr ichki chizilgan. Silindr asosining radiusini toping.
A) $4,5$ B) 4 C) $4,8$ D) $4,2$ E) 5

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1-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		E	B	D	B	B	C	B	C	B
1	B	C	B	B	A	B	D	C	B	D
2	B	C	B	D	B	E	D	C	D	A
3	B	C	C	E	B	C	B	B	D	C
4	D	C	D	D	C	E	D	C	A	D
5	C	D	D	A	C	C	C	A	D	D
6	D									

3-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	B	C	D	E	B	B	D	B
1	E	D	D	E	E	A	D	C	D	C
2	E	B	B	D	C	B	C	C	A	A
3	C	A	E	C	B	B	D	A	C	C
4	C	E	D	C	B	D	B	E	B	D
5	C	B	B	C	B	E	C	D	C	C
6	B	B	A	B	C	C	D	A	C	B
7	E	B	D	C	D	B	C	E	D	A
8	B	D	C	E	C	A	B	B	D	E
9	E	C	E	B	D	A	C	E	B	D
10	A	C	E	B	A	D	D	C	B	E
11	A	D	B							

6-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	B	A	C	D	E	D	E	B
1	C	D	C	C	D	D	B	D	E	C
2	D	A	E	C	E	A	D	B	C	A
3	E	C	D	C	C	E	B	E	D	A
4	C	E	B	E	C	D	A	C	C	B
5	C	C	A	D	D	C	C	A	D	C
6	B									

7-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	D	C	D	C	A	B	A	B
1	C	A	C	E	B	C	B	A	C	C
2	E	B	A	B	E	C	C	A	B	B
3	C	D	B	E	C	A	C	D	D	C
4	B	D	B	B	A	C	B	B	C	E
5	C	C	B	E	B	C	B	B	C	C
6	C									

9-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	C	B	D	B	E	A	B	D
1	A	E	B	A	D	C	E	A	B	B
2	C	B	A	C	B	A	D	C	E	A
3	C	B	A	C	D	D	A	C	C	E
4	E	E	A	D	B	E	E	A	D	C
5	B	B	D	A	A	C	B	D	D	C
6	C	C	B	B	C	A	C	D	A	B
7	D	B	E	C	E	A	B	B	D	B
8	D	E	A	C	D	E	B	D	B	D
9	C	D	C	E	A	C	D	D	D	D
10	C	E	C	C	C	C				

10-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	B	A	A	B	A	C	C	C
1	C	B	C	E	B	B	C	B	A	B
2	C	B	E	A	E	B	C	C	C	D
3	B	A	C	B	A	B	C	D	C	E
4	D	B	C	A	D	A	B	B	C	C
5	D	B	C	A	D	D				

11-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	D	A	A	C	A	E	A	D
1	B	C	B	A	A	A	B	E	A	C
2	C	B	C	E	D	A	C	B	C	B
3	E	B	A	A	C	A	B	E	B	B
4	A	B	A	B	E	A	C	D	E	A
5	C	E	A	E	E	B	C	A	A	E
6	B									

12-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		E	E	E	B	A	E	D	C	E
1	B	B	C	B	B	C	D	B	E	B
2	D	C	E	C	B	E	D	C	E	B
3	B	B	C	B	C	C	D	E	B	C
4	D	D	A	D	A	C	B	E	A	C
5	C	A	A	E	B	A	D	A	D	D
6	B	C	D	A	E	B	E	D	B	A
7	B	A	D	E	B	C	D	A	B	C
8	D	C	B	B	C	E	A	E	D	C
9	B	E	E	D	B	D	D	B	E	C
10	A	C	B	E	D	A	D	C	A	B
11	C	C								

13-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	D	C	B	E	D	B	A	E
1	A	D	B	C	A	D	B	E	C	A
2	D	A	B	C	E	D	A	A	B	C
3	D	E	C	D	D	A	C	E	C	A
4	D	D	A	A	E	D	A	C	A	E
5	C	D	B	E	D					

1997 yil - Matematika

1-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	C	D	C	B	D	D	C	E
1	E	C	B	C	C	D	B	A	E	E
2	C	B	C	B	B	D	B	E	C	B
3	D	B	C	A	E	D	B	C	D	A
4	C	B	A	C	C	D	B	A	C	E
5	C	C	D	B	E	D	D	B	B	C
6	D	D	E	C	C	D	A	B	A	E
7	D	B	A	B	B	C	D	C		

