MATEMATIKA

1. Ifodaning qiymatini toping:
$$\frac{\left(\sqrt{5}-\sqrt{11}\right)\left(\sqrt{33}+\sqrt{15}-\sqrt{22}-\sqrt{10}\right)}{\sqrt{75}-\sqrt{50}}.$$

$A) -1,2$ $B) -2,4$ $C)1,2$ $D)2,4$

Yechim:
$$\frac{\left(\sqrt{5}-\sqrt{11}\right)\left(\sqrt{3}(\sqrt{11}+\sqrt{5})-\sqrt{2}(\sqrt{11}+\sqrt{5})\right)}{5(\sqrt{3}-\sqrt{2})}$$
$$\frac{\left(\sqrt{5}-\sqrt{11}\right)\left(\sqrt{11}+\sqrt{5}\right)\left(\sqrt{3}-\sqrt{2}\right)}{5(\sqrt{3}-\sqrt{2})}=\frac{5-11}{5}$$
$$=-1,2$$

Javob:A

2. Uch yashikda 64,2 kg meva bor. 2-yashikdagi meva 1-yashikdagi mevaning 0,8 qismini tashkil qiladi, 3-yashikda esa 2-yashikdagining 42,5 % miqdoricha meva bor. Birinchi yashikda qancha meva bor?

$A)36\,kg$ $B)30\,kg$ $C)28\,kg$ $D)24\,kg$

Yechim:
$$\begin{cases} a+b+c=64,2 \\ b=0,8a \\ c=0,425b \end{cases} \Rightarrow a+0,8a+0,425\cdot0,8a=64,2$$
$$a=30$$

Javob:B

3. Uchta sonning uchinchisi ikkinchisidan nechta ortiq bo'lsa, ikkinchisi birinchisidan shuncha ortiq. Bu sonlardan ikkita kichigining ko'paytmasi 85, ikkita kattasining ko'paytmasi 115 ekanligi ma'lum. Shu uchta sondan ikkinchisini toping.

$A)10,5$ $B)9,5$ $C)11$ $D)10$

Yechim:
$$+\begin{cases} a_1a_2=85 \\ a_2a_3=115 \end{cases} \Rightarrow a_1a_2+a_2a_3=200$$
$$a_2(a_1+a_3)=200$$
$$a_2\cdot 2a_2=200$$
$$a_2=10$$

Javob:D

4. Tenglamani yeching: $(a\neq 1)$
$$1+a+a^2+a^3+\cdots+a^{x-1}+a^x=$$
$$(1+a)(1+a^2)(1+a^4)(1+a^8).$$

$A)14$ $B)15$ $C)16$ $D)17$

Yechim:
$$\frac{1\cdot(a^{x+1}-1)}{a-1}=(1+a)(1+a^2)(1+a^4)(1+a^8)$$
$$(a^{x+1}-1)=(a-1)(1+a)(1+a^2)(1+a^4)(1+a^8)$$
$$(a^{x+1}-1)=(a^{16}-1)$$
$$x+1=16$$
$$x=15$$

Javob:B

5. Arifmetik progressiyada $a_{19}=9a_{11}$ bo'lsa, uning dastlabki o'n to'qqizta hadi yig'indisini toping.

$A)4$ $B)38$ $C)0$ $D)19$

Yechim:
$$a_{11}+8d=9a_{11}$$
$$d=a_{11}$$
$$a_1=a_{11}-10d=-9d$$
$$\frac{a_1+a_{19}}{2}\cdot 19=\frac{-9d+9d}{2}\cdot 19=0$$

Javob:C

6. 1,2,2,3,3,3,4,4,4,4,5,5,5,5,5,6, ... kamaymaydigan sonlar ketma-ketligida har bir son o'zining qiymati necha bo'lsa, shuncha marta takrorlanadi. Bu ketma-ketlikda 2017-o'rinda turgan sonni toping.

$A)65$ $B)62$ $C)63$ $D)64$

Yechim:
Ushbu qatorda kelgan bir xil sonlarning soni arifmetik progressiyani tashkil etadi:
$$1;2;3;4;5;6;\ldots;n, \qquad n\in N$$
$$\frac{1+n}{2}\cdot n=2017$$
$$n^2+n-4034=0$$
$$n>63\Rightarrow n=64$$

Javob:D

7. Arifmetik progressiyada $a_7+a_{13}=34$ va $a_5+a_7=18$ bo'lsa, a_{19} ni toping.

$A)39$ $B)37$ $C)33$ $D)35$

Yechim:
$$-\begin{cases} a_7+a_{13}=34 \\ a_5+a_7=18 \end{cases} \Rightarrow 8d=16\Rightarrow d=2$$
$$a_7+a_{13}=2a_{10}=34\Rightarrow a_{10}=17$$
$$a_{19}=a_{10}+9d=17+18=35$$

Javob:D

8. Agar geometrik progressiyada $b_5-b_1=18$ va $b_3-b_1=12$ bo'lsa, b_{11} ni toping.

$A) -\dfrac{16}{27}$ $B) -\dfrac{4}{94}$ $C) -\dfrac{3}{4}$ $D) -\dfrac{3}{8}$

Yechim:
$$\begin{cases} b_5-b_1=18 \\ b_3-b_1=12 \end{cases} \Rightarrow \begin{cases} b_1(q^4-1)=18 \\ b_1(q^2-1)=12 \end{cases}$$
$$\Rightarrow q^2+1=\frac{3}{2}\Rightarrow q^2=\frac{1}{2}\Rightarrow b_1=-24$$
$$b_{11}=b_1q^{10}=-24\cdot\frac{1}{32}=-\frac{3}{4}$$

Javob:C

9. $sinx + \sqrt{3}cosx = 1$ tenglamaning $(-\pi; \pi)$ intervalga tegishli ildizlari yig'indisini toping.

$A)90°$ $B)120°$ $C)135°$ $D)60°$

Yechim:

$sinx + \sqrt{3}cosx = 1$

$2sin\left(x + \frac{\pi}{3}\right) = 1$

$sin\left(x + \frac{\pi}{3}\right) = \frac{1}{2}$

$x + \frac{\pi}{3} = (-1)^n\frac{\pi}{6} + n\pi, n\epsilon Z$

$x = (-1)^n\frac{\pi}{6} - \frac{\pi}{3} + n\pi, n\epsilon Z$

$x = -30°; 90°$

$-30° + 90° = 60°$

Javob:D

10. Hisoblang: $2arcsin\left(-\frac{\sqrt{3}}{2}\right) + arcctg(-1) + arccos\frac{1}{\sqrt{2}} + \frac{1}{2}arccos(-1)$.

$A)\frac{5\pi}{12}$ $B)\frac{5\pi}{3}$ $C)\frac{11\pi}{12}$ $D)\frac{5\pi}{6}$

Yechim:

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

Javob:D

11. Hisoblang: $sin\left(\frac{1}{2}arcsin\left(-\frac{2\sqrt{2}}{3}\right)\right)$.

$A) -\sqrt{3}$ $B)\sqrt{3}$ $C) -\frac{1}{\sqrt{3}}$ $D)\frac{1}{\sqrt{3}}$

Yechim:

$$sin\left(\frac{1}{2}arcsin\left(-\frac{2\sqrt{2}}{3}\right)\right) =$$

$$-\sqrt{\frac{1 - \sqrt{1 - \left(-\frac{2\sqrt{2}}{3}\right)^2}}{2}} = -\frac{1}{\sqrt{3}}$$

Javob:C

12. $\frac{\left|log_{0,5}(tg\frac{\pi}{3})\right|}{log_{0,5}(tg\frac{\pi}{3})} + \frac{3\cdot\left|3\sqrt{3}-2\sqrt{7}\right|}{3\sqrt{3}-2\sqrt{7}} + \frac{9\cdot\left|arccos(-0,5)-\frac{\pi}{2}\right|}{arccos(-0,5)-\frac{\pi}{2}}$ ifodaning qiymatini toping.

