2017-yil matematika variant yechimlari (spectrum)

25-variant

Bizning kanal : @axborotnoma

Adminsratorlar hayati : @axborotnoma_bot

Matematika yordam guruhi : @axborotnomaguruhi

Reklama xizmati : @axborotnoma_reklama

25-variant

1. Qarang: 8-variant 12-savol (61-bet).
2. Qarang: 8-variant 15-savol (62-bet).
3. Qarang: 3-variant 14-savol (22-bet).
4. $m = 97$, $n = 41$ bo'lsa, $\left(\frac{m^2}{n^2}+\frac{n}{m}\right):\left(\frac{m}{n^2}-\frac{1}{n}+\frac{1}{m}\right)$ ifoda qiymatini toping.

Yechish:

Ifodani soddalashtirib $m = 97$, $n = 41$ dagi qiymatini topamiz.

$$1)\ \left(\frac{m^2}{n^2}+\frac{n}{m}\right)\cdot\left(\frac{m}{n^2}-\frac{1}{n}+\frac{1}{m}\right)=$$

$$=\frac{m^3+n^3}{n^2\cdot m}:\frac{m^2-mn+n^2}{n^2m}=$$

$$=\frac{(m+n)(m^2-mn+n^2)}{n^2m}\cdot\frac{n^2m}{m^2-mn+n^2}=m+n$$

$2)\ m+n=97+41=138.$

Javob: 138.

5. Qarang: 6-variant 1-savol (45-bet).

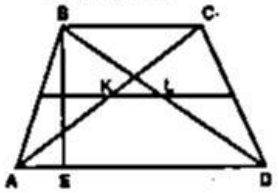
6. Qarang: 10-variant 11-savol (77-bet).

7. ABCD (AD||BC) trapetsiyada AD = 12, BC = 8. Trapetsiyaning balandligi 8 ga teng. AD asosi, diagonallar va o'rta chiziq bilan chegaralangan to'rtburchakning yuzini toping.

Berilgan:

ABCD – trapetsiya
AD||BC
AD = 12
BC = 8
BE = 8
$S_{AKLD} = ?$

Yechish:



$$1)\ KL=\frac{AD-BC}{2}=\frac{12-8}{2}=2$$

2) AKLD trapetsiya.

$$S_{AKLD}=\frac{KL+AD}{2}\cdot\frac{BE}{2}=\frac{2+12}{2}\cdot\frac{8}{2}=7\cdot4=28.$$

Javob: 28.

8. Nechta toq son $\sqrt[3]{x^{\log_3\sqrt[3]{x}}}>3$ tengsizlikning yechimi bo'la olmaydi?

Yechish:

1) aniqlanish sohasi $x>0,\ x\neq1$

$$2)\ \log_3\sqrt[3]{x^{\log_3\sqrt[3]{x}}}>\log_3 3$$

$$\log_3 x^{\frac{\log_3\sqrt[3]{x}}{3}}>1$$

$$\frac{\log_3\sqrt[3]{x}}{3}\log_3 x>1$$

$$(\log_3 x)^2>9$$

$$(\log_3 x-3)(\log_3 x+3)>0$$

$$\log_3 x<-3,\ \log_3 x>3$$

$$x<3^{-3}=\frac{1}{27},\ x>27$$

$$x\in\left(0;\frac{1}{27}\right)\cup(27;\infty)$$

Tengsizlikning yechimi bo'lmaydigan oraliq $\left[\frac{1}{27};\ 27\right]$. *Oraliqdagi natural toq son 14 ta.*

Javob: 14.

9. Hisoblang:

$$\log_{\sqrt[5]{7}}\sqrt[5]{7}\,(2^{\log_2 11}-\log_2 4-\log_2 16).$$

Yechish:

1) asosiy logarifmik ayniyatga ko'ra:

$$a^{\log_a b}=b.\ 2^{\log_2 11}=11.$$

2) logarifm xossalariga ko'ra:

$\log_2 4=2,\ \log_2 16=4$

$$\log_{\sqrt[5]{7}}\sqrt[5]{7}=\frac{3}{5}\log_7 7=\frac{3}{5}.$$

$$3)\ \frac{3}{5}\cdot(11-2-4)=\frac{3}{5}\cdot5=3.$$

Javob: 3.

10. Qaysi son yarmining $\frac{4}{9}$ qismidan 3 ni ayirsa 7 ga teng bo'ladi?

Yechish:

x – son

$$\frac{4x}{2\cdot9}-3=7$$

$$\frac{2x}{9}=7+3,$$

$$\frac{2x}{9}=10,$$

$$x=\frac{10\cdot9}{2}=45.$$

Javob: 45.

