2017-yil matematika variant yechimlari (spectrum)
22-variant

Bizning kanal : @axborotnoma

Adminsratorlar hayati : @axborotnoma_bot

Matematika yordam guruhi : @axborotnomaguruhi

Reklama xizmati : @axborotnoma_reklama

1. Qarang: 21-variant 2-savol (150-bet).

2. Piramidaning asosi katetlari 5 va 12 ga teng bo'lgan to'g'ri burchakli uchburchakdan iborat. Piramidaning barcha yon qirralari asos tekisligi bilan 45° li burchak tashkil etsa, piramidaning katta yon yog'i yuzini toping.

Berilgan:

SABC – piramida
ABC – to'g'ri burchakli uchburchak
AC = a
BC = b

Yechish:

155
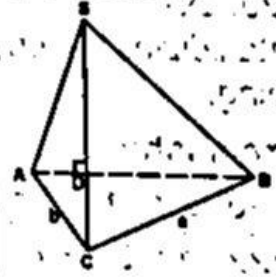
$a = 12$
$b = 5$
$\angle SAB = 45°$
$S_{ASB} = ?$

$$S_{ASB} = \frac{AB \cdot SD}{2}$$

1) $AB^2 = c^2 = a^2 + b^2 = 12^2 + 5^2 = 13^2$
2) $\angle SAD = 45°$ bo'lganligi sababli
$H = SD = AD.$
$AD = AB/2 = 13/2 = 6,5$

$$S = \frac{13 \cdot 6,5}{2} = 6,5^2 = 42,25$$

Javob: 42,25.

3. $|x - 1| - 2|x - 2| + 3|x - 3| = 4$ tenglamaning butun ildizlari yig'indisini toping.

Yechish:
1) $x \le 1$
$1 - x - 2(2 - x) + 3(3 - x) = 4$
$1 - x - 4 + 2x + 9 - 3x = 4$
$-2x = 2, x = 1, 1 \in (-\infty; 1]$
2) $1 < x < 2$
$x - 1 - 2(2 - x) + 3(3 - x) = 4$
$x - 1 - 4 + 2x + 9 - 3x = 4$
$0 = 0$
3) $2 \le x < 3$
$x - 1 - 2(x - 2) + 3(3 - x) = 4$
$x - 1 - 2x + 4 + 9 - 3x = 4$
$-4x = -8, x = 2, 2 \in [2; 3)$
4) $x \ge 3$
$x - 1 - 2(x - 2) + 3(x - 3) = 4$
$x - 1 - 2x + 4 + 3x - 9 = 4$
$2x = 10, x = 5, 5 \in [3; \infty)$
Tenglamaning ildizlari: $x = 1, x = 2, x = 5$.
Ildizlari yig'indisi: $1 + 2 + 5 = 8$.

Javob: 8.

4. $f(x) = \ln(\ctg 5x)$ funksiya hosilasini toping.

Yechish:
$f(x) = \ln(\ctg 5x)$ murakkab funksiya.

$$f'(x) = (\ln(\ctg 5x))' = \frac{(\ctg 5x)'}{\ctg 5x} =$$

$$= -\frac{5}{\ctg 5x \cdot \sin^2 5x} = \frac{-5}{\dfrac{\cos 5x}{\sin 5x} \cdot \sin^2 5x} =$$

$$= \frac{-5}{\sin 5x \cdot \cos 5x} = \frac{-10}{\sin 10x}.$$

Javob: $\dfrac{-10}{\sin 10x}.$

5. Qarang: 21-variant 27-savol (154-bet).

6. Qarang: 6-variant 27-savol (50-bet).

7. Qarang: 3-variant 29-savol (26-bet).

8. Tenglamani yeching:
$$\frac{2x^2 + 5x + 15}{2x^2 + 5x + 3} - \frac{2x^2 + 5x + 13}{2x^2 + 5x + 5} = 1.$$

Yechish:
$2x^2 + 5x + 3 = a$ belgilash kiritamiz.