2-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	D	C	E	C	B	A	D	D
1	C	B	C	E	C	B	D	E	D	A
2	C	D	E	C	A	C	B	E	D	A
3	A	C	D	D	B	E	C	D	C	A
4	E	D	D	C	A	C	A	E	C	B
5	D	A	B	D	D	C	B	C	D	

3-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	E	A	D	C	A	C	D	B
1	C	E	A	E	C	B	C	A	C	A
2	B	C	B	C	C	D	E	B	A	B
3	D	B	C	A	B	A	B	E	C	C
4	D	D	D	B	C	B	C	B	D	D
5	A	D	B	C	C	E	A	A	B	C

4-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	C	B	E	C	E	D	C	A
1	B	D	E	D	C	B	A	B	D	E
2	C	E	E	B	C	B	A	D	E	B
3	C	D	A	E	E	B	D	C	C	E
4	B	B	C	D	E	D	B	A	B	D
5	E	C	E	E	D	B	C	D	E	B
6	A	B	C	C						

5-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	B	D	E	A	D	A	C	E
1	C	B	B	B	C	A	B	A	E	C
2	C	D	B	E	A	C	D	C	C	A
3	C	E	A	B	D	B	B	A	D	D
4	B	B	B	B	D	C	D	B	A	B
5	B	C	C	B	E					

6-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	D	B	C	C	C	A	D	E
1	C	B	D	E	A	C	A	E	E	B
2	D	A	C	B	A	D	C	E	B	A
3	E	A	C	C	A	B	A	D	E	B
4	E	A	B	B	D	A	A	B	E	B
5	C	E	B	B	C	E	B	D	B	C
6	C	C	D	E	D	A	B	B	D	D
7	A	B	C	E	D	D				

7-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		E	E	D	C	A	C	B	C	B
1	C	D	A	C	C	E	A	C	B	E
2	D	D	C	B	C	C	C	B	A	C
3	C	D	C	B	D	B	B	B	D	C
4	D	E	C	C	B	C	B	B	D	B
5	E	C	C	B	D	E	C	D	B	A
6	C	A	A	C	B	A	E			

8-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	B	E	D	C	C	D	A	D
1	C	E	C	D	A	E	A	B	D	D
2	D	E	B	B	C	E	E	D	B	C
3	E	D	C	B	E	A	C	B	C	D
4	A	A	B	D	D	A	E	E	B	B
5	D	E	B	C	D	D	B	A	C	E
6	D									

9-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	D	C	C	B	D	D	A	A
1	B	E	A	D	E	D	C	B	C	E
2	E	A	C	A	C	E	A	A	B	D
3	E	C	B	C	B	B	A	E	B	A
4	C	B	B	E	A	A	D	D	B	C
5	E	D	E	D	B	B	B	A	B	A
6	B	C	B	C	E	A	E	E	B	C
7	B	D	C	E	A	D	B	E	B	B
8	A	D	E	E	A	C	D	E	B	A
9	C	D	A	C	A	B	C	E	A	D
10	B	C	E	D	A	C	D	E	B	C
11	D	D	A	C	E	C	C	D		

10-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	D	C	C	B	C	C	D	E
1	B	B	C	D	B	E	D	D	B	E
2	C	C	B	C	A	D	D	D	A	B
3	B	A	E	C	C	B	D	C	A	B
4	B	D	C	C	B	D	B	C	C	C
5	A	B	A	A	A	D	B	B		

11-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	B	D	B	E	E	A	C	D
1	B	A	B	E	C	B	B	E	E	C
2	B	D	A	D	D	E	D	A	E	D
3	A	B	D	C	E	A	B	A	C	B
4	D	A	B	E	E	B	A	C		

12-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	D	B	E	C	B	E	C	D
1	D	C	E	C	D	A	C	A	D	B
2	E	B	C	B	D	C	B	E	C	D
3	D	C	B	C	E	D	C	E	B	E
4	C	C	D	A	C	E	C	D	E	B
5	C	E	D	C	B	E	D	C	C	B
6	A	C	C	C	B	B	D			

