2017-yil matematika variant yechimlari (spectrum)

26-variant

Bizning kanal : @axborotnoma

Adminsratorlar hayati : @axborotnoma_bot

Matematika yordam guruhi : @axborotnomaguruhi

Reklama xizmati : @axborotnoma_reklama

26-variant

1. Qarang: 3-variant 4-savol (20-bet).

2. $\frac{|x+2|+x}{x+1} > 1$ tengsizlikning manfiy butun yechimlari nechta?

Yechish:

$\frac{|x+2|+x}{x+1} > 1,$

$x \neq -1$

$\frac{|x+2|+x}{x+1} - 1 > 0, \frac{|x+2|+x-x-1}{x+1} > 0$

$\frac{|x+2|-1}{x+1} > 0$ *tengsizlik quyidagi tengsizliklar sistemasiga teng kuchli.*

1) $\begin{cases} |x+2|-1>0 \\ x+1>0 \end{cases}$

2) $\begin{cases} |x+2|-1<0 \\ x+1<0 \end{cases}$

1) $\begin{cases} |x+2|-1>0 \\ x+1>0 \end{cases} \Rightarrow$

$\begin{cases} x+2<-1 \\ x+2>1 \\ x>-1 \end{cases} \Rightarrow \begin{cases} x<-3 \text{ va } x>-1 \\ x>-1 \end{cases} \Rightarrow x>-1$

2) $\begin{cases} |x+2|<1 \\ x+1<0 \end{cases} \Rightarrow \begin{cases} -1<x+2<1 \\ x<-1 \end{cases} \Rightarrow$

$\Rightarrow \begin{cases} -3<x<-1 \\ x<-1 \end{cases}$

Tengsizlikning yechimlari oraliqlari $(-3; -1) \cup (-1; \infty)$ *butun manfiy yechimi* -2 *ga teng. Bitta manfiy yechimga ega.*

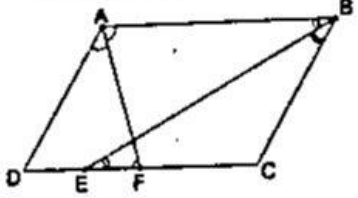
Javob: 1.

3. Qarang: 4-variant 27-savol (34-bet).

4. Qarang: 23-variant 5-savol (163-bet).

5. ABCD parallelogramm. |BE| va |AF| – bissektrisalar. |AB| = 16 sm va |BC| = 10 sm bo'lsa, |EF| nimaga teng?

Yechish:



ABCD – parallelogramm
|AB| = 16
|BC| = 10
|BE|, |AF| – bissektrisalar

DC = AB = 16, AD = BC = 10
AD = DF = EC = BC
DC = DE + EF + FC
DE = DC – EC = 16 – 10 = 6
16 = 6 + EF + 6, |EF| = 4.

Javob: |EF| = 4.

6. Ifodaning eng katta qiymatini toping:

$\frac{1}{4}\cos 2\alpha - \sin^2\alpha.$

Yechish:

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

2) $\frac{1}{4}\cos 2\alpha - \left(\frac{1}{2} - \frac{1}{2}\cos 2\alpha\right) = \frac{3}{4}\cos 2\alpha - \frac{1}{2}$

3) $-1 \le \cos 2\alpha \le 1$

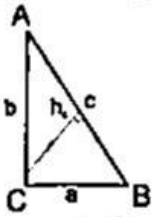
4) eng katta qiymat:

$\frac{3}{4}\cdot 1 - \frac{1}{2} = \frac{3}{4} - \frac{1}{2} = \frac{1}{4} = 0{,}25$.

Javob: 0,25.

7. Gipotenuzaga tushirilgan balandligi h ga teng bo'lgan to'g'ri burchakli uchburchak yuzasining eng kichik qiymatini toping.