$A)10$ $B)4$ $C)5$ $D)6$

Yechim:

$\frac{\left|log_{0,5}(tg\frac{\pi}{3})\right|}{log_{0,5}(tg\frac{\pi}{3})} = \frac{-log_{0,5}(tg\frac{\pi}{3})}{log_{0,5}(tg\frac{\pi}{3})} = -1$

$\frac{3\cdot\left|3\sqrt{3}-2\sqrt{7}\right|}{3\sqrt{3}-2\sqrt{7}} = \frac{3(2\sqrt{7}-3\sqrt{3})}{3\sqrt{3}-2\sqrt{7}} = -3$

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$\frac{9\cdot\left|arccos(-0,5)-\frac{\pi}{2}\right|}{arccos(-0,5)-\frac{\pi}{2}} =$

$\frac{9(arccos(-0,5)-\frac{\pi}{2})}{arccos(-0,5)-\frac{\pi}{2}} = 9$

$-1 + (-3) + 9 = 5$

Javob:C

13. Ifodani soddalashtiring:

$$\frac{1 - sin^2\alpha}{1 - cos^2\alpha} + tg\alpha \cdot ctg\alpha.$$

$A)sin^2\alpha$ $B)cos^2\alpha$ $C)\frac{1}{cos^2\alpha}$ $D)\frac{1}{sin^2\alpha}$

Yechim:

$\frac{1 - sin^2\alpha}{1 - cos^2\alpha} + 1 = \frac{1 - sin^2\alpha + 1 - cos^2\alpha}{1 - cos^2\alpha}$

$$= \frac{sin^2\alpha + cos^2\alpha}{sin^2\alpha} = \frac{1}{sin^2\alpha}$$

Javob:D

14. Agar $sinx = \frac{1}{2}$ bo'lsa, $6,8 + 2cos^2x$ ifodaning qiymatini toping.

$A)6,8$ $B)7,8$ $C)8,3$ $D)9,3$

Yechim:

$$sinx = \frac{1}{2} \Rightarrow cosx = \pm\frac{\sqrt{3}}{2}$$

$$6,8 + 2cos^2x = 6,8 + 2\cdot\frac{3}{4} = 8,3$$

Javob:C

15. Ifodani soddalashtiring:

$$cos^4\alpha + sin^2\alpha \cdot cos^2\alpha$$

$A)cos2\alpha$ $B)2sin^2\alpha$ $C)cos^4\alpha$ $D)cos^2\alpha$

Yechim:

$$cos^2\alpha(cos^2\alpha + sin^2\alpha) = cos^2\alpha$$

Javob:D

16. Agar $12 \cdot sin5° \cdot cos5° \cdot cos10° = m$ tenglik bajarilsa, $tg70°$ ni m orqali ifodalang.

$A)\frac{\sqrt{9-m^2}}{3}$ $B)\frac{\sqrt{9-m^2}}{9m}$ $C)\frac{\sqrt{9-m^2}}{m}$ $D)\frac{\sqrt{3-m^2}}{m}$

Yechim:

$$6 \cdot 2sin5° \cdot cos5° \cdot cos10° = m$$

$$3 \cdot 2sin10° \cdot cos10° = m$$

$$3 \cdot sin20° = m$$

$$sin20° = \frac{m}{3}$$

$$tg70° = ctg20° = \frac{cos20°}{sin20°} = \frac{\sqrt{1 - sin^220°}}{sin20°}$$

$$= \frac{\sqrt{1 - \frac{m^2}{9}}}{\frac{m}{3}} = \frac{\sqrt{9 - m^2}}{m}$$

Javob:C

17. Ifodani soddalashtiring:
$$sin\alpha + \sin\left(\alpha + \frac{2\pi}{3}\right) + \sin\left(\alpha + \frac{4\pi}{3}\right).$$
A)1   **B)0**   C)$1 + sin\alpha$ D)$sin\alpha$
Yechim:
$$\sin\left(\alpha + \frac{2\pi}{3}\right) + \sin\left(\alpha + \frac{4\pi}{3}\right) = -2sin\alpha cos\frac{\pi}{3}$$
$$= -sin\alpha$$
$$sin\alpha + (-sin\alpha) = 0$$
Javob:B

18. Ifodani soddalashtiring:
$$(2(sin\alpha)^{-1} + 2(tg\alpha)^{-1}):(tg\frac{\alpha}{2})^{-1}.$$
A)$tg\frac{\alpha}{2}$ B)4   C)$ctg\frac{\alpha}{2}$ **D)2**
Yechim:
$$\left(\frac{2}{sin\alpha} + \frac{2cos\alpha}{sin\alpha}\right) = \frac{2(1 + cos\alpha)}{sin\alpha}$$
$$= \frac{4cos^2\frac{\alpha}{2}}{2sin\frac{\alpha}{2}cos\frac{\alpha}{2}} = \frac{2cos\frac{\alpha}{2}}{sin\frac{\alpha}{2}}$$
$$(tg\frac{\alpha}{2})^{-1} = ctg\frac{\alpha}{2}$$
$$\frac{2cos\frac{\alpha}{2}}{sin\frac{\alpha}{2}}:ctg\frac{\alpha}{2} = 2$$
Javob:D

19. Ifodani soddalashtiring:
$$((sin\alpha)^{-1} + (tg\alpha)^{-1}):(tg\frac{\alpha}{2})^{-1}.$$
A)$tg\frac{\alpha}{2}$ **B)1**   C)2   D)$tg^2\frac{\alpha}{2}$
Yechim:
$$\left(\frac{1}{sin\alpha} + \frac{cos\alpha}{sin\alpha}\right) = \frac{(1 + cos\alpha)}{sin\alpha} = \frac{2cos^2\frac{\alpha}{2}}{2sin\frac{\alpha}{2}cos\frac{\alpha}{2}}$$
$$= \frac{cos\frac{\alpha}{2}}{sin\frac{\alpha}{2}}$$
$$(tg\frac{\alpha}{2})^{-1} = ctg\frac{\alpha}{2}$$
$$\frac{cos\frac{\alpha}{2}}{sin\frac{\alpha}{2}}:ctg\frac{\alpha}{2} = 1$$
Javob:B

20. Ifodani soddalashtiring:
$$\frac{1}{2}(cos\alpha - cos\beta)^2 + \frac{1}{2}(sin\alpha - sin\beta)^2$$
$$- 2sin^2\frac{\alpha - \beta}{2}.$$
A)$4sin^2\frac{\alpha - \beta}{2}$ B)1   C)$4sin\frac{\alpha - \beta}{2}$ **D)0**
Yechim:

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$$\frac{1}{2}(cos\alpha - cos\beta)^2 + \frac{1}{2}(sin\alpha - sin\beta)^2 =$$
$$\frac{1}{2}(cos^2\alpha - 2cos\alpha cos\beta + cos^2\beta +$$
$$sin^2\alpha - 2sin\alpha sin\beta + sin^2\beta) =$$
$$\frac{1}{2}(2 - 2\cos(\alpha - \beta)) =$$
$$1 - \cos(\alpha - \beta) = 2sin^2\frac{\alpha - \beta}{2}$$
$$2sin^2\frac{\alpha - \beta}{2} - 2sin^2\frac{\alpha - \beta}{2} = 0$$
Javob:D

21. Ifodani soddalashtiring:
$$5 - ((cos\alpha - cos\beta)^2 + (sin\alpha - sin\beta)^2):$$
$$(2sin^2\frac{\alpha - \beta}{2})$$
A)$sin^2\frac{\alpha - \beta}{2}$ **B)3**   C)$2sin^2\frac{\alpha - \beta}{2}$ D)2
Yechim:
$$cos^2\alpha - 2cos\alpha cos\beta + cos^2\beta + sin^2\alpha$$
$$-2sin\alpha sin\beta + sin^2\beta = 2 - 2\cos(\alpha - \beta) =$$
$$= 4sin^2\frac{\alpha - \beta}{2}$$
$$4sin^2\frac{\alpha - \beta}{2}:2sin^2\frac{\alpha - \beta}{2} = 2$$
$$5 - 2 = 3$$
Javob:B

22. Agar $a = 8$ bo'lsa,   ifodani soddalashtiring:
$$\frac{\left(25^{\frac{1}{2log_{49}25}} + 2log_2log_2log_2a^{2log_a4}\right) \cdot 4^{-\frac{2}{log_34}} - a^2}{1 - a}$$
A)10   B)8   **C)9**   D)4,5
Yechim:
$$25^{\frac{1}{2log_{49}25}} = 25^{\frac{log_{25}49}{2}} = 49^{\frac{log_{25}25}{2}} = 7$$
$$2log_2log_2log_2a^{log_a16} = 2log_2log_2log_216 =$$
$$2log_2log_24 = 2log_22 = 2$$
$$4^{-\frac{2}{log_34}} = 4^{-2log_43} = 3^{-2log_44} = \frac{1}{9}$$
$$\frac{(7 + 2) \cdot \frac{1}{9} - 64}{1 - 8} = 9$$

23. Ifodani soddalashtiring:
$$\frac{1 - log_a^3b}{(log_ab + log_ba + 1) \cdot log_a\frac{a}{b}} \cdot log_ba.$$
A)3   B)0   C)2   **D)1**
Yechim:
$$(1 - log_a^3b) \cdot log_ba = (1 - log_ab)$$
$$(1 + log_ab + log_a^2b) \cdot log_ba =$$
$$log_a\frac{a}{b}(log_ba + 1 + log_ab)$$
$$\frac{(log_ab + log_ba + 1) \cdot log_a\frac{a}{b}}{(log_ab + log_ba + 1) \cdot log_a\frac{a}{b}} = 1$$

Javob:D

24. $(a^2 - b^2 - c^2 + 2bc):\frac{a+b-c}{a+b+c}$ ifodaning $a = 3, \ b = \sqrt{3}, c = -1$ dagi qiymatini toping.