11. Qarang: 17-variant 15-savol (126-bet).

12. $a_1 = \lg 4$, $a_2 = \lg(2^x - 4)$ va $a_3 = \lg(2^x + 20)$ sonlar arifmetik progressiyani tashkil etadi. $\frac{1}{4}x$ qiymatini toping.

Yechish:

$a_1 = \lg 4$,

$a_2 = \lg(2^x - 4)$ va $a_3 = \lg(2^x + 20)$; $\frac{x}{4} = ?$

1) arifmetik progressiyada $2a_2 = a_1 + a_3$
$2\lg(2^x - 4) = \lg 4 + \lg(2^x + 20)$
$\lg(2^x - 4)^2 = \lg 4 \cdot (2^x + 20)$
$(2^x - 4)^2 = 4 \cdot (2^x + 20)$. $2^x = y$
$(y - 4)^2 = 4(y + 20)$
$y^2 - 8y + 16 = 4y + 80$
$y^2 - 12y - 64 = 0$. $y = -4$, $y = 16$
2) $2^x = -4 \to \varnothing$
$2^x = 16$, $x = 4$
3) $\frac{1}{4}x = \frac{1}{4} \cdot 4 = 1$

Javob: 1.

13. $y = \frac{|x^2 - x - 12|}{\sqrt{11x - x^2 - 18}}$ funksiyaning aniqlanish sohasini toping.

Yechish:

$y = \frac{|x^2 - x - 12|}{\sqrt{11x - x^2 - 18}}$, $D(y) = ?$
$11x - x^2 - 18 > 0$, $x^2 - 11x + 18 < 0$
$2 < x < 9$.

Javob: (2; 9).

14. $\{x | x \in N, x^2 \le 30{,}1\}$ to'plamning nechta qism-to'plamlari mavjud?

Yechish:

$\{x | x \in N, x^2 \le 30{,}1\}$
$A = \{1, 2, 3, 4, 5\}$
A to'plamning qism to'plamlari 32 ta.
A to'plam 5 ta elementdan iborat.
1) bitta elementdan iborat qism to'plamlari:

$C_5^1 = \frac{5!}{1!(5-1)!} = \frac{4! \cdot 5}{4!} = 5$, 5 ta.

2) ikkita elementdan iborat qism to'plamlari:

$C_5^2 = \frac{5!}{2!(5-2)!} = \frac{3! \cdot 4 \cdot 5}{2! \cdot 3!} = \frac{4 \cdot 5}{1 \cdot 2} = 10$, 10 ta

3) uchta elementdan iborat qism to'plamlari:

$C_5^3 = \frac{5!}{3!(5-3)!} = \frac{5!}{3! \cdot 2!} = \frac{3! \cdot 4 \cdot 5}{3! \cdot 1 \cdot 2} = 10$ ta

4) to'rtta elementdan iborat qism to'plamlari:

$C_5^4 = \frac{5!}{4!(5-4)!} = \frac{4! \cdot 5}{4! \cdot 1} = 5$, 5 ta

5) Ø va A to'plam ham A to'plamning qism to'plami bo'ladi, jami 32 ta qism to'plam.

Javob: 32.

15. 312, 156, 234 sonlarining eng kichik umumiy karralisining eng katta umumiy bo'luvchisiga nisbatini toping.

Yechish:

1) sonlarni tub ko'paytuvchilarga ajratamiz:
$312 = 2^3 \cdot 3 \cdot 13$
$156 = 2^2 \cdot 3 \cdot 13$
$234 = 2 \cdot 3^2 \cdot 13$
2) $EKUK = 2^3 \cdot 3^2 \cdot 13$
$EKUB = 2 \cdot 3 \cdot 13$
3) $\frac{EKUK}{EKUB} = \frac{2^3 \cdot 3^2 \cdot 13}{2 \cdot 3 \cdot 13} = 2^2 \cdot 3 = 12$.

Javob: 12.

16. Qandaydir a, b, c uchun $\cos 4x = a\cos^4 x + b\cos^2 x + c$ ayniyat bajarilsa, c ni toping.

Yechish:

$\cos 4x = a\cos^4 x + b\cos^2 x + c$ ayniyat. $c = ?$
1) $\cos 4x = 2\cos^2 2x - 1$.
2) $\cos 2x = 2\cos^2 x - 1$.
3) $\cos 4x = 2(2\cos^2 x - 1)^2 - 1 =$
$= 8\cos^4 x - 8\cos^2 x + 1$.
Demak, $a = 8$, $b = -8$, $c = 1$.