$$\frac{a+12}{a} - \frac{a+10}{a+2} = 1.$$

$(a + 12)(a + 2) - (a + 10) \cdot a = a \cdot (a + 2)$
$a^2 + 14a + 24 - a^2 - 10a = a^2 + 2a$
$a^2 - 2a - 24 = 0, a = 6, a = -4$
$2x^2 + 5x + 3 = a.$
1) $a = 6$ da $2x^2 + 5x + 3 = 6$,
$2x^2 + 5x - 3 = 0.$

$x_1 = -3, x_2 = \dfrac{1}{2}.$

2) $a = -4$ da $2x^2 + 5x + 3 = -4$,
$2x^2 + 5x + 7 = 0.$
Tenglama yechimga ega emas.

Tenglamaning yechimlari $x = -3$ va $x = \dfrac{1}{2}.$

Javob: $-3; \dfrac{1}{2}.$

9. $y = 2^{\sin x} - 1$ funksiyaning qiymatlar sohasini toping.

Yechish:
$y = 2^{\sin x} - 1$ qiymatlar sohasini topamiz.
$-1 \le \sin x \le 1$ bo'lganligi uchun.

$$y_{min} = 2^{\sin x} - 1 = 2^{-1} - 1 = \frac{1}{2} - 1 = -\frac{1}{2}.$$

$$y_{max} = 2^{\sin x} - 1 = 2^1 - 1 = 2 - 1 = 1.$$

$$E(y) = \left[-\frac{1}{2}; 1\right]$$

Javob: $\left[-\dfrac{1}{2}; 1\right].$

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10. Qarang: 8-variant 18-savol (62-bet).

11. $f(x) = 8\cos x$ funksiyaning boshlang'ich $F(x)$ ni $X_0 = -\pi$ nuqtadagi qiymati 13 ga teng. $F(\frac{\pi}{6})$ ni toping.

Yechish:

$f(x) = 8\cos x$, $F(-\pi) = 13$, $F(\frac{\pi}{6}) = ?$

1) boshlang'ich funksiyasini topamiz:
$f(x) = 8\cos x$ $F(x) = 8\sin x + C$
2) $F(-\pi) = 13$, $F(-\pi) = 8\cdot\sin(-\pi) + C = 13$
$C = 13$
3) $F(x) = 8\sin x + 13$

$F(\frac{\pi}{6}) = 8\cdot\sin\frac{\pi}{6} + 13 = 8\cdot\frac{1}{2} + 13 = 17.$

Javob: 17.

12. $y = \dfrac{2}{\sin^2 3x}$ funksiyaning grafigi $M(\frac{\pi}{6}; 3)$ nuqtadan o'tuvchi boshlang'ich funksiyasini toping.

Yechish:

$y = \dfrac{2}{\sin^2 3x}$, $M(\frac{\pi}{6}; 3)$

1) funksiyaning boshlang'ich funksiyasini topamiz:

$f(x) = \dfrac{2}{\sin^2 3x}$, $F(x) = -\dfrac{2}{3}\operatorname{ctg}3x + C$

2) $M(\frac{\pi}{6}; 3)$.

$F(\frac{\pi}{6}) = -\dfrac{2}{3}\operatorname{ctg}3\cdot\frac{\pi}{6} + C = 3$

$-\dfrac{2}{3}\operatorname{ctg}\frac{\pi}{2} + C$, $\operatorname{ctg}\frac{\pi}{2} = 0$, $C = 3$

3) $F(x) = -\dfrac{2}{3}\operatorname{ctg}3x + 3.$

Javob: $-\dfrac{2}{3}\operatorname{ctg}3x + 3.$

13. $\sqrt{14-x} > 2 - x$ tengsizlikning eng katta butun yechimini toping.