$A)9 \quad B)2 \quad C)1 \quad D)3$

Yechim:

$$a^2 - b^2 - c^2 + 2bc = a^2 - (b-c)^2$$
$$= (a - b + c)(a + b - c)$$
$$(a - b + c)(a + b - c) \cdot \frac{a+b+c}{a+b-c}$$
$$= (a - b + c)(a + b + c) = (a+c)^2 - b^2$$
$$= (3-1)^2 - \sqrt{3}^2 = 1$$

Javob:C

25. $\frac{x}{ax-2a^2} - \frac{2}{x^2+x-2ax-2a} \cdot \left(1 + \frac{3x+x^2}{3+x}\right)$ ifodaning $a = 0{,}25$ dagi qiymatini toping.

$A)1/16 \quad B)4 \quad C)1/4 \quad D)16$

Yechim:

$$\frac{2}{x^2 + x - 2ax - 2a} \cdot \left(1 + \frac{3x + x^2}{3 + x}\right) =$$
$$\frac{2}{x(x + 1) - 2a(x + 1)} \cdot \frac{3 + x + 3x + x^2}{3 + x}$$
$$= \frac{2}{(x + 1)(x - 2a)} \cdot \frac{(1 + x)(3 + x)}{3 + x} = \frac{2}{x - 2a}$$
$$\frac{x}{ax - 2a^2} - \frac{2}{x - 2a} = \frac{x - 2a}{ax - 2a^2} = \frac{1}{a} = \frac{1}{0{,}25}$$
$$= 4$$

Javob:B

26. Agar $a \in (-1; 1)$ bo'lsa, ifodani soddalashtiring:

$$\sqrt[4]{(1 - 2a + a^2)(a^2 - 1)(a - 1)}:\frac{a^2 + 2a - 3}{\sqrt[4]{a + 1}}.$$

$A) -\frac{\sqrt{a + 1}}{a + 3} \quad B) -\frac{\sqrt{a + 1}}{\sqrt{a + 3}}$

$C) \frac{\sqrt{a + 1}}{\sqrt{a + 3}} \quad D) \frac{\sqrt{a + 1}}{a + 3}$

Yechim:

$$\sqrt[4]{(1 - 2a + a^2)(a - 1)(a + 1)(a - 1)}$$
$$= |a - 1|\sqrt[4]{a + 1} = (1 - a)\sqrt[4]{a + 1}$$
$$(1 - a)\sqrt[4]{a + 1} \cdot \frac{\sqrt[4]{a + 1}}{a^2 + 2a - 3} = -\frac{\sqrt{a + 1}}{a + 3}$$

Javob:A

27. $\frac{100-4c^2-4cd-d^2}{20c+10d-4c^2-4cd-d^2}$ kasrni qisqartiring.

$A)\frac{10 + 2c + d}{2c - d}$

$B)\frac{10 - 2c - d}{2c - d}$

$C)\frac{10 - 2c - d}{2c + d}$

$D)\frac{10 + 2c + d}{2c + d}$

Yechim:

$$\frac{100 - 4c^2 - 4cd - d^2}{20c + 10d - 4c^2 - 4cd - d^2} =$$
$$\frac{100 - (2c + d)^2}{10(2c + d) - (2c + d)^2} =$$
$$\frac{(10 - 2c - d)(10 + 2c + d)}{(2c + d)(10 - 2c - d)} = \frac{(10 + 2c + d)}{(2c + d)}$$

Javob:D

28. $\frac{x^2y^2+2xy-3}{x^2y^2-1}$ kasrni qisqartiring.

$A)\frac{xy + 3}{xy - 1}$

$B)\frac{xy - 3}{xy + 1}$

$C)\frac{xy + 3}{xy + 1}$

$D)\frac{xy - 3}{xy - 1}$

Yechim:

$$x^2y^2 + 2xy + 1 - 4 = (xy + 1)^2 - 4 =$$
$$(xy + 1 - 2)(xy + 1 + 2) = (xy - 1)(xy + 3)$$
$$x^2y^2 - 1 = (xy - 1)(xy + 1)$$
$$\frac{(xy - 1)(xy + 3)}{(xy - 1)(xy + 1)} = \frac{(xy + 3)}{(xy + 1)}$$

Javob:C

29. $\sqrt{2^{20} + 2^{11} + 1} - \sqrt{2^{20} - 2^{12} + 4}$ ni hisoblang.

$A)4 \quad B)2 \quad C)1 \quad D)3$

Yechim:

$$\sqrt{2^{20} + 2^{11} + 1} = \sqrt{(2^{10} + 1)^2} = 2^{10} + 1$$
$$\sqrt{2^{20} - 2^{12} + 4} = \sqrt{(2^{10} - 2)^2} = 2^{10} - 2$$
$$2^{10} + 1 - 2^{10} + 2 = 3$$

Javob:D

30. M natural sonni 3 ga bo'lganda qoldiqda $\frac{(3a+1)^{40}+1}{(3a+1)^{20}}$ qoladi. a ning eng kichik qiymati nimaga teng?

$A)0 \quad B)1 \quad C) -\frac{2}{3} \quad D) -\frac{1}{2}$

Yechim: 3 ga bo'lganda qoldiq: 0;1;2 bo'lishi mumkin. $\frac{(3a+1)^{40}+1}{(3a+1)^{20}} = 0; 1; 2$

$$\frac{(3a+1)^{40}+1}{(3a+1)^{20}}=0 \Rightarrow \emptyset$$

$$\frac{(3a+1)^{40}+1}{(3a+1)^{20}}=1 \Rightarrow a=\emptyset$$

$$\frac{(3a+1)^{40}+1}{(3a+1)^{20}}=2 \Rightarrow$$

$$(3a+1)^{40}+1=2(3a+1)^{20}$$

$$(3a+1)^{40}-2(3a+1)^{20}+1=0$$

$$(3a+1)^{20}=1$$

$$3a+1=1 \Rightarrow a=0$$

$$3a+1=-1 \Rightarrow a=-\frac{2}{3}$$

Javob:C

31. Ifodani soddalashtiring:
$$\sqrt[5]{b^5}-\sqrt[4]{b^4}+\sqrt[6]{b^6}-\sqrt[7]{b^7},$$
bu yerda $b \geq 0$.
$A)0; -4b$ $\boldsymbol{B)0}$ $C)4b$ $D)0; 4b$
Yechim:

$$b-b+b-b=0$$

Javob:B

32. $\sqrt{x+3-4\sqrt{x-1}}+\sqrt{x+8-6\sqrt{x-1}}=1$
$(5 \leq x \leq 10)$ bo'lsa, tenglamaning butun ildizlari yig'indisini toping.
$A)15$ $\boldsymbol{B)45}$ $C)20$ $D)10$
Yechim:

$$\sqrt{x+3-4\sqrt{x-1}}=\sqrt{(\sqrt{x-1}-2)^2}=\sqrt{x-1}-2$$

$$\sqrt{x+8-6\sqrt{x-1}}=\sqrt{(3-\sqrt{x-1})^2}=3-\sqrt{x-1}$$

$$\sqrt{x-1}-2+3-\sqrt{x-1}=1$$

$$5 \leq x \leq 10$$

$$5+6+7+8+9+10=45$$

Javob:B

33. Ifodani soddalashtiring:
$$\frac{x^3+27}{2x-2}\cdot\frac{x^2-1}{x^2+4x+3}\cdot\frac{6x+12}{3x^2-9x+27}$$
$A)2x+1$ $B)\frac{x+2}{2}$ $C)\frac{x+2}{x-1}$ $\boldsymbol{D)x+2}$
Yechim:

$$\frac{x^3+27}{2x-2}\cdot\frac{x^2-1}{x^2+4x+3}\cdot\frac{6x+12}{3x^2-9x+27}$$

$$=\frac{(x+3)(x^2-3x+9)}{2(x-1)}\cdot\frac{(x+1)(x-1)}{(x+1)(x+3)}\cdot$$

$$\frac{6(x+2)}{3(x^2-3x+9)}=x+2$$

Javob:D

34. $a^2-b^2+a+7b-12$ ko'phadning ko'paytuvchilaridan birini toping.
$A)a+b+3$ $B)a+b+4$
$C)a-b+3$ $\boldsymbol{D)a-b+4}$

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Yechim:
$$a^2-b^2+6b-9+a+b-3=$$
$$a^2-(b-3)^2+a+b-3=$$
$$(a-b+3)(a+b-3)+(a+b-3)=$$
$$(a+b-3)(a-b+4)$$

