

## MATEMATIKA

1. Ifodaning qiymatini toping:

$$\frac{(\sqrt{5} - \sqrt{11})(\sqrt{33} + \sqrt{15} - \sqrt{22} - \sqrt{10})}{\sqrt{75} - \sqrt{50}}$$

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

**Yechim:**

$$\frac{(\sqrt{5} - \sqrt{11})(\sqrt{3}(\sqrt{11} + \sqrt{5}) - \sqrt{2}(\sqrt{11} + \sqrt{5}))}{5(\sqrt{3} - \sqrt{2})}$$

$$\frac{(\sqrt{5} - \sqrt{11})(\sqrt{11} + \sqrt{5})(\sqrt{3} - \sqrt{2})}{5(\sqrt{3} - \sqrt{2})} = \frac{5 - 11}{5}$$

$$= -1,2$$

**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 % miqdorida meva bor. Birinchi yashikda qancha meva bor?

A) 36 kg B) 30 kg C) 28 kg D) 24 kg

**Yechim:**

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

**Javob:B**

3. Uchta sonning uchinchi 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:**

$$\begin{cases} a_1 a_2 = 85 \\ a_2 a_3 = 115 \end{cases} \Rightarrow a_1 a_2 + a_2 a_3 = 200$$

$$a_2(a_1 + a_3) = 200$$

$$a_2 \cdot 2a_2 = 200$$

$$a_2 = 10$$

**Javob:D**

4. Tenglamani yeching: ( $a \neq 1$ )

$$1 + a + a^2 + a^3 + \dots + a^{x-1} + a^x = (1 + a)(1 + a^2)(1 + a^4)(1 + a^8).$$

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**

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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. 1,2,2,3,3,3,4,4,4,4,5,5,5,5,6, ... 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:

$$1; 2; 3; 4; 5; 6; \dots; n, \quad n \in N$$

$$\frac{1 + n}{2} \cdot n = 2017$$

$$n^2 + n - 4034 = 0$$

$$n > 63 \Rightarrow n = 64$$

**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.

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

**Yechim:**

$$\begin{cases} b_5 - b_1 = 18 \\ b_3 - b_1 = 12 \end{cases} \Rightarrow \begin{cases} b_1(q^4 - 1) = 18 \\ b_1(q^2 - 1) = 12 \end{cases}$$

$$\Rightarrow q^2 + 1 = \frac{3}{2} \Rightarrow q^2 = \frac{1}{2} \Rightarrow b_1 = -24$$

$$b_{11} = b_1 q^{10} = -24 \cdot \frac{1}{32} = -\frac{3}{4}$$

**Javob:C**

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

- A)  $90^\circ$  B)  $120^\circ$  C)  $135^\circ$  D)  $60^\circ$

**Yechim:**

$$\sin x + \sqrt{3}\cos x = 1$$

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

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

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

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

$$x = -30^\circ; 90^\circ$$

$$-30^\circ + 90^\circ = 60^\circ$$

**Javob:D**

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

- 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:**

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

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

**Javob:C**

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

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

**Yechim:**

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

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

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

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

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

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

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

**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:**

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

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

**Javob:D**

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

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

**Yechim:**

$$\sin x = \frac{1}{2} \Rightarrow \cos x = \pm \frac{\sqrt{3}}{2}$$

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

**Javob:C**

15. Ifodani soddalashtiring:

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

- A)  $\cos 2\alpha$  B)  $2\sin^2\alpha$  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  $12 \cdot \sin 5^\circ \cdot \cos 5^\circ \cdot \cos 10^\circ = m$  tenglik bajarilsa,  $tg 70^\circ$  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:**

$$6 \cdot 2\sin 5^\circ \cdot \cos 5^\circ \cdot \cos 10^\circ = m$$

$$3 \cdot 2\sin 10^\circ \cdot \cos 10^\circ = m$$

$$3 \cdot \sin 20^\circ = m$$

$$\sin 20^\circ = \frac{m}{3}$$

$$tg 70^\circ = ctg 20^\circ = \frac{\cos 20^\circ}{\sin 20^\circ} = \frac{\sqrt{1 - \sin^2 20^\circ}}{\sin 20^\circ}$$

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

**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 + sinα D)sinα

**Yechim:**

$$\begin{aligned} \sin \left( \alpha + \frac{2\pi}{3} \right) + \sin \left( \alpha + \frac{4\pi}{3} \right) &= -2\sin \alpha \cos \frac{\pi}{3} \\ &= -\sin \alpha \\ \sin \alpha + (-\sin \alpha) &= 0 \end{aligned}$$

**Javob:B**

18. Ifodani soddalashtiring:

$$(2(\sin \alpha)^{-1} + 2(\operatorname{tg} \alpha)^{-1}) : (\operatorname{tg} \frac{\alpha}{2})^{-1}.$$