Yechish:

$\sqrt{14-x} > 2 - x$ irratsional tengsizlik quyidagi tengsizliklar sistemasiga teng kuchli bo'ladi:

$$\begin{cases}\begin{cases}2-x<0\\14-x\geq 0\end{cases}\\\begin{cases}2-x\geq 0\\14-x>4-4x+x^2\end{cases}\end{cases} \Leftrightarrow \begin{cases}\begin{cases}x>2\\x\leq 14\end{cases}\\\begin{cases}x\leq 2\\x^2-3x-10<0\end{cases}\end{cases}$$

$x \in (2; 14]$
$x^2 - 3x - 10 = 0$ tenglama $x_1 = 5$ va $x_2 = -2$ ildizlarga ega $\Rightarrow$

ikkinchi tenglamalar sistemasi:

$$\begin{cases}x\leq 2\\-2<x<5\end{cases}$$

$x \in (-2; 2]$
Demak, berilgan irratsional tengsizlikning yechimi
$x \in (-2; 2]\cup(2; 14]$ yoki $x \in (-2; 14]$.
Eng katta butun yechimi 14 ga teng.

Javob: 14.

14. Qarang: 11-variant 19-savol (85-bet).

15. Qarang: 20-variant 30-savol (147-bet).

16. Qarang: 8-variant 21-savol (63-bet).

17. Qarang: 18-variant 15-savol (132-bet).

18. Agar $xy + \sqrt{(1+x^2)(1+y^2)} = \sqrt{5}$ bo'lsa, $x\sqrt{1+y^2} + y\sqrt{1+x^2}$ ifodaning qiymatini toping.

Yechish:

1) $(xy + \sqrt{(1+x^2)(1+y^2)})^2 = (\sqrt{5})^2$

$x^2y^2 + 2xy\sqrt{(1+x^2)(1+y^2)} + (1+x^2)(1+y^2) = 5$

$2x^2y^2 + x^2 + y^2 + 2xy\sqrt{(1+x^2)(1+y^2)} = 4$

2) $(x\sqrt{1+y^2} + y\sqrt{1+x^2})^2 = a^2$

$x^2(1+y^2) + 2xy\sqrt{(1+x^2)(1+y^2)} + y^2(1+x^2) = a^2$

$2x^2y^2 + x^2 + y^2 + 2xy\sqrt{(1+x^2)(1+y^2)} = a^2$

3) $\begin{aligned}2x^2y^2 + x^2 + y^2 + 2xy\sqrt{(1+x^2)(1+y^2)} &= 4\\2x^2y^2 + x^2 + y^2 + 2xy\sqrt{(1+x^2)(1+y^2)} &= a^2\end{aligned}$
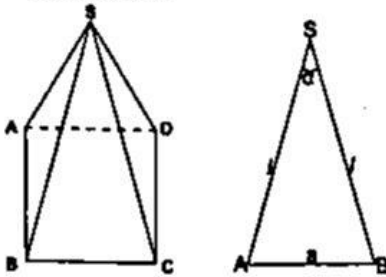
$0 = 4 - a^2$

$a^2 = 4,$

$a = \pm 2.$

Javob: ±2.

19. Muntazam to'rtburchakli piramida uchidagi yassi burchagi α. Asos yuzi Q. To'la sirti yuzini toping.

Yechish:

$\angle ASB = \alpha.$

$S_{asos} = Q,$

$AB = a$

$S_{to'la} = S_{asos} + S_{yon}$

$S_{asos} = a^2 = Q,$

$a = \sqrt{Q}$

$S_{yon} = 4 \cdot S_{ASB}$

$S_{ASB} = \dfrac{(SA)^2 \cdot \sin\alpha}{2},$

$SA = l$

$l = \dfrac{a}{2\sin\dfrac{\alpha}{2}},$

$S_{ASB} = \dfrac{a^2 \sin\alpha}{8\sin^2\dfrac{\alpha}{2}} = \dfrac{a^2 \cos\dfrac{\alpha}{2}}{4\sin\dfrac{\alpha}{2}} = \dfrac{a^2 ctg\dfrac{\alpha}{2}}{4} = \dfrac{Q \cdot ctg\dfrac{\alpha}{2}}{4}.$

$S_{to'la} = Q + 4 \cdot \dfrac{Q \cdot ctg\dfrac{\alpha}{2}}{4} = Q(1 + ctg\dfrac{\alpha}{2}).$

Javob: $Q(ctg\dfrac{\alpha}{2} + 1).$

20. Agar $\log_9 5 = a$, $\log_{25} 8 = b$ bo'lsa, $\log_2 3$ ni a va b orqali ifodalang.

Yechish:

$\log_9 5 = a$, $\log_{25} 8 = b$, $\log_2 3$ ni a va b orqali ifodalaymiz.