Javob:D

35. Agar $|a| \neq |b| \neq |c|$ va $\frac{a}{b+c}+\frac{b}{c+a}+\frac{c}{a+b}=1$ bo'lsa, $\left(\frac{a^2}{b+c}+\frac{b^2}{c+a}+\frac{c^2}{a+b}\right):(a+b+c)$ ning qiymatini toping.
$A)1$ $B)0,5$ $\boldsymbol{C)0}$ $D)2$
Yechim:

$$+\begin{cases}\dfrac{a^2}{b+c}+\dfrac{ab}{c+a}+\dfrac{ac}{a+b}=a\\[2mm]\dfrac{ab}{b+c}+\dfrac{b^2}{c+a}+\dfrac{bc}{a+b}=b\\[2mm]\dfrac{ac}{b+c}+\dfrac{bc}{c+a}+\dfrac{c^2}{a+b}=c\end{cases}$$

$$\frac{a^2}{b+c}+\frac{ab}{c+a}+\frac{ac}{a+b}+\frac{ab}{b+c}+\frac{b^2}{c+a}+\frac{bc}{a+b}$$

$$+\frac{ac}{b+c}+\frac{bc}{c+a}+\frac{c^2}{a+b}=a+b+c$$

$$\frac{a^2}{b+c}+\frac{b^2}{c+a}+\frac{c^2}{a+b}+a+b+c$$

$$=a+b+c$$

$$\frac{a^2}{b+c}+\frac{b^2}{c+a}+\frac{c^2}{a+b}=0$$

$$0:(a+b+c)=0$$

Javob:C

36. Tenglamani yeching:
$$\frac{x-1}{1+\sqrt{x}}=4-\frac{1-\sqrt{x}}{2}.$$
$A)49$ $\boldsymbol{B)81}$ $C)64$ $D)25$
Yechim:

$$\frac{(\sqrt{x}-1)(1+\sqrt{x})}{1+\sqrt{x}}=4-\frac{1-\sqrt{x}}{2}$$

$$\sqrt{x}-1=4-\frac{1-\sqrt{x}}{2}$$

$$\sqrt{x}-1-\frac{\sqrt{x}-1}{2}=4$$

$$\frac{\sqrt{x}-1}{2}=4$$

$$x=81$$

Javob:B

37. $2x^2-(2\sqrt{3}+3\sqrt{2})x+\sqrt{6}+2=0$ tenglamaning kichik ildizini toping.
$\boldsymbol{A)\dfrac{\sqrt{2}}{2}}$ $B)-\dfrac{\sqrt{2}}{2}$ $C)\sqrt{3}-\sqrt{2}$ $D)\sqrt{3}+\sqrt{2}$
Yechim:

$$D = \left(2\sqrt{3} + 3\sqrt{2}\right)^2 - 4 \cdot 2 \cdot \left(\sqrt{6} + 2\right)$$
$$= \left(2\sqrt{3} + \sqrt{2}\right)^2$$
$$x_1 = \frac{\sqrt{2}}{2}, x_2 = \sqrt{3} + \sqrt{2}$$

Javob:A

38. $(x-3)^6 + (x^2 - 2x - 1)^3 = 0$ tenglamaning ildizlari yig'indisini (agar u bitta bo'lsa, shu ildizning o'zini) toping.

A)**4**   B)1   C)2   D)3

Yechim:
$$(x-3)^6 = -(x^2 - 2x - 1)^3$$
$$(x-3)^2 = -x^2 + 2x + 1$$
$$x^2 - 6x + 9 = -x^2 + 2x + 1$$
$$2x^2 - 8x + 8 = 0$$
$$x^2 - 4x + 4 = 0$$
$$x_1 + x_2 = 4$$

Javob:A

39. Tenglamani yeching: $sinx + cosx = \sqrt{2}$

A)$x = \dfrac{\pi}{4} + 2\pi n, n\epsilon Z$

B)$x = \dfrac{3\pi}{4} + 2\pi n, n\epsilon Z$

C)$x = \dfrac{3\pi}{4} + \pi n, n\epsilon Z$

D)$x = \dfrac{\pi}{4} + \pi n, n\epsilon Z$

Yechim:
$$sinx + cosx = \sqrt{2}\sin\left(x + \frac{\pi}{4}\right)$$
$$\sqrt{2}\sin\left(x + \frac{\pi}{4}\right) = \sqrt{2}$$
$$\sin\left(x + \frac{\pi}{4}\right) = 1$$
$$x + \frac{\pi}{4} = \frac{\pi}{2} + 2\pi n, n\epsilon Z$$
$$x = \frac{\pi}{4} + 2\pi n, n\epsilon Z$$

Javob:A

40. Tenglamani yeching:
$sin^{100}x + cos^{100}x = 1$.

A) $\left\{\dfrac{\pi n}{2}, n\epsilon Z\right\}$

B) $\left\{\dfrac{\pi n}{4}, n\epsilon Z\right\}$

C) $\left\{\dfrac{\pi n}{3}, n\epsilon Z\right\}$

D) $\left\{\dfrac{2\pi n}{3}, n\epsilon Z\right\}$

Yechim:
$$\begin{bmatrix} sin^{100}x = 1 \Rightarrow cosx = 0 \\ cos^{100}x = 1 \Rightarrow sinx = 0 \end{bmatrix} \Rightarrow x = \frac{\pi n}{2}, n\epsilon Z$$

Javob:A

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41. Tenglamani yeching: $6sin^2x + 13sinx + 5 = 0$

A)$x = -\dfrac{\pi}{6} + \dfrac{\pi n}{2}, n\epsilon Z; \ x = \dfrac{7\pi}{6} + \pi n, n\epsilon Z$

B)$x = -\dfrac{\pi}{6} + \pi n, n\epsilon Z; \ x = \dfrac{\pi}{6} + 2\pi n, n\epsilon Z$

C)$x = -\dfrac{\pi}{6} + 2\pi n, n\epsilon Z; \ x = \dfrac{7\pi}{6} + 2\pi n, n\epsilon Z$

D)$x = -\dfrac{\pi}{3} + 2\pi n, n\epsilon Z; \ x = \dfrac{7\pi}{5} + 2\pi n, n\epsilon Z$

Yechim: $6sin^2x + 13sinx + 5 = 0$
$$D = 169 - 120 = 49$$
$$sinx = \frac{-13 + 7}{12} = -\frac{1}{2}$$
$$sinx = \frac{-13 - 7}{12} < -1$$
$$x = -\frac{\pi}{6} + 2\pi n, n\epsilon Z; \ x = \frac{7\pi}{6} + 2\pi n, n\epsilon Z$$

Javob:C

42. $\dfrac{(5^x - 25)\cdot(7^x - 7)}{\sqrt{7 - 5x}} = 0$ tenglamaning ildizi 5 dan qancha kam?

A)8   *C*)10   **D**)4

Yechim:
$$\frac{(5^x - 25)\cdot(7^x - 7)}{\sqrt{7 - 5x}} = 0$$
$$\begin{cases} 5^x - 25 = 0 \\ 7^x - 7 = 0 \\ 7 - 5x > 0 \end{cases} \Rightarrow \begin{cases} x = 2 \\ x = 1 \\ x < 1,4 \end{cases} \Rightarrow x = 1$$
$$5 - 1 = 4$$

Javob:D

43. $\dfrac{13^{x^2+3x+2} - 11^{x^2+3x+2}}{x+1} = 0$ tenglamaning ildizi 8 dan qancha kam?

A)12   *B*)8   *C*)6,9   **D**)10

Yechim:
$$\begin{cases} 13^{x^2+3x+2} - 11^{x^2+3x+2} = 0 \\ x + 1 \neq 0 \end{cases}$$
$$\begin{cases} x^2 + 3x + 2 = 0 \\ x \neq -1 \end{cases} \Rightarrow \begin{cases} x = -2; x = -1 \\ x \neq -1 \end{cases} \Rightarrow x = -2$$
$$8 - (-2) = 10$$

Javob:D

44. $log_4^2x - log_4\sqrt{x} - 1,5 = 0$ tenglamaning eng katta va eng kichik ildizlari nisbatini toping.

A)16   *B*)64   **C**)32   *D*)2

Yechim:
$$log_4^2x - 0,5log_4x - 1,5 = 0$$
$$log_4x = -1 \quad log_4x = 1,5$$
$$x = 0,25 \quad x = 8$$
$$8 : 0,25 = 32$$

Javob:C

45. $log_{x-1}x^2 = log_{x-1}(6x - 8)$ tenglamaning ildizlari soni x_0 bo'lsa, $x_0 + 5$ ni toping.