Javob: 1.

17. **Qarang: 23-variant 25-savol (166-bet).**

18. **Qarang: 16-variant 26-savol (122-bet).**

19. **Qarang: 11-variant 18-savol (84-bet).**

20. **Qarang: 18-variant 3-savol (130-bet).**

21. a ning qanday qiymatlarida $ax^2 + (2 - a)x + 4a = 0$ tenglama ildizga ega emas?

Yechish:

$ax^2 + (2-a)x + 4a = 0.\ D < 0,$

$a = ?$

$D = (2-a)^2 - 4\cdot a\cdot 4a < 0$

$(2-a)^2 - (4a)^2 < 0$

$(2-a-4a)(2-a+4a) < 0,$

$(2-5a)(2+3a) < 0$

$(5a-2)(2a+3) > 0.$

$a \in (-\infty; -\frac{2}{3}) \cup (\frac{2}{5}; \infty).$

Javob: $(-\infty; -\frac{2}{3}) \cup (\frac{2}{5}; \infty).$

22. Qarang: 6-variant 30-savol (50-bet).

23. ABCD teng yonli trapetsiyaning AC diagonali 6 ga teng va u AD katta asos bilan 22,5° li burchak tashkil etadi. Trapetsiyaning yuzini toping.

Berilgan:

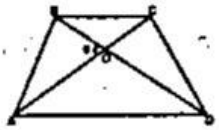
$ABCD$ – teng yonli trapetsiya

$AC = BD = 6$

$\angle CAD = \angle BDA = 22{,}5^\circ$

$S = ?$

Yechish:



$S = \frac{AC\cdot BD}{2}\cdot \sin\varphi$

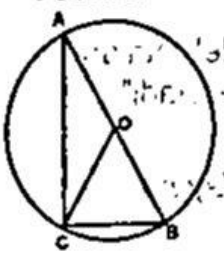
$\varphi = \angle OAD + \angle ODA = 22{,}5^\circ + 22{,}5^\circ = 45^\circ$

$S = \frac{6\cdot 6}{2}\cdot \sin 45^\circ = 18\cdot\frac{\sqrt{2}}{2} = 9\sqrt{2}$

Javob: $9\sqrt{2}$.

24. To'g'ri burchakli uchburchakda gipotenuza va kichik kafetning yig'indisi 27 ga teng. Agar katta katetning uzunligi $9\sqrt{3}$ ga teng bo'lsa, unga tashqi chizilgan aylana uzunligini toping.

Yechish:



ΔABC to'g'ri burchakli

$AB = c,$

$AC = b,$

$CB = a$

$c + b = 27,$

$a = 9\sqrt{3}$

Pifagor teoremasiga ko'ra

$c^2 = a^2 + b^2$

$c^2 = (9\sqrt{3})^2 + (27-c)^2$

$(c - 27 + c)(c + 27 - c) = 81\cdot 3$

$(2c - 27)\cdot 27 = 81\cdot 3$

$2c - 27 = 9,\ 2c = 36,\ c = 18$

$b = 9$

To'g'ri burchakli uchburchakka tashqi chizilgan aylana radiusi $R = \frac{c}{2}$. Aylana uzunligi $L = 2\pi R = \pi\cdot c = 18\pi.$

Javob: 18π.

25. ABCD parallelogrammda M nuqta BD diagonalda yotadi. Bunda MD:BM = 1:2. Agar ADCM to'rtburchak yuzi 3 ga teng bo'lsa, ABCD parallelogramm yuzini toping.

Berilgan:

$ABCD$ – parallelogramm

$M \in BD$

$MD:BM = 1:2$

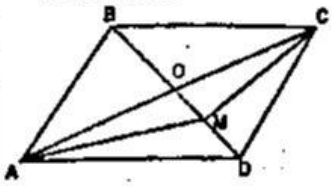
$MD = x$

$BM = 2x$

$S_{ADCM} = 3$

$S_{ABCD} = ?$

Yechish:



$S_{ABCD} = \frac{AC\cdot BD}{2}\cdot \sin\varphi = \frac{3x\cdot AC}{2}\cdot \sin\varphi$

$S_{ABCM} = \frac{BM\cdot AC}{2}\cdot \sin\varphi = \frac{2x\cdot AC}{2}\cdot \sin\varphi$

$S_{ADCM} = S_{ABCD} - S_{ABCM} =$

$= \frac{3x\cdot AC}{2}\cdot \sin\varphi - \frac{2x\cdot AC}{2}\cdot \sin\varphi = \frac{x\cdot AC}{2}\cdot \sin\varphi$

$3 = \frac{x\cdot AC}{2}\cdot \sin\varphi$

$S_{ABCD} = 3\cdot\frac{x\cdot AC}{2}\cdot \sin\varphi = 3\cdot 3 = 9$

Javob: 9.