1998 yil - Matematika

1-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	E	B	B	C	D	B	E	C
1	B	D	A	C	C	E	C	A	B	B
2	C	D	C	D	E	E	C	B	A	B
3	E	D	B	D	E	B	C	A	E	A
4	C	E	B	C	A	A	D	C	B	B
5	C	E	A	D	B	D	E	A	E	E
6	C									

2-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		E	C	D	B	C	A	D	E	B
1	C	B	D	E	B	D	C	E	B	C
2	B	A	E	E	C	E	D	B	B	C
3	C	C	D	E	D	C	D	B	E	D
4	B	C	D	A	B	E	B	D	C	D
5	A	C	B	B	D	C	E	B	C	E

3-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	D	E	E	B	D	E	B	D
1	B	C	A	C	C	D	D	E	C	C
2	D	C	B	D	C	B	B	B	C	C
3	C	D	D	C	E	D	C	D	B	A
4	D	C	A	D	E	C	C	A	A	C
5	B	B	B	A	B	E	D	D	C	A
6	A									

4-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	B	C	D	E	E	D	C	B
1	A	B	E	A	C	D	E	E	C	B
2	A	A	B	C	D	E	E	D	C	B
3	A	A	B	C	D	E	A	D	C	B
4	A	A	B	C	D	D	A	D		

5-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	A	C	B	D	A	B	B	E
1	A	E	C	C	B	D	A	E	D	C
2	A	B	A	D	B	C	B	A	D	B
3	A	E	C	C	D	E	B	C	B	A
4	D	E	B	B	B	A	D	A	B	C
5	B	E	D	C	B	A				

6-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	B	C	D	E	E	D	C	B
1	A	E	D	A	C	B	A	E	B	C
2	E	A	C	A	C	B	D	A	A	E
3	A	C	B	A	E	E	B	D	A	A
4	E	C	B	A	C	D	A	E	B	D
5	A	A	E	D	C	A	B	C	E	

7-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	D	C	E	E	C	A	D	B
1	C	D	B	B	C	A	A	E	D	B
2	A	D	C	E	C	E	A	E	C	D
3	A	C	D	D	D	D	E	B	A	D
4	B	C	D	E	A	E	B	A	C	E
5	A	E	D	C	E					

8-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	D	A	C	C	D	E	D	B
1	C	B	C	D	E	D	D	B	A	B
2	C	B	D	C	E	D	C	E	D	A
3	C	E	B	C	D	D	B	A	C	D
4	A	B	A	D	B	C	C	A	C	E
5	E	C	E	B	B	E	A	C	B	A
6	C	C	B	A						

9-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	C	A	B	C	A	C	D	B
1	E	D	C	A	B	E	D	C	C	B
2	A	D	C	C	A	B	B	E	E	C
3	D	E	C	B	D	E	D	D	B	A
4	E	D	C	D	C	E	D	A	E	B
5	D	C	E	C	B	D	C	C		

10-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	C	A	E	D	B	C	C	D
1	B	E	B	D	E	C	E	D	C	A
2	C	E	C	D	B	D	E	B	C	D
3	C	E	B	E	C	D	B	D	D	C
4	E	B	E	B	C	D	E	D	C	A
5	A	B	E	A	E	A	C	A	B	C
6	C	E	A	C	C	C	A	C	B	C
7	C	B	D	C	A	B	E	D	E	A
8	B	B	C	D	D	C	E	D	D	C
9	A	E	B	C	C	E	C	E	E	C
10	D	B	A	E	C	A				

11-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	C	A	C	B	B	A	A	C
1	D	D	C	C	C	A	D	E	B	E
2	B	C	E	E	D	C	A	B	B	C
3	B	A	A	D	E	C	D	B	B	C
4	D	A	D	B	B	A	A	C	C	E
5	B	A	B	E	A	E	A	C	E	A
6	A	D	A	B	C	D	D	A	A	B
7	A	E	A	D	B	D	A	A	A	D
8	A	E	A	D	A	D	A	B	E	E
9	B	A	D	D	A	A	B	A	E	A
10	A	D	A	A	A	E				

12-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	C	A	A	A	A
1	A	C	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	B	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A
5	A	A	A	A	A	A	A	A	A	A
6	A	C	E	A	A	A	E	C	D	A
7	C	D	E	A	B	A	A	C	A	A
8	C	E	C	B	E	A	B	E	A	B
9	B	A	C	D	A	C	A	E	A	C
10	A	C	A	C	A	D	A	B		