1) $\log_9 5 = a$, $\log_{3^2} 5 = a$, $\dfrac{1}{2}\log_3 5 = a$

$\log_3 5 = 2a$

2) $\log_{25} 8 = b$, $\log_{5^2} 2^3 = b$, $\dfrac{3}{2}\log_5 2 = b$

$\log_5 2 = \dfrac{2}{3}b$

3) $\log_3 5 \cdot \log_5 2 = \log_3 2$

$\dfrac{2}{3}b \cdot 2a = \log_3 2$, $\log_3 2 = \dfrac{4ab}{3}$

$\log_2 3 = \dfrac{3}{4ab}$

Javob: $\dfrac{3}{4ab}$.

21. Rombning diagonallari 24 sm va 70 sm bo'lsa, perimetrini toping.

Yechish:

$d_1 = 24$ sm, $d_2 = 70$ sm,

$P = ?$

$d_1^2 + d_2^2 = 4a^2$ bundan

$a = \sqrt{\dfrac{d_1^2 + d_2^2}{4}} = \dfrac{\sqrt{d_1^2 + d_2^2}}{2}$

$P = 4a = 4 \cdot \dfrac{\sqrt{d_1^2 + d_2^2}}{2} = 2\sqrt{d_1^2 + d_2^2} =$

$= 2 \cdot \sqrt{24^2 + 70^2} = 2 \cdot 74 = 148.$

Javob: 148.

22. $\dfrac{\sqrt{x^2 - 9} + 3}{x} \leq 1$ tengsizlikni yeching.

Yechish:

1) aniqlanish sohasi

$\begin{cases} x^2 - 9 \geq 0 \\ x \neq 0 \end{cases} \Rightarrow \begin{cases} (x+3)(x-3) \geq 0 \\ x \neq 0 \end{cases}$

$x \leq -3, \ x \geq 3$

2) $\dfrac{\sqrt{x^2 - 9} + 3 - x}{x} \leq 0.$

a) $\begin{cases} x > 0 \\ \sqrt{x^2 - 9} + 3 - x \leq 0 \end{cases} \Rightarrow \begin{cases} x > 0 \\ \sqrt{x^2 - 9} \leq x - 3 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x > 0, \ x - 3 \geq 0 \\ x^2 - 9 \leq x^2 - 6x + 9 \end{cases} \Rightarrow$

$$\Rightarrow \begin{cases} x \ge 3 \\ 6x \le 18 \end{cases} \Rightarrow \begin{cases} x \ge 3 \\ x \le 3 \end{cases} \Rightarrow x = 3.$$

b) $\begin{cases} x < 0 \\ \sqrt{x^2 - 9} + 3 - x \ge 0 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x < 0 \\ \sqrt{x^2 - 9} \ge x - 3 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x < 0 \\ x^2 - 9 \ge x^2 - 6x + 9 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} x < 0 \\ 6x \ge 18 \end{cases} \Rightarrow \begin{cases} x < 0 \\ x \ge 3 \end{cases} \to \varnothing$

Javob: {3}.

23. Hisoblang: $\sqrt[3]{\dfrac{12}{\sqrt{2}}\sqrt{\dfrac{63^2 - 27^2}{5}}}$

Yechish:

1) qisqa ko'paytirish formulasiga asosan

$\sqrt{\dfrac{63^2 - 27^2}{5}} = \sqrt{\dfrac{(63 + 27)(63 - 27)}{5}} =$

$= \sqrt{\dfrac{90 \cdot 36}{5}} = \sqrt{18 \cdot 36} = 6 \cdot 3\sqrt{2} = 18\sqrt{2}$

2) $\sqrt[3]{\dfrac{12}{\sqrt{2}} \cdot 18\sqrt{2}} = \sqrt[3]{12 \cdot 18} = \sqrt[3]{216} = 6.$

Javob: 6.