   $A)7$ $B)8$ $C)9$ $D)6$

Yechim:

$$\begin{cases} x - 1 > 0 \\ x - 1 \neq 1 \\ 6x - 8 > 0 \\ x^2 \neq 0 \\ x^2 = 6x - 8 \end{cases}$$

$$x^2 - 6x + 8 = 0$$
$$x = 2 \quad \boldsymbol{x = 4}$$
$$x_0 = 1$$
$$1 + 5 = 6$$

Javob:D

46. Tenglama ildizlari yig'indisini toping:
$4^{log_4^2(x+2)} + 2(x + 2)^{log_4\sqrt{x+2}} = 8$.

   $A)3/4$ $B)5/4$ $C)\boldsymbol{1/4}$ $D)15/4$

Yechim:

$$4^{log_4^2(x+2)} = (x + 2)^{log_4(x+2)} = a^2$$
$$2(x + 2)^{log_4\sqrt{x+2}} = 2\sqrt{x + 2}^{log_4(x+2)} = a$$
$$a^2 + 2a - 8 = 0$$

$$a = -4 \Rightarrow \emptyset, \quad a = 2$$
$$\sqrt{x + 2}^{log_4(x+2)} = 2$$
$$log_4\sqrt{x + 2}^{log_4(x+2)} = log_4 2$$
$$log_4(x + 2)log_4\sqrt{x + 2} = log_4 2$$
$$log_4(x + 2) \cdot \frac{1}{2}log_4(x + 2) = log_4 2$$
$$log_4(x + 2)log_4(x + 2) = 1$$
$$log_4(x + 2) = \pm 1$$
$$(x + 2) = 4 \quad x = 2$$
$$x + 2 = 0.25 \quad x = -1.75$$
$$-1.75 + 2 = 0.25$$

Javob:C

47. Ildizlari $\frac{1}{10-\sqrt{72}}$ va $\frac{1}{10+6\sqrt{2}}$ ga teng bo'lgan ratsional koeffitsiyentli kvadrat tenglamani aniqlang.

$A)7x^2 - 20x + 1 = 0$
$B)7x^2 - 5x + 1 = 0$
$C)\boldsymbol{28x^2 - 20x + 1 = 0}$
$D)28x^2 - 20x + \frac{1}{4} = 0$

Yechim:

$$\begin{cases} \dfrac{1}{10 - \sqrt{72}} + \dfrac{1}{10 + 6\sqrt{2}} = -p \\ \dfrac{1}{10 - \sqrt{72}} \cdot \dfrac{1}{10 + 6\sqrt{2}} = q \end{cases} \Rightarrow p = -\frac{20}{28} \quad q = \frac{1}{28}$$

$$28x^2 - 20x + 1 = 0$$

Javob:C

48. $x^2 - 11 + \sqrt{x^2 + 11} = 20$ tenglama ildizlari nisbatini toping.

   $A)1$ $B) -1$ $C) -5$ $D)5$

Yechim:

$$x^2 + 11 - 22 + \sqrt{x^2 + 11} = 20$$
$$\sqrt{x^2 + 11} = t$$
$$t^2 + t - 42 = 0$$
$$t = -7 \quad t = 6$$

$$\sqrt{x^2 + 11} = -7 \quad \Rightarrow \emptyset$$
$$\sqrt{x^2 + 11} = 6 \quad x = \pm 5$$
$$5 : (-5) = -1$$

Javob:B

49. $x^4 - 2x^3 + x^2 - 9 = 0$ tenglamaning ildizlari yig'indisi a va ildizlari soni b bo'lsa, $a + b$ ni toping.

   $A)\boldsymbol{5}$ $B)2$ $C)3$ $D)4$

Yechim:

$$x^4 - 2x^3 + x^2 = 9$$
$$(x^2 - x)^2 = 9$$
$$x^2 - x = 3$$
$$x^2 - x - 3 = 0$$
$$D > 0$$
$$x_1 + x_2 = 1$$
$$x^2 - x = -3$$
$$x^2 - x + 3 = 0$$
$$D < 0$$
$$a = 3 \quad b = 2$$
$$a + b = 5$$

Javob:A

50. $2x^3 + 3x^2 - 1 = 0$ tenglama katta ildizining kichik ildiziga nisbatini toping.

   $A) -2$ $B) -\dfrac{1}{2}$ $C)2$ $D)\dfrac{1}{2}$

Yechim:

$$2x^3 + 2x^2 + x^2 - 1 =$$
$$2x^2(x + 1) + (x - 1)(x + 1) =$$
$$(x + 1)(2x^2 + x - 1) = 0$$
$$x = -1 \quad x = 0.5$$
$$0.5 : (-1) = -0.5$$

Javob:B

51. Tenglamani yeching: $2^{sin^2x} + 2^{cos^2x} = 3$.

$A)\pi n, n \epsilon Z$
$B)\dfrac{\boldsymbol{\pi n}}{\boldsymbol{2}}, \boldsymbol{n \epsilon Z}$
$C)\dfrac{\pi n}{4}, n \epsilon Z$
$D)\dfrac{\pi n}{3}, n \epsilon Z$

Yechim:

$$\begin{cases} sin^2x = 1 \Rightarrow cosx = 0 \\ cos^2x = 1 \Rightarrow sinx = 0 \end{cases} \Rightarrow x = \frac{\pi n}{2}, n\epsilon Z$$

Javob:B

52. Tenglamalar sistemasini yeching:

$$\begin{cases} x \cdot 2^x - y \cdot 4^y = x \cdot 4^y - y \cdot 2^x \\ 3^x \cdot 9^y = 81 \end{cases}$$

$A)(-4;-4),(2;1)$ $\boldsymbol{B)(-4;4),(-2;1)}$
$C)(-4;4),(2;1)$ $D)(4;-4),(-2;-1)$

Yechim:

$$2^x(x+y) = 4^y(x+y)$$
$$(x+y)(2^x - 4^y) = 0$$
$$(x+y) = 0 \ \ \boldsymbol{x = -y}$$
$$(2^x - 4^y) = 0 \ \ \boldsymbol{x = 2y}$$
$$3^x \cdot 9^y = 81$$
$$3^x \cdot 3^{2y} = 81$$
$$3^{x+2y} = 3^4$$
$$\boldsymbol{x + 2y = 4}$$
$$\begin{cases} x = -y \\ x + 2y = 4 \end{cases} x = -4 \ y = 4$$
$$\begin{cases} x = 2y \\ x + 2y = 4 \end{cases} x = 2 \ y = 1$$

Javob:B

53. Tenglamalar sistemasini yeching:

$$\begin{cases} 2^x - 3^y = 1 \\ 2^{x+2} - 3^{y+1} = 7 \end{cases}$$

$A)(2;-1)$ $B)(2;1),(-2;-1)$
$\boldsymbol{C)(2;1)}$ $D)(2;1),(1;2)$

Yechim:

$$2^x = 1 + 3^y$$
$$2^x \cdot 4 - 3^y \cdot 3 = 7$$
$$(1 + 3^y) \cdot 4 - 3^y \cdot 3 = 7$$
$$1 \cdot 4 + 3^y \cdot 4 - 3^y \cdot 3 = 7$$
$$3^y = 3$$
$$y = 1 \ x = 2$$

Javob:C

54. Tenglamalar sistemasini yeching:

$$\begin{cases} x^{13} = 12^y \\ x^2 - 11x - 12 = 0 \end{cases}$$

$\boldsymbol{A)(12;13)}$ $B)(12;13),(-12;-13)$
$C)(-12;-13)$ $D)(12;13),(13;12)$

Yechim:

$$x^2 - 11x - 12 = 0$$
$$x = -1 \ \ \boldsymbol{x = 12}$$
$$(-1)^{13} = 12^y \Rightarrow \emptyset$$
$$12^{13} = 12^y \Rightarrow \boldsymbol{y = 13}$$

Javob:A

55. $6x^3 - 7x^2 - 16x + m = 0$ tenglama ildizlaridan biri 2 ga teng bo'lsa, qolgan ildizlari ko'paytmasini toping.

$A)1$ $B)2$ $\boldsymbol{C)-1}$ $D)-2$

Yechim:

$$6 \cdot 2^3 - 7 \cdot 2^2 - 16 \cdot 2 + m = 0$$
$$m = 12$$
$$6x^3 - 7x^2 - 16x + 12 = 0$$
$$x^3 - \frac{7}{6}x^2 - \frac{16}{6}x + 2 = 0$$
$$x_1 = 2 \ \ x_1 x_2 x_3 = -2 \ \ x_2 x_3 = -1$$

Javob:C

56. $|5x - 3| + |3x - 5| = 9x - 10$ tenglamaning ildizi 9 dan qancha kam?

$\boldsymbol{A)7}$ $B)8$ $C)5$ $D)6$

Yechim:

1) $x \le 3/5$
$$-5x + 3 - 3x + 5 = 9x - 10$$
$$x = 18/17 \Rightarrow \emptyset$$

2) $3/5 \le x \le 5/3$
$$5x - 3 - 3x + 5 = 9x - 10$$
$$x = 12/7 \Rightarrow \emptyset$$

3) $x \ge 5/3$
$$5x - 3 + 3x - 5 = 9x - 10$$
$$x = 2$$
$$9 - 2 = 7$$

Javob:A

57. $\dfrac{x^7 - 4x^5 + 4x^2 - 7x - 2}{x^7 - 4x^5 + 3x^2 - 4x - 4} = 1$ tenglamaning barcha ildizlari yig'indisi (agar u bitta bo'lsa, shu ildizning o'zini) toping.