1999 yil - Matematika

1-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	B	A	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	C
5	A									

2-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	B	C	E	E	B	C	D	B
1	D	C	A	C	D	D	C	D	D	C
2	E	D	A	B	C	C	E	E	B	C
3	E	C	E	D	C	B	D	D	B	D
4	D	B	C	D	E	C	E	C	B	C
5	D	A	D	B	C	D	C			

3-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	C	C	B	D	A	E	D	D
1	D	B	D	C	A	B	A	E	C	C
2	B	A	E	B	D	C	D	E	D	D
3	D	E	A	D	D	C	E	B	C	E
4	A	D	D	B	C	C	A	B	A	A
5	B	D	D	A	B	B	A	E	A	C
6	E									

4-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	E	A	C	B	D	C	A	C
1	E	B	B	C	E	D	E	A	D	E
2	A	B	C	D	C	B	B	C	A	D
3	B	E	D	C	B	B	A	B	D	C
4	C	D	E	E	D	B	A	B	C	C
5	C	B	E	D	B	C	C			

5-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	E	D	A	C	C	D	D	B
1	D	D	B	D	D	E	C	E	D	E
2	D	C	B	D	D	B	D	A	D	D
3	E	B	B	A	C	E	C	C	B	B
4	C	C	D	B	B	D	E	B	C	A
5	B	B	D	D	B	C	D	E		

6-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	B	A	C	E	D	B	C	D
1	E	A	A	A	A	A	A	E	A	A
2	B	A	E	A	D	A	D	C	D	A
3	A	A	A	D	A	E	A	A	E	A
4	D	A	A	A	C	A	A	D	A	E
5	E	C	A	E	A	A	A	B	A	A

7-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	D	B	C	E	A	A	D	E
1	C	A	B	E	D	E	A	C	D	E
2	C	B	A	D	E	A	B	D	B	D
3	A	D	A	C	E	D	A	E	D	D
4	C	D	E	B	B	C	D	E	A	B

8-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	E	A	C	E	A	C	A	A
1	D	C	A	A	A	A	A	A	B	A
2	E	A	A	A	A	E	D	A	A	A
3	C	D	B	A	A	A	D	C	A	A
4	A	A	E	A	A	D	A	A	C	A
5	C	B	B	A	E	A	B	A	A	E
6	C	A	A	A	A	A	A	A	A	A
7	A	A	A	A	A	A	E	B	D	D
8	E									

9-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	D	B	E	C	E	C	E	C
1	A	C	D	B	D	C	C	D	B	D
2	B	E	A	C	E	D	B	C	E	C
3	C	A	E	B	D	D	E	C	A	D
4	D	E	D	D	E	D	B	B	D	C
5	E	B	C							

10-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	A	E	D	D	B	B	C	B
1	D	B	C	E	B	C	D	B	C	C
2	E	D	C	D	E	C	D	E	C	A
3	E	D	E	E	C	E	B	C	E	D
4	B	D	A	B	C	C	E	E	B	C

2000 yil - Matematika

1-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	E	D	C	E	B	A	C	A
1	B	B	D	C	E	C	A	E	C	B
2	B	D	E	D	A	E	A	A	C	E
3	C	C	D	B	D	D	E	C	C	B
4	B	C	D	C	E	A	C	D	C	D
5	B	E	A	D	E	C	B	C	D	E

2-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	C	B	E	D	A	D	A	E
1	A	B	D	A	D	E	A	C	A	A
2	C	D	C	E	A	C	A	B	A	E
3	A	A	C	A	A	E	A	C	D	A
4	C	C	A	B	A	A	A	A	A	

3-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	E	D	D	D	D	D	C	C
1	B	B	A	D	E	D	E	A	E	D
2	E	C	E	D	E	A	D	E	C	A
3	C	D	E	C	A	A	B	A	B	A
4	E	D	C	E	D	D	B	E	A	D
5	C	C	D	E	C	E	E	A	B	C
6	D	B	B	C	E	D	A	C	B	A
7	C	D	E	D	E	A	B	B	C	C
8	D	C	E	E	D					