24. Oxirgi raqami 1 bo'lgan va (46; 350) intervalga tegishli bo'lgan barcha natural sonlar yig'indisini toping.

Yechish:

Oxirgi raqami 1 bo'lgan va (46; 350) intervalga tegishli bo'lgan natural sonlar 51, 61, 71, ..., 341.

$a_1 = 51$, $a_2 = 61$, $d = 10$,
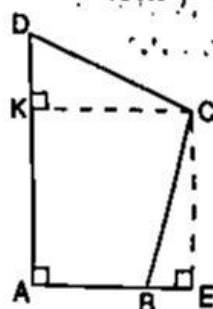
$a_n = 341$

$341 = 51 + 10(n - 1)$

$10(n - 1) = 290$

$n - 1 = 29$, $n = 30$

$S_{30} = \dfrac{51 + 341}{2} \cdot 30 = 196 \cdot 30 = 5880.$

Javob: 5880.

25. ABCD to'rtburchakda $\angle DAB = 90°$, $\angle ADC = 60°$, $\angle DCB = 60°$, $|BC| = 4$, $|DC| = 6$ bo'lsa, $|AB|$ ni toping.

Yechish:

ABCD to'rburchak

$\angle DAB = 90°$,

$\angle ADC = 60°$,

$\angle DCB = 60°$ bo'lsa,

$\angle ABC = 150°$

$|BC| = 4$, $|DC| = 6$

1) DKC da $\angle KDC = 60°$,

$\angle DCK = 30°$, bundan $|DC| = 6$ bo'lsa,

$|KD| = 3$, $|KC| = 3\sqrt{3}$

2) $\triangle BEC$ da $\angle CBE = 30°$,

$\angle BCE = 60°$, bundan $|CB| = 4$ bo'lsa,

$|CE| = 2$, $|BE| = 2\sqrt{3}$

3) $AB = AE - BE = KC - BE =$

$= 3\sqrt{3} - 2\sqrt{3} = \sqrt{3}.$

Javob: $\sqrt{3}$.

26. Hisoblang: $\dfrac{\dfrac{1}{3} - 2 - 5 \cdot \left(2 - \dfrac{1}{3}\right)}{2 - \dfrac{1}{3} + 3 \cdot \left(\dfrac{1}{3} - 2\right)}$

Yechish:

1) $\dfrac{1}{3} - 2 - 5 \cdot \left(2 - \dfrac{1}{3}\right) = \dfrac{1}{3} - 2 - \dfrac{25}{3} = -10$

2) $2 - \dfrac{1}{3} + 3\left(\dfrac{1}{3} - 2\right) =$

$= 2 - \dfrac{1}{3} - \dfrac{15}{3} = 2 - \dfrac{16}{3} = \dfrac{-10}{3}$

3) $-10 : \left(\dfrac{-10}{3}\right) = 3.$

Javob: 3.

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27. Tenglamani yeching:
$x^2 - 2ax + a^2 - b^2 = 0.$

Yechish:
$x^2 - 2ax + a^2 - b^2 = 0.$

$$x_{1,2} = \frac{2a \pm \sqrt{(2a)^2 - 4(a^2 - b^2)}}{2} =$$

$$\frac{2a \pm \sqrt{4a^2 - 4a^2 + 4b^2}}{2} = \frac{2a \pm 2b}{2}$$

$x_1 = a + b,\ x_2 = a - b.$

Javob: $a + b,\ a - b.$

28. Qarang: 6-variant 3-savol (46-bet).

29. Qarang: 3-variant 3-savol (20-bet).

30. ABCD parallelogrammda M nuqta BD diagonalda yotadi. Bunda MD:BM = 1:2. Agar ADCM to'rtburchak yuzi 5 ga teng bo'lsa, ABCD parallelogramm yuzini toping.