$A)1$ $\boldsymbol{B)2}$ $C)-1$ $D)4$

Yechim:

$$x^7 - 4x^5 + 4x^2 - 7x - 2 =$$
$$= x^7 - 4x^5 + 3x^2 - 4x - 4$$
$$x^2 - 3x + 2 = 0$$
$$x \ne 1 \ (maxraj \ nol \ bo'lib \ qoladi)$$
$$x = 2$$

Javob:B

58. $\dfrac{2}{x^2-4} + \dfrac{x+2}{x^2+2x} = \dfrac{1}{x^2-2x}$ tenglamaning barcha ildizlari yig'indisini (agar u bitta bo'lsa, shu ildizning o'zini) toping.

$A)-5$ $B)5$ $\boldsymbol{C)-3}$ $D)4$

Yechim:

$$\frac{2}{(x-2)(x+2)} + \frac{x+2}{x(x+2)} = \frac{1}{x(x-2)}$$
$$2x + (x+2)(x-2) = x + 2$$
$$x^2 + x - 6 = 0$$
$$x = -3$$
$$x \ne 2 (maxraj \ nol \ bo'lib \ qoladi)$$

Javob:C

59. Tenglamani yeching:

$$cos^2 2x + cos^2 3x + cos^2 4x = \frac{3}{2}.$$

$A)x = \dfrac{\pi}{12} + \dfrac{\pi n}{6}, n\epsilon Z; \ x = \pm\dfrac{\pi}{3} + 2\pi n, n\epsilon Z$

$B) x = \dfrac{\pi}{12} + \dfrac{\pi n}{6}, n\epsilon Z; \ x = \pm\dfrac{\pi}{3} + \pi n, n\epsilon Z$

$C) x = \dfrac{\pi}{12} + \dfrac{\pi n}{6}, n\epsilon Z; \ x = \pm\dfrac{2\pi}{3} + \pi n, n\epsilon Z$

$D) x = \dfrac{\pi}{12} + \dfrac{\pi n}{3}, n\epsilon Z; \ x = \pm\dfrac{\pi}{3} + 2\pi n, n\epsilon Z$

Yechim:

$$\frac{1 + \cos 4x}{2} + \frac{1 + \cos 6x}{2} + \frac{1 + \cos 8x}{2} = \frac{3}{2}$$

$$\cos 4x + \cos 6x + \cos 8x = 0$$

$$2\cos 6x \cos 2x + \cos 6x = 0$$

$$\cos 6x(2\cos 2x + 1) = 0$$

$$\cos 6x = 0$$

$$\cos 2x = -1/2$$

$$x = \frac{\pi}{12} + \frac{\pi n}{6}, n\epsilon Z; \ x = \pm\frac{\pi}{3} + \pi n, n\epsilon Z$$

Javob:B

60. Tenglamani yeching:

$$4\cos^2 x - 2\sin^2 x - 5\cos x - 4 = 0$$

$A) x = \arccos\left(-\dfrac{2}{3}\right) + \pi n, n\epsilon Z$

$B) x = \pm\arccos\dfrac{2}{3} + \pi n, n\epsilon Z, n\epsilon Z$

$C) x = \pm\arccos\left(-\dfrac{2}{3}\right) + \pi n, n\epsilon Z$

$D) x = \pm\arccos\left(-\dfrac{2}{3}\right) + 2\pi n, n\epsilon Z$

Yechim:

$$4\cos^2 x - 2(1 - \cos^2 x) - 5\cos x - 4 = 0$$

$$\cos x = a$$

$$4a^2 - 2 + 2a^2 - 5a - 4 = 0$$

$$6a^2 - 5a - 6 = 0$$

$$a = 1{,}5 \quad a = -\frac{2}{3}$$

$$\cos x = -\frac{2}{3}$$

$$x = \pm\arccos\left(-\frac{2}{3}\right) + 2\pi n, n\epsilon Z$$

Javob:D

61. Tenglamalar sistemasini yeching:

$$\begin{cases} (x + xy^2 + y^2)(x + y^2)^2 = 225 \\ (x - xy^2 + y^2)(x + y^2)^2 = 25 \end{cases}$$

$A)(4; 1), (4; -1) \ B)(-4; 1), (4; -1), (1; 2), (1; -2)$

$C)(4; 1), (4; -1), (1; 2), (1; -2) \ D)(1; 2), (1; -2)$

Yechim:

$$+\begin{cases} (x + xy^2 + y^2)(x + y^2)^2 = 225 \\ (x - xy^2 + y^2)(x + y^2)^2 = 25 \end{cases}$$

$$(x + xy^2 + y^2)(x + y^2)^2 + (x - xy^2 + y^2)(x + y^2)^2 = 250$$

$$2(x + y^2)^3 = 250$$

$$(x + y^2)^3 = 125$$

$$x + y^2 = 5$$

$$(x - xy^2 + y^2) = 1$$

$$xy^2 = 4$$

$$\begin{cases} x + y^2 = 5 \\ xy^2 = 4 \end{cases}$$

$$(4; 1), (4; -1), (1; 2), (1; -2)$$

Javob:C

62. Tenglamalar sistemasini yeching:

$$\begin{cases} x + y + xy = 0 \\ x^3 + y^3 + x^3 y^3 = 12 \end{cases}$$

$A)\left(1 + \sqrt{3}; 1 - \sqrt{3}\right), \left(1 - \sqrt{3}; 1 + \sqrt{3}\right)$

$B)(1; \sqrt{3}), (\sqrt{3}; 1) \ C)(1 - \sqrt{3}; 1 + \sqrt{3})$

$D)\left(1 + \sqrt{3}; 1 + \sqrt{3}\right), \left(1 - \sqrt{3}; 1 - \sqrt{3}\right)$

Yechim:

$$x + y = p \quad xy = q \quad x^3 + y^3 = p^3 - 3pq$$

$$\begin{cases} p + q = 0 \\ p^3 - 3pq + q^3 = 12 \end{cases} \Rightarrow p^3 + q^3 = 0$$

$$-3pq = 12 \quad pq = -4$$

$$\begin{cases} p + q = 0 \\ pq = -4 \end{cases} \Rightarrow \begin{cases} p = -q \\ -q^2 = -4 \end{cases} \Rightarrow q = \pm 2 \ p = \mp 2$$

$$\begin{cases} x + y = 2 \\ xy = -2 \end{cases} \Rightarrow$$

$$\left(1 + \sqrt{3}; 1 - \sqrt{3}\right)\left(1 + \sqrt{3}; 1 - \sqrt{3}\right)$$

$$\begin{cases} x + y = -2 \\ xy = 2 \end{cases} \Rightarrow \emptyset$$

Javob:A

63. Tenglamalar sistemasini yeching:

$$\begin{cases} y - \log_3 x = 1 \\ x^y = 3^{12} \end{cases}$$

$A)\left(\dfrac{1}{81}; 3\right), (27; 4) \quad B)\left(\dfrac{1}{81}; -3\right), (27; 2)$

$C)\left(\dfrac{1}{81}; -3\right), (81; 4) \quad D)\left(\dfrac{1}{81}; -3\right), (27; 4)$

Yechim:

$$y - \log_3 x = 1$$

$$y = 1 + \log_3 x$$

$$y = \log_3 3x$$

$$3^y = 3x$$

$$x = 3^{y-1}$$

$$x^y = 3^{12}$$

$$3^{y(y-1)} = 3^{12}$$

$$y(y - 1) = 12$$

$$y^2 - y - 12 = 0$$

$$y = -3 \quad y = 4$$

$$x = 3^{-4} \quad x = 3^3$$

Javob:D

64. a ning qanday eng katta butun qiymatida $3x^2 - 18x - 3 > a$ tengsizlik x ning barcha qiymatlarida o'rinli bo'ladi?

$A) -29 \quad B) -32 \quad C) -30 \quad D) -31$

Yechim:

$$3x^2 - 18x - 3 - a > 0$$

$$D < 0$$

$$324 + 12(3 + a) < 0$$

$$27 + 3 + a < 0$$
$$a < -30$$
$$a = -31$$

Javob:D

65. $\frac{(8-x)^2}{x-3} > 0$ tengsizlikning $[-1; 9]$ oraliqda yotuvchi butun yechimlari yig'indisini toping.

$A)17$ $B)31$ $C)42$ $D)39$

Yechim:

$$\frac{(8-x)^2}{x-3} > 0$$
$$(3; 8) \cup (8; \infty)$$
$$[-1; 9]$$
$$4 + 5 + 6 + 7 + 9 = 31$$

Javob:B

66. $2^{log_{0,4}(x) \cdot log_{0,4}(2,5x)} > 1$ tengsizlikning eng kichik natural yechimini toping.

$A)2$ $B)4$ $C)3$ $D)1$

Yechim:

$$2^{log_{0,4}(x) \cdot log_{0,4}(2,5x)} > 2^0$$
$$log_{0,4}(x) \cdot log_{0,4}(2,5x) > 0$$
$$log_{0,4}(x) \cdot \left(log_{0,4}2,5 + log_{0,4}x\right) > 0$$
$$a(a - 1) > 0$$
$$a = 0 \ log_{0,4}x = 0 \ x = 1$$
$$a = 1 \ log_{0,4}x = 1 \ x = 0,4$$
$$(1; \infty)$$

Javob:A

67. $log_{0,2}^2(x - 1) > 4$ tengsizlikni yeching.