4-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	E	B	B	C	B	A	E	C
1	D	D	E	C	E	D	C	E	C	A
2	D	D	C	A	E	C	E	E	E	C
3	C	C	B	D	E	B	D	A	C	C
4	D	C	C	B	C	C	A	E	A	B
5	A	D	D	B	C					

5-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	B	B	A	D	D	C	B	D
1	A	E	A	C	C	B	B	C	A	E
2	C	A	B	E	D	C	B	A	C	D
3	A	A	C	B	A	E	C	D	C	C
4	A	B	D	C	E	D	C	B	A	D
5	E	C	E	B	A	E	C	B	D	B
6	A	D	C	B	E	E	B	C	D	E
7	E	B								

6-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	D	E	D	E	C	A	B	E
1	E	A	B	A	D	C	C	C	C	B
2	E	B	A	A	E	C	E	D	E	C
3	C	E	A	D	B	C	E	A	E	C
4	E	E	A	C	B	B	E	C	B	A
5	B	E	E	B	D	C	E			

7-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	D	E	D	B	D	A	B	C
1	C	C	C	B	E	D	B	C	E	E
2	D	D	C	D	C	A	B	E	D	A
3	B	D	E	B	C	D	B	C	E	A
4	C	D	B	A	E	D	D	B	C	C
5	D	B	B							

8-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	A	A	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A
5	A	B	E	B	B	A	C	E	D	A
6	A	C	B	B	A	E	E	E	A	A

9-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	E	E	D	D	D	D	E	E
1	A	A	C	C	B	E	D	C	B	D
2	E	A	B	D	B	D	C	A	E	C
3	C	E	C	A	E	E	C	A	C	C
4	C	B	C	B	D	D	D	B	C	C
5	A	D	C	E	C	B	E	E	A	C
6	C	B	B	B	C	A	D	C		

10-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	B	E	E	E	A	D	D	E
1	C	B	B	C	C	E	C	A	E	D
2	D	E	C	D	C	C	C	A	A	D
3	A	B	A	A	C	A	E	B	C	D
4	C	A	B	B	C	B	B	B	A	B
5	A	E	A	C	E	C	A	E	A	A
6	A	E	A	A	E	E	A	A	A	A
7	A	A	A	A	C	A	A	D	A	A
8	A	A	A							

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1-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	C	D	E	A	C	E	D	D
1	D	D	D	E	D	B	C	C	B	D
2	E	B	D	B	E	E	E	B	C	B
3	C	B	A	C	B	E	D	A	A	D
4	C	E	C	B	A	D	A	E	B	A
5	C	B	C	C	D	B	E	B	A	C
6	E	E	D	B	D	D	B	B	D	C
7	E	D	A							

2-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	E	B	D	E	C	B	D	B
1	C	E	B	D	D	D	E	C	E	C
2	B	C	A	E	B	C	B	D	D	A
3	D	B	C	B	E	A	C	E	B	C
4	D	A	E	C	D	B	D	B	A	C
5	E	B	D	A	C	E	C	D	B	E
6	D	C	C	D	D	C	A	B	D	E
7	A	D	D	E	B	D	B	A	B	B
8	E	E	E	D	E	C	C	C		

3-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	E	C	A	E	B	A	D	B
1	C	E	A	E	C	D	C	A	D	A
2	D	C	B	B	D	B	C	C	A	B
3	E	B	A	C	C	B	D	A	A	B
4	C	A	B	C						

4-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	D	C	A	C	D	B	C
1	B	D	C	B	D	D	A	D	D	D
2	E	A	A	C	D	E	B	A	B	B
3	A	A	C	A	A	B				

5-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	A	A	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A

6-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		E	B	B	E	D	E	C	B	C
1	D	E	B	B	D	A	C	B	C	C
2	E	C	A	D	B	C	E	B	E	E
3	C	C	C	B	C	D	E	D	D	D
4	C	D	E	B	B	D	A	D	D	C
5	B	C	B	A	C	D				

7-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	E	C	E	C	E	D	D	B
1	E	D	C	B	E	D	D	D	B	E
2	D	E	C	C	B	D	E	C	A	E
3	D	C	B	D	E	B	E	C	B	D
4	C	A	B	D	E	C	A	D	E	E
5	D	B	A	B	E	B	D	A	D	