Berilgan:
ABCD – parallelogramm
AC, BD – diagonallar
M ∈ BD
MD:BM = 1:2

$S_{ADCM} = 5$
$S_{ABCD} = ?$

Yechish:

1) $S_{ABCD} = \dfrac{AC \cdot BD}{2} \cdot \sin\alpha = \dfrac{AC \cdot 3x}{2} \cdot \sin\alpha$

2) $S_{ABCM} = \dfrac{AC \cdot 2x}{2} \cdot \sin\alpha$

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

$= \dfrac{AC \cdot 3x}{2} \cdot \sin\alpha - \dfrac{AC \cdot 2x}{2} \cdot \sin\alpha =$

$= \dfrac{AC \cdot x}{2} \cdot \sin\alpha$

$\dfrac{AC \cdot x}{2} \cdot \sin\alpha = 5$

4) $S_{ABCD} = 3 \cdot \dfrac{AC \cdot x}{2} \cdot \sin\alpha = 3 \cdot 5 = 15$

Javob: 15.

31. Raqamli signalni analogli signalga va aksinchaga aylantirib beruvchi qurilma nomini toping.

Yechish:
Raqamli signalni analogli signalga va aksinchaga aylantirib beruvchi qurilma **modem** deyiladi. Modem so'zi modulyatsiya-demodulyatsiya so'zlaridan hosil qilingan.

Javob: modem.

32. Faylga yo'l berilgan: *C : \My pictures\klass\picture.bmp*
Bosh katalogni ko'rsating.

Yechish:
C : \My pictures\klass\picture.bmp da
    picture – fayl nomi;
    bmp – fayl kengaytmasi;
    klass – fayl joylashgan katalog nomi;
    My pictures – klass katalogi joylashgan katalog nomi;
    \ – bosh (kornevoy) katalog nomi.
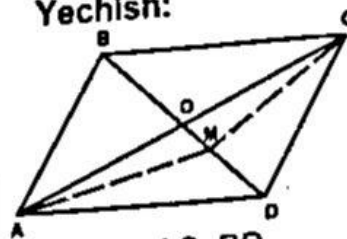   C: – disk nomi.
Biroq javoblarda \ ko'rsatilmagani sababli C: ni tanlaymiz.

Javob: C:.

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

CLXXXVIII = "Informatikani, odatda, Hardware va Software kabi ikki qismning birligi sifatida qaraladi"

XIX = "Hardware – bu informatikaning qismi bo'lib, texnik vositalar sifatida qaraladi"

IV = "Informatikani, odatda, Hardware va Programware kabi ikki qismning birligi sifatida qaraladi".

Yechish:

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

CLXXXVIII = 188 = "Informatikani, odatda, Hardware va Software kabi ikki qismning birligi sifatida qaraladi" – rost

XIX = 19 = "Hardware – bu informatikaning qismi bo'lib, texnik vositalar sifatida qaraladi" – rost

IV = 4 = "Informatikani, odatda, Hardware va Programware kabi ikki qismning birligi sifatida qaraladi". – yolg'on

CLXXXVIII + XIX = 188 + 19 = 207 = CCVII

Javob: CCVII.

34. Qarang: 5-variant 36-savol (45-bet).

35. TCP protokolining ish tamoyili nimalardan iborat?

Yechish:
TCP (transmission control protocol) – asosiy protokollardan biridir. Bu protokol yordamida ma'lumotlarni manzilga uzatadi, ya'ni marshrutlaydi.

Javob: ma'lumotlarni marshrutlaydi.

36. Sakkizlik sanoq sistemasida 42644_8 va 12241_8 sonlarining yig'indisini hisoblang.

Yechish:
$42644_8 + 12241_8 = ?$
Qo'shish uchun avval ikkilik sanoq sistemasiga o'tib, keyin raqamlarni qo'shib chiqamiz.
$42644_{(8)} = 100010110100100_{(2)}$.
$12241_{(8)} = 1010010100001_{(2)}$.

```
 .100010110100100
+  1010010100001
 101101001000101₍₂₎
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Endi bu sonni triadalarga ajratib 8-lik sanoq sistemasiga o'tkazamiz.
$101101001000101_{(2)} = 55105_{(8)}$.

Javob: 55105.