A)tg  $\frac{\alpha}{2}$  B)4 C)ctg  $\frac{\alpha}{2}$  D)2

**Yechim:**

$$\begin{aligned} \left( \frac{2}{\sin \alpha} + \frac{2\cos \alpha}{\sin \alpha} \right) &= \frac{2(1 + \cos \alpha)}{\sin \alpha} \\ &= \frac{4\cos^2 \frac{\alpha}{2}}{2\sin \frac{\alpha}{2} \cos \frac{\alpha}{2}} = \frac{2\cos \frac{\alpha}{2}}{\sin \frac{\alpha}{2}} \\ (\operatorname{tg} \frac{\alpha}{2})^{-1} &= \operatorname{ctg} \frac{\alpha}{2} \\ \frac{2\cos \frac{\alpha}{2}}{\sin \frac{\alpha}{2}} : \operatorname{ctg} \frac{\alpha}{2} &= 2 \end{aligned}$$

**Javob:D**

19. Ifodani soddalashtiring:

$$((\sin \alpha)^{-1} + (\operatorname{tg} \alpha)^{-1}) : (\operatorname{tg} \frac{\alpha}{2})^{-1}.$$

A)tg  $\frac{\alpha}{2}$  B)1 C)2 D)tg<sup>2</sup>  $\frac{\alpha}{2}$

**Yechim:**

$$\begin{aligned} \left( \frac{1}{\sin \alpha} + \frac{\cos \alpha}{\sin \alpha} \right) &= \frac{(1 + \cos \alpha)}{\sin \alpha} = \frac{2\cos^2 \frac{\alpha}{2}}{2\sin \frac{\alpha}{2} \cos \frac{\alpha}{2}} \\ &= \frac{\cos \frac{\alpha}{2}}{\sin \frac{\alpha}{2}} \\ (\operatorname{tg} \frac{\alpha}{2})^{-1} &= \operatorname{ctg} \frac{\alpha}{2} \\ \frac{\cos \frac{\alpha}{2}}{\sin \frac{\alpha}{2}} : \operatorname{ctg} \frac{\alpha}{2} &= 1 \end{aligned}$$

**Javob:B**

20. Ifodani soddalashtiring:

$$\begin{aligned} \frac{1}{2}(\cos \alpha - \cos \beta)^2 + \frac{1}{2}(\sin \alpha - \sin \beta)^2 \\ - 2\sin^2 \frac{\alpha - \beta}{2}. \end{aligned}$$

A)4sin<sup>2</sup>  $\frac{\alpha - \beta}{2}$  B)1 C)4sin  $\frac{\alpha - \beta}{2}$  D)0

**Yechim:**

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$$\begin{aligned} \frac{1}{2}(\cos \alpha - \cos \beta)^2 + \frac{1}{2}(\sin \alpha - \sin \beta)^2 &= \\ \frac{1}{2}(\cos^2 \alpha - 2\cos \alpha \cos \beta + \cos^2 \beta + \\ \sin^2 \alpha - 2\sin \alpha \sin \beta + \sin^2 \beta) &= \\ \frac{1}{2}(2 - 2\cos(\alpha - \beta)) &= \\ 1 - \cos(\alpha - \beta) &= 2\sin^2 \frac{\alpha - \beta}{2} \\ 2\sin^2 \frac{\alpha - \beta}{2} - 2\sin^2 \frac{\alpha - \beta}{2} &= 0 \end{aligned}$$

**Javob:D**

21. Ifodani soddalashtiring:

$$5 - ((\cos \alpha - \cos \beta)^2 + (\sin \alpha - \sin \beta)^2):$$

$$\left( 2\sin^2 \frac{\alpha - \beta}{2} \right)$$

A)sin<sup>2</sup>  $\frac{\alpha - \beta}{2}$  B)3 C)2sin<sup>2</sup>  $\frac{\alpha - \beta}{2}$  D)2

**Yechim:**

$$\begin{aligned} \cos^2 \alpha - 2\cos \alpha \cos \beta + \cos^2 \beta + \sin^2 \alpha \\ - 2\sin \alpha \sin \beta + \sin^2 \beta &= 2 - 2\cos(\alpha - \beta) = \\ &= 4\sin^2 \frac{\alpha - \beta}{2} \\ 4\sin^2 \frac{\alpha - \beta}{2} : 2\sin^2 \frac{\alpha - \beta}{2} &= 2 \\ 5 - 2 &= 3 \end{aligned}$$

**Javob:B**

22. Agar  $a = 8$  bo'lsa, ifodani soddalashtiring:

$$\frac{1}{(25^{2\log_4 25} + 2\log_2 \log_2 \log_2 a^{2\log_4 a})} \cdot 4^{-\frac{2}{\log_3 4}} - a^2$$