$A)(0; 1,04) \cup (5; \infty)$ $B)(26; \infty)$
$C)(1; 26)$ $D)(1; 1,04) \cup (26; \infty)$

Yechim:

$$log_{0,2}^2(x - 1) - 4 > 0$$
$$\left(log_{0,2}(x - 1) - 2\right)\left(log_{0,2}(x - 1) + 2\right) > 0$$
$$log_{0,2}(x - 1) = 2 \ x - 1 = 0,04 \ x = 1,04$$
$$log_{0,2}(x - 1) = -2 \ x - 1 = 25 \ x = 26$$
$$(26; \infty)$$

Javob:B

68. $\frac{5}{|x+2|+2} > |x + 2| - 2$ tengsizlikni qanoatlantiruvchi butun sonlar nechta?

$A)4 \ ta$ $B)7 \ ta$ $C)5 \ ta$ $D)6 \ ta$

Yechim:

$$\frac{5}{|x + 2| + 2} > |x + 2| - 2$$
$$5 > (x + 2)^2 - 4$$
$$5 > x^2 + 4x + 4 - 4$$
$$x^2 + 4x - 5 < 0$$
$$(-5; 1)$$
$$-4; -3; -2; -1; 0$$

Javob:C

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69. $2^{\sqrt{x+1}} - 6 < 2^{4-\sqrt{x+1}}$ tengsizlikni qanoatlantiruvchi eng katta va eng kichik butun sonlar ayirmasini toping.

$A)6$ $B)7$ $C)9$ $D)8$

Yechim:

$$2^{\sqrt{x+1}} = a$$
$$a - 6 < \frac{16}{a}$$
$$a^2 - 6a - 16 < 0$$
$$(a - 8)(a + 2) < 0$$
$$a < 8$$
$$2^{\sqrt{x+1}} < 8$$
$$\sqrt{x + 1} < 3$$
$$\begin{cases} x + 1 < 9 \\ x + 1 \geq 0 \end{cases} \Rightarrow [-1; 8)$$
$$7 - (-1) = 8$$

Javob:D

70. $y = \sqrt{3x - 7} + \frac{\sqrt{4-x}}{x-3}$ funksiyaning aniqlanish sohasini toping.

$A)\left(-\infty; \frac{7}{3}\right] \cup [43; \infty)$ $B)\left[\frac{7}{3}; 4\right]$
$C)\left[\frac{7}{3}; 3\right) \cup (3; 4]$ $D)\left(\frac{7}{3}; 3\right) \cup (3; 4)$

Yechim:

$$\begin{cases} 3x - 7 \geq 0 \\ x - 3 \neq 0 \\ 4 - x \geq 0 \end{cases} \Rightarrow \left[\frac{7}{3}; 3\right) \cup (3; 4]$$

Javob:C

71. $f(x) = \left(\frac{1}{3}\right)^{x^2-6x+11}$ funksiyaning qiymatlar sohasini toping.

$A)(0; 9]$ $B)[-9; \infty)$ $C)\left(0; \frac{1}{9}\right]$ $D)[9; \infty)$

Yechim:

$$0 < \left(\frac{1}{3}\right)^{x^2-6x+9+2} \leq \frac{1}{9}$$

Javob:C

72. $y = \sqrt{log_{\frac{1}{3}}(x^2 - 2x) + 1}$ funksiyaning aniqlanish sohasini toping.

$A)[-1; 3]$ $B)(-\infty; 0) \cup (2; \infty)$
$C)(-\infty; -1] \cup [3; \infty)$ $D)[-1; 0) \cup (2; 3]$

Yechim:

$$log_{\frac{1}{3}}(x^2 - 2x) + 1 \geq 0$$
$$log_3(x^2 - 2x) \leq 1$$
$$\begin{cases} x^2 - 2x \leq 3 \\ x^2 - 2x > 0 \end{cases} \Rightarrow \begin{cases} x^2 - 2x - 3 \leq 0 \\ x^2 - 2x > 0 \end{cases} \Rightarrow [-1; 0)$$
$$\cup (2; 3]$$

Javob:D

73. $y = (1 + ctg^2 x)sin^2 x + \frac{2sin2x}{cosx}$
funksiyaning qiymatlar sohasini toping.

$A)[-1; 3]$ $B)[-1; 1) \cup (1; 3]$
$C)[-3; 5]$ $\boldsymbol{D)(-3; 1) \cup (1; 5)}$

Yechim:
$$y = (1 + ctg^2 x)sin^2 x + \frac{2sin2x}{cosx}$$
$$\frac{1}{sin^2 x}sin^2 x + \frac{4sinxcosx}{cosx} = 1 + 4sinx$$
$$sinx \neq 0 \quad cosx \neq 0$$
$$(-3; 1) \cup (1; 5)$$

Javob:D

74. $y = \frac{sinx(ctgx+1)+cosx(tgx+1)}{2}$
funksiyaning qiymatlari sohasini toping.

$A)[-\sqrt{2}; \sqrt{2}]$
$B)[-\sqrt{2}; -1) \cup (-1; 0) \cup (0; 1) \cup (1; \sqrt{2})$
$C)[-\sqrt{2}; 0) \cup (0; \sqrt{2})$
$\boldsymbol{D)[-\sqrt{2}; -1) \cup (-1; 1) \cup (1; \sqrt{2}]}$

Yechim:
$$y = \frac{sinx(ctgx + 1) + cosx(tgx + 1)}{2}$$
$$\frac{sinx\left(\frac{cosx}{sinx} + 1\right) + cosx\left(\frac{sinx}{cosx} + 1\right)}{2} =$$
$$\frac{cosx + sinx + cosx + sinx}{2} = sinx + cosx$$
$$= \sqrt{2}sin(45° + x)$$
$$sinx \neq 0 \quad cosx \neq 0$$
$$[-\sqrt{2}; -1) \cup (-1; 1) \cup (1; \sqrt{2}]$$

Javob:D

75. $y = \arcsin\left(\left|x - \frac{1}{2}\right| + |x|\right)$ funksiyaning qiymatlari sohasini ko'rsating.

$A)\left[\frac{\pi}{6}; \frac{\pi}{2}\right]$ $B)\left[0; \frac{\pi}{2}\right]$ $C)\left[-\frac{\pi}{2}; \frac{\pi}{2}\right]$ $D)\left[-\frac{\pi}{2}; \frac{\pi}{6}\right]$

Yechim:
$$0,5 \leq \left|x - \frac{1}{2}\right| + |x| < \infty$$
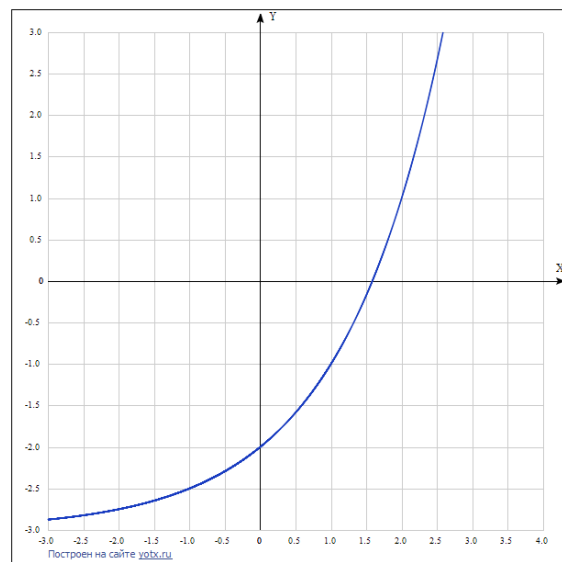$$-1 \leq \left|x - \frac{1}{2}\right| + |x| \leq 1$$
$$0,5 \leq \left|x - \frac{1}{2}\right| + |x| \leq 1$$
$$y = \arcsin(0,5) = \frac{\pi}{6}$$
$$y = \arcsin(1) = \frac{\pi}{2}$$

Javob:A

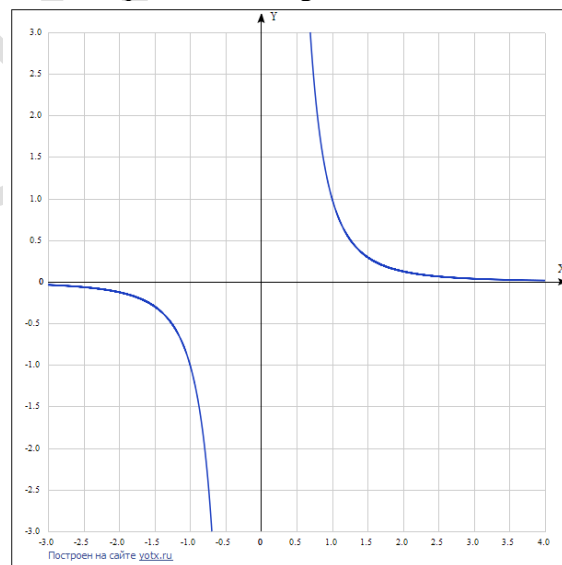76. Chizmada qaysi funksiya grafigi taqriban tasvirlangan?