26. Qarang: 8-variant 13-savol (61-bet).

27. Soddalashtiring:

$n - \frac{2}{3n+1} - \frac{3n^2 - 0{,}5n - 2{,}5}{3n+1}.$

Yechish:

Umumiy maxrajga keltirib soddalashtiramiz,

$$n-\frac{2}{3n+1}-\frac{3n^2-0,5n-2,5}{3n+1}=$$

$$\frac{3n^2+n-2-3n^2+0,5n+2,5}{3n+1}=$$

$$=\frac{1,5n+0,5}{3n+1}=\frac{0,5(3n+1)}{3n+1}=0,5.$$

Javob: 0,5.

28. Kasrning maxraji suratidan 3 ga katta. Agar suratiga 7 ni, maxrajiga 5 ni qo'shsak, kasr $\frac{1}{2}$ ga ortadi. Kasmi toping.

Yechish:

Kasmi $\frac{a}{b}$ ko'rinishda yozib olamiz.

Unda shartga ko'ra $b = a + 3$,

$$\frac{a+7}{b+5}=\frac{a}{b}+\frac{1}{2}\Rightarrow\frac{a+7}{a+8}=\frac{a}{a+3}+\frac{1}{2}$$

$$\frac{a+7}{a+8}=\frac{3a+3}{2a+6}$$

$$2a^2+14a+6a+42=3a^2+3a+24a+24$$

$$a^2+7a-18=0$$

Viyet teoremasiga ko'ra

$a_1 = -9$; $a_2 = 2$.

Demak, izlanayatgan kasr $\frac{2}{2+3}=\frac{2}{5}$.

Javob: $\frac{2}{5}$.

29. Agar $a > 0$ bo'lsa, $y=\frac{a}{|x-a|}$ funksiyaning vertikal asimptotasini toping.

Yechish:

$a > 0$, $y=\frac{a}{|x-a|}$

Vertikal asimptota $x = a$ to'g'ri chiziq.

Javob: x = a.

30. Qarang: 3-variant 27-savol (25-bet).

31. Faqat rost mulohazalarni aniqlang va ularga tenglashtirilgan sonlar yig'indisini rim sanoq sistemasida hisoblang.

DCXCIX = "Klod Shennon axborotni bizni va sezgilarimizni tashqi olamga moslashuvimizdagi mazmunni ifodalash deb qaraydi"

XCVII = "XX asrning 50-yillarida informatika faniga asos solingan"

IV = "Software – bu informatikaning qismi bo'lib, dasturiy vositalar sifatida qaraladi"

Yechish:

DCXCIX = 699="Klod Shennon axborotni bizni va sezgilarimizni tashqi olamga moslashuvimizdagi mazmunni ifodalash deb qaraydi" – yolg'on. Bu Norbert Viner so'zlari.

XCVII = 97 ="XX asrning 50-yillarida informatika faniga asos solingan" – rost

IV = 4 = "Software – bu informatikaning qismi bo'lib, dasturiy vositalar sifatida qaraladi" – rost

XCVII + IV = 97 + 4 = 101 = CI

Javob: CI.

32. Rost mulohazalarga mos sonlar yig'indisini rim sanoq sistemasida aniqlang:

CXLV = "Axborot ikki turda bo'ladi: analog va diskret"

XCVII = "Insonga uzluksiz ta'sir etib turuvchi axborotlar analog axborotlar deb ataladi"

IV = "Insonga uzluksiz ta'sir etib turovchi axborotlar diskret axborotlar deb ataladi"

Yechish:

Rim raqamlarini 10-lik sanoq sistemasiga o'tkazib, rost mulohazalarni aniqlaymiz:

CXLV = 145 = "Axborot ikki turda bo'ladi: analog va diskret" – rost

XCVII = 97 = "Insonga uzluksiz ta'sir etib turuvchi axborotlar analog axborotlar deb ataladi" – rost

IV = 4 = "Insonga uzluksiz ta'sir etib turovchi axborotlar diskret axborotlar deb ataladi" – yolg'on

CXLV + XCVII = 145 + 97 = 242 = CCXLII

Javob: CCXLII.

33. Qarang: 3-variant 36-savol (27-bet).

34. Qarang: 19-variant 34-savol (142-bet).

35. Qarang: 7-variant 32-savol (59-bet).

36. Qarang: 1-variant 35-savol (11-bet).