8-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	D	B	B	A	D	C	B	C
1	E	C	D	E	B	D	B	A	A	E
2	E	E	D	C	D	A	A	B	C	E
3	E	E	D	C	B	B	A	C	B	C
4	E	E	B	B	B	E	D	A	C	D
5	A	A	D	E	C	B	A	D		

9-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	A	A	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	C	C	C
3	A	B	E	A	E	C	E	B	D	E
4	B	B	E	A	B	E	A	E	C	D
5	C	D	C	D	E	D	C			

10-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	E	C	C	C	D	E	E	E
1	C	C	C	E	B	C	C	E	D	C
2	B	D	B	D	B	D	A	A	D	B
3	E	D	B	C	C	C	A	C	B	E
4	C	E	B	E	C	C	A	D	B	B
5	A	C	B							

11-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	D	B	D	E	B	C	D	D
1	C	E	D	C	D	B	A	E	D	E
2	C	C	B	E	D	C	E	E	B	D
3	E	E	C	D	E	B	C	A	E	A
4	C	D	B	B	D	E	C	A	E	D
5	E	B	E	D	C	D				

12-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	D	A	B	D	C	E	A	E
1	E	B	C	C	A	C	A	C	E	D
2	B	B	A	E	E	B	C	D	A	D
3	E	C	B	D	C	B	A	C	C	C
4	D	E	B	C	D	C	D	B	B	A
5	B	E	B	A	B	B				

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1-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	B	A	A	A	C	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	C	C
3	A	B	B	C	D	A	E	C	E	C
4	D	B	B	D	A	A	E	B	E	A
5	D	E	E	B	E	D	D	B	A	E
6	D	E	E	A	C	D	E	B	D	C
7	D	C	C	C	A	C	B			

2-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	A	A	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A
5	A	A	A	A	A	A	A	A	A	A
6	A	A	A	A						

3-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	A	A	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A
5	A	A	A	A	A	A	A	A	A	A
6	A	A	A	A	A	A	A	A	A	A
7	A	A	A	C	A	A	A	A	A	A
8	A	A								

4-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	B	D	B	B	D	C	B	A
1	B	C	E	C	C	B	C	D	C	E
2	B	C	B	B	C	C	C	B	D	C
3	D	B	C	B	C	C	C	B	B	E
4	D	B	D	E	B	D	A	A	B	B
5	C	B	E							

5-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	C	B	B	D	D	B	C	A
1	E	E	C	D	A	A	D	D	D	D
2	C	B	C	A	A	D	E	C	D	A
3	E	B	E	E	B	D	A	D	C	C
3	D	E	C	B	C	E	A	C	B	C
4	B	B	C	C						

6-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	A	D	B
1	B	D	D	D	B	C	C	B	C	A
2	C	E	E	C	D	B	A	C	B	D
3	C	A	D	D	B	B	D	C	B	A
4	D	A	C	E	E	A	E	D	E	B
5	B	D	D	C	C	E				

7-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	C	A	A	A	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A
5	A	A	A	A	A	A	A			

8-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	B	A	A	A	A	A	A	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A							

9-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	B	B	A	D	B	D
1	A	D	C	C	B	B	D	B	C	E
2	B	D	C	C	D	C	A	E	B	B
3	B	A	A	D	B	B	B	A	E	A
4	B	D	C	C	A	A	B	B	D	B
5	D	D	D	E	E	E	B	D	E	E
6	C									

10-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	A	D	A
1	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	D	A	A
5	A	A	A	A	A	A	A	A	A	A
6	A	A	A	A	A	A	A	A	A	A
7	A	A	A	A	A	A	A	A	A	A
8	A									

11-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	D	C	B	D	D	E	E	E
1	A	A	D	B	E	C	D	D	D	A
2	D	B	B	A	B	B	E	A	C	E
3	D	C	E	D	D	E	D	B	C	E
4	C	C	E	D	B	E	A	D	B	D
5	A	C	E	C	E	D	A	B	E	B
6	C	B	D	D						

12-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	A	B	E	C	C	A	E	E
1	C	A	B	C	A	B	E	D	C	B
2	C	E	B	B	C	D	D	B	E	D
3	B	E	D	C	C	B	E	D	B	A
4	C	B	D	C	A	C	D	D	E	D
5	B	E	E	A	A	B	C	E	D	C
6	B	C	A	A	E					