$A)y = 2^{-x} - 2$ $\boldsymbol{B)y = 2^x - 2}$
$C)y = 2^{x-1,5}$ $D)y = 2^x - 3$

Yechim:
$(0; -2)$ va $(1; -1)$ nuqtadan o'tuvchi funksiyani javoblar ichidan topamiz.

Javob:B

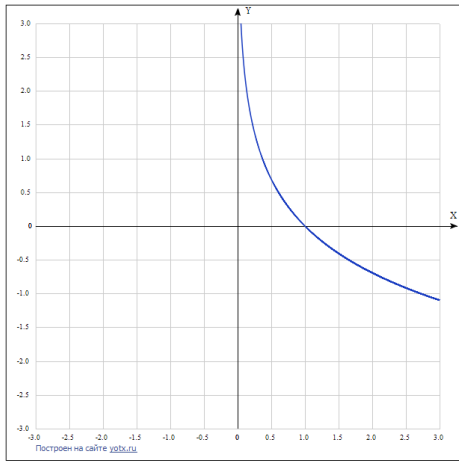77. Chizmada qaysi funksiya grafigi taqriban tasvirlangan?

$A)y = x^{-4}$ $\boldsymbol{B)y = x^{-3}}$ $C)y = x^3$ $D)y = x^{-2}$
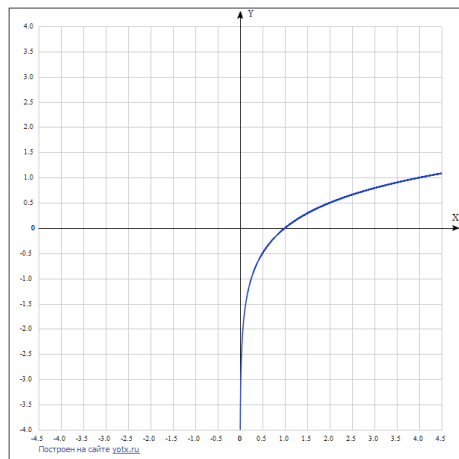
Yechim:
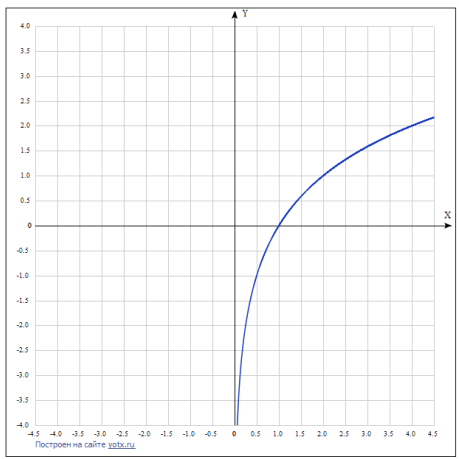$(-1; -1)$ va $(1; 1)$ $x \neq 0$ nuqtadan o'tuvchi funksiyani javoblar ichidan topamiz.

Javob:B

78. Qaysi chizmada $y = log_4 x$ funksiya grafigi taqriban tasvirlangan?

A)

B)
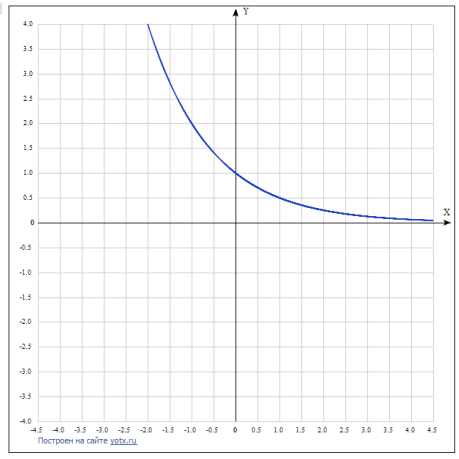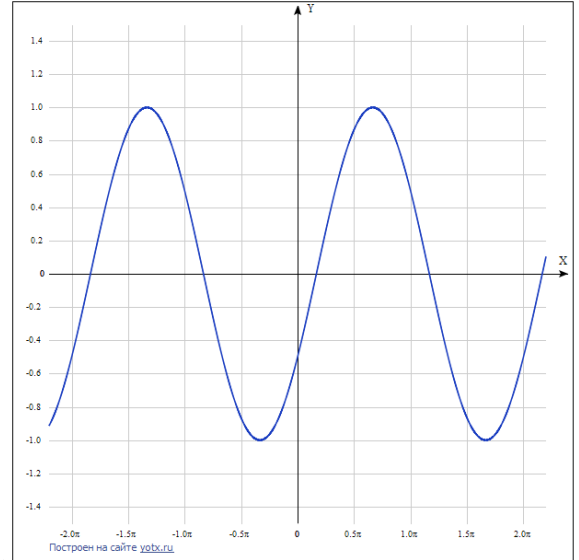
C)

D)

Yechim:
$(4; 1)$ nuqtadan o'tuvchi funksiyani javoblar ichidan topamiz.

Javob:B

79. Chizmada qaysi funksiya grafigi taqriban tasvirlangan?

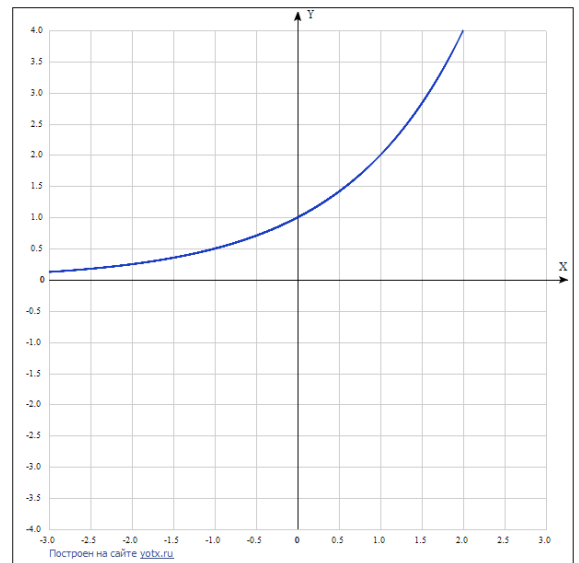$A) y = \sin\left(x + \dfrac{\pi}{6}\right)$ $B) y = \sin\left(x + \dfrac{\pi}{3}\right)$

$C) \boldsymbol{y = \sin\left(x - \dfrac{\pi}{6}\right)}$ $D) y = \sin x$

Yechim:
Funksiyaning grafigidan ma'lumki, funksiyaning grafigi OX o'qi bo'yicha o'ngga surilgan. Demak, argumentidan biror son ayirilmoqda.

Javob:C

80. Grafik ko'rinishda berilgan funksiyani toping.
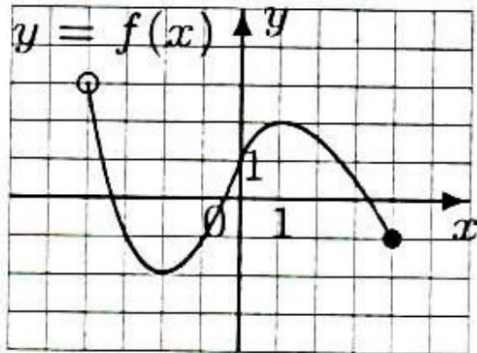
$A) y = e^x$ $B) y = \log_2 x$

$C) y = \left(\dfrac{1}{2}\right)^x$ $D) \boldsymbol{y = 2^x}$

Yechim:
$(1; 2)$ va $(2; 4)$ nuqtadan o'tuvchi funksiyani javoblar ichidan topamiz.
Javob:D

81. Grafik ko'rinishda berilgan funksiya qiymatlar to'plamini toping.

$A)(-2; 2)$ $\boldsymbol{B}[-\boldsymbol{2}; \boldsymbol{3})$ $C)[-2; 2]$ $D(-4; 4]$
Javob:B

82. Chizmada $[-5; 4]$ kesmada berilgan $y = g(x)$ funksiyaning grafigi tasvirlangan. $g(x) \geq x$ tengsizlikni qanoatlantiradigan x ning barcha qiymatlarini toping.

$A)[-4; -2] \cup [3; 4]$ $\boldsymbol{B})[-\boldsymbol{5}; -\boldsymbol{2}] \cup [\boldsymbol{3}; \boldsymbol{4}]$
$C)[-5; -3] \cup [2; 4]$ $D)[-2; 3]$
Yechim:
$g(x) \geq x$ funksiya grafigidan $(-\infty; -2] \cup [3; \infty)$ ekanligi ma'lum, $[-5; 4]$ kesma bilan kesissmasi $[-5; -2] \cup [3; 4]$
Javob:B