A)10 B)8 C)9 D)4,5

**Yechim:**

$$\begin{aligned} \frac{1}{25^{2\log_4 25}} &= 25^{\frac{\log_4 25}{2}} = 49^{\frac{\log_2 25}{2}} = 7 \\ 2\log_2 \log_2 \log_2 a^{\log_4 16} &= 2\log_2 \log_2 \log_2 16 = \\ 2\log_2 \log_2 4 &= 2\log_2 2 = 2 \\ 4^{-\frac{2}{\log_3 4}} &= 4^{-2\log_4 3} = 3^{-2\log_4 4} = \frac{1}{9} \\ \frac{(7 + 2) \cdot \frac{1}{9} - 64}{1 - 8} &= 9 \end{aligned}$$

23. Ifodani soddalashtiring:

$$\frac{1 - \log_a^3 b}{(\log_a b + \log_b a + 1) \cdot \log_a \frac{a}{b}} \cdot \log_b a.$$

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

**Yechim:**

$$\begin{aligned} (1 - \log_a^3 b) \cdot \log_b a &= (1 - \log_a b) \\ (1 + \log_a b + \log_a^2 b) \cdot \log_b a &= \\ \log_a \frac{a}{b} (\log_b a + 1 + \log_a b) &= \\ \frac{(\log_a b + \log_b a + 1) \cdot \log_a \frac{a}{b}}{(\log_a b + \log_b a + 1) \cdot \log_a \frac{a}{b}} &= 1 \end{aligned}$$

**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 B)2 C)1 D)3

**Yechim:**

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

**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 B)4 C)1/4 D)16

**Yechim:**

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

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

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

**Yechim:**

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

**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:**

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

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

**Yechim:**

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

**Javob:C**

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

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

**Yechim:**

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

**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 B)1 C)  $-\frac{2}{3}$  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;  $-4b$     **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    **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) $\frac{x+2}{x-1}$     **D)x+2**

**Yechim:**

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

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

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

**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    **D)a - b + 4**

**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,  $(\frac{a^2}{b+c} + \frac{b^2}{c+a} + \frac{c^2}{a+b}) : (a+b+c)$  ning qiymatini toping.

A)1    B)0,5    **C)0**    D)2

**Yechim:**

$$\begin{cases} \frac{a^2}{b+c} + \frac{ab}{c+a} + \frac{ac}{a+b} = a \\ \frac{ab}{b+c} + \frac{b^2}{c+a} + \frac{bc}{a+b} = b \\ \frac{ac}{b+c} + \frac{bc}{c+a} + \frac{c^2}{a+b} = c \end{cases}$$

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

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

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

**Javob:C**

36. Tenglamani yeching:

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

A)49    **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.

A) $\frac{\sqrt{2}}{2}$     B) $-\frac{\sqrt{2}}{2}$     C) $\sqrt{3} - \sqrt{2}$     D) $\sqrt{3} + \sqrt{2}$

**Yechim:**

$$D = (2\sqrt{3} + 3\sqrt{2})^2 - 4 \cdot 2 \cdot (\sqrt{6} + 2)$$

$$= (2\sqrt{3} + \sqrt{2})^2$$

$$x_1 = \frac{\sqrt{2}}{2}, x_2 = \sqrt{3} + \sqrt{2}$$

**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:  $\sin x + \cos x = \sqrt{2}$

A)  $x = \frac{\pi}{4} + 2\pi n, n \in \mathbb{Z}$

B)  $x = \frac{3\pi}{4} + 2\pi n, n \in \mathbb{Z}$

C)  $x = \frac{3\pi}{4} + \pi n, n \in \mathbb{Z}$

D)  $x = \frac{\pi}{4} + \pi n, n \in \mathbb{Z}$

**Yechim:**

$$\sin x + \cos x = \sqrt{2} \sin\left(x + \frac{\pi}{4}\right)$$

$$\sqrt{2} \sin\left(x + \frac{\pi}{4}\right) = \sqrt{2}$$

$$\sin\left(x + \frac{\pi}{4}\right) = 1$$

$$x + \frac{\pi}{4} = \frac{\pi}{2} + 2\pi n, n \in \mathbb{Z}$$

$$x = \frac{\pi}{4} + 2\pi n, n \in \mathbb{Z}$$

**Javob:**

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

A)  $\left\{\frac{\pi n}{2}, n \in \mathbb{Z}\right\}$

B)  $\left\{\frac{\pi n}{4}, n \in \mathbb{Z}\right\}$

C)  $\left\{\frac{\pi n}{3}, n \in \mathbb{Z}\right\}$

D)  $\left\{\frac{2\pi n}{3}, n \in \mathbb{Z}\right\}$

**Yechim:**

$$\begin{cases} \sin^{100} x = 1 \Rightarrow \cos x = 0 \\ \cos^{100} x = 1 \Rightarrow \sin x = 0 \end{cases} \Rightarrow x = \frac{\pi n}{2}, n \in \mathbb{Z}$$

**Javob:A**