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1-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		E	E	B	C	A	B	D	D	B
1	C	B	A	B	E	E	C	D	E	B
2	E	D	E	C	E	A	D	E	D	C
3	E	E	B	D	E	D	A	B	B	D
4	A	D	A	B	A	A	C	C	C	B
5	D	E	B	E	E	D	C	D	C	A
6	D	B	D	C	E	A	C	C	B	C
7	D									

2-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	B	C	D	E	B	E	A	A
1	E	C	C	A	C	D	A	C	B	E
2	C	D	B	D	E	E	C	D	E	B
3	A	B	B	E	C	B	D	A	C	D
4	C	C	C	B	C	D	E	B	C	E
5	A	D	B	E	E	B	D	E	D	B
6	D	A	B	E	C	B	C	C	A	D

3-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		D	A	E	B	B	B	C	E	E
1	C	A	D	C	C	B	C	C	D	D
2	C	B	C	C	D	B	E	D	E	D
3	C	C	D	C	B	D	C	E	E	B
4	D	A	C	E	A	D	E	A	D	B
5	D	E	B	A	C	D	E	E	C	B
6	C									

4-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	D	D	E	D	B	C	E	C
1	D	D	B	E	C	E	D	B	C	B
2	D	A	B	D	B	C	E	B	B	D
3	C	E	C	B	C	B	C	C	C	C
4	D	E	B	C	C	C	D	C	B	C
5	B	D	E	D	C	E				

5-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	B	A	A	A	A	A	A	A
1	A	A	A	A	A	A	A	A	E	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A
5	A	A	A	A	A	A	A	A	A	A
6	A	A	A	A						

6-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	C	D	A	B	C	B	D
1	C	B	D	E	E	C	E	B	A	C
2	B	C	E	E	E	B	D	D	C	B
3	D	B	D	A	D	B	C	C	D	B
4	E	E	B	D	D	B	C	C	C	B
5	E	D	A	D	B	E	D	B	C	D
6	A	C	E	E	B	D	C	C	B	E
7	C	B	A	C	E	A	D	E	A	B
8	D	C	E	D						

7-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	C	C	B	E	B	E	B	C
1	E	B	B	A	E	B	A	C	A	B
2	E	C	C	D	D	B	B	C	E	D
3	A	E	E	D	C	D	D	A	A	A
4	E	B	A	D	D	C	A	E	E	C
5	B	D	A	C	D	B	C	D	D	E
6	B	C	A	A	D	E	E	D	D	E
7	B	E	A	E	C	C	D	B	C	C
8	A	A	D	D	B	A				

8-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	C	B	C	D	B	C	B	A
1	E	B	C	B	D	E	D	E	C	D
2	A	A	A	A	A	A	A	A	E	A
3	A	A	A	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A
5	A	A	A	A	A	A	A	A	A	A
6	A									

9-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		C	B	E	A	D	D	B	E	C
1	B	C	A	B	C	C	D	B	B	D
2	B	A	C	D	C	C	D	E	E	D
3	E	C	D	C	D	C	A	B	A	C
4	D	C	A	E	E	C	B	A	B	E
5	C	D	E	E	D	B	D	C	C	C
6	A	A	A	A	A	A	A			

10-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	A	A	A
1	A	A	A	A	A	A	B	D	C	B
2	D	B	D	B	A	D	B	D	C	B
3	A	A	D	D	E	C	B	E	B	D
4	E	E	A	C	E	C	C	C	A	C
5	D	D	C	E	A	E	C	B	E	A
6	C	B	A	D	B					

11-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		A	A	A	A	A	A	A	A	A
1	A	A	A	E	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	D	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A
5	A	A	A	B	C	A	D	B	D	A
6	E	B	C	B	C	E	A	B	C	E
7	A	C	C	B	D	C	B	A	E	E
8	C	C	D	E						

12-axborotnoma

	0	1	2	3	4	5	6	7	8	9
0		B	D	C	D	A	C	A	A	D
1	C	C	B	A	E	B	D	C	E	B
2	D	B	B	E	D	B	C	C	C	D
3	B	C	A	E	A	E	B	C	C	D
4	B	D	A	E	C	B	E	B	B	C
5	C	C	B	A	A	C	D	E	E	E
6	C	D	D	C	E	A	E	E	E	C
7	A	D	A	D	A	D	C	E	D	E
8	D	B	E	C	B	D	A			