Yechish:



ΔABC to'g'ri burchakli.
$\angle C = 90°$
$h_c = h$
$S_{min} = ?$

1) $S = \frac{a\cdot b}{2} = \frac{c\cdot h}{2}$,

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

$ab = h\cdot\sqrt{a^2+b^2}$

$a^2b^2 = h^2a^2 + h^2b^2$

$a^2(b^2-h^2) = h^2b^2$

$a = \frac{hb}{\sqrt{b^2-h^2}}$

$S = \frac{a\cdot b}{2} = \frac{hb^2}{2\sqrt{b^2-h^2}}$

2) hosila yordamida yechamiz

$S' = \left(\frac{hb^2}{2\sqrt{b^2-h^2}}\right)' = \frac{h}{2}\left(b^2\cdot(b^2-h^2)^{-\frac{1}{2}}\right)' =$

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

3) $S' = 0$

$\frac{h}{2}\left(\frac{2}{\sqrt{b^2-h^2}} - \frac{b^2}{2\left(b^2-h^2\sqrt{b^2-h^2}\right)}\right) = 0$

$2(b^2-h^2) - b^2 = 0$

$b^2 - 2h^2 = 0 \to b = h\sqrt{2}$

$a = \frac{h\cdot h\sqrt{2}}{\sqrt{(h\sqrt{2})^2-h^2}} = \frac{\sqrt{2}h^2}{h} = \sqrt{2}h$

4) $S_{min} = \frac{ab}{2} = \frac{h\sqrt{2}\cdot\sqrt{2}h}{2} = h^2$

Javob: h^2.

8. **Qarang: 2-variant 6-savol (13-bet).**

9. **Qarang: 19-variant 8-savol (137-bet).**

10. $f(x) = -3x^2 + 9x + t - 3$ funksiyaning maksimumi 4 ga teng, t ning qiymatini toping.

Yechish:

$f(x) = -3x^2 + 9x + t - 3$, $f_{max} = 4$,
$t = ?$

1) $f'(x) = (-3x^2 + 9x + t - 3)' = -6x + 9$

2) $f'(x) = 0$, $-6x + 9 = 0$, $x = 1{,}5$

3) $\xrightarrow[1,5]{+\quad -}$

$x = 1{,}5$ – maksimum nuqta.

4) $4 = -3\cdot(1{,}5)^2 + 9\cdot 1{,}5 + t - 3$

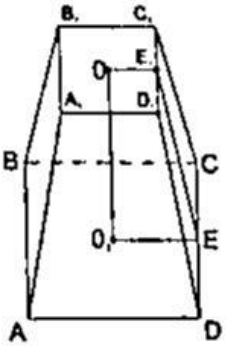
$4 = -\frac{27}{4} + \frac{27}{2} + t - 3$

$t = 7 - \frac{27}{4} = \frac{1}{4} = 0{,}25$

Javob: 0,25.

11. Muntazam to'rtburchakli kesik piramida apofemasi va asosining tomonlari 5:8:2 kabi nisbatda, hajmi $1\frac{3}{4}\,m^3$. To'la sirtli yuzini toping.

Yechish:

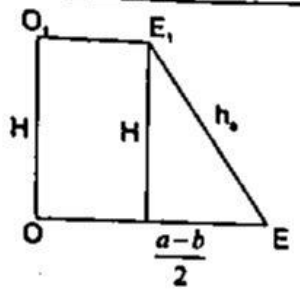


$ABCDA_1B_1C_1D_1$ – kesik piramida
$AB = 8x$, $a = 8x$
$A_1B_1 = 2x$, $b = 2x$
$EE_1 = 5x$, $h_a = 5x$
$V = 1\frac{3}{4}$
$S_{tola} = ?$

$S_{tola} = a^2 + b^2 + \frac{h_a(P_1+P_2)}{2}$

$v = \frac{1}{3}H(S_1 + S_2 + \sqrt{S_1\cdot S_2}) =$

$= \frac{1}{3}H(a^2 + b^2 + ab)$



$H^2 = h_a^2 - \left(\frac{a-b}{2}\right)^2 = (5x)^2 - \left(\frac{8x-2x}{2}\right)^2 =$

$= 25x^2 - 9x^2$

$H = 4x$

$1\frac{3}{4} = \frac{1}{3} \cdot 4x((8x)^2 + (2x)^2 + 8x \cdot 2x)$

$\frac{7}{4} = \frac{4}{3}x \cdot 84x^2,\ x^3 = \frac{1}{64},\ x = \frac{1}{4}$

$S_{to'la} = 64x^2 + 4x^2 + \frac{5x(32x+8x)}{2} =$

$= 68x^2 + 100x^2 = 168x^2 =$

$= 168 \cdot \left(\frac{1}{4}\right)^2 = \frac{168}{16} = 10{,}5.$

Javob: 10,5.

12. $\int \frac{dx}{16+x^2}$ ni hisoblang.

Yechish:

$\int \frac{dx}{16+x^2} = arctgx + C$ ga asosan yechamiz.

$\int \frac{dx}{16+x^2} = \int \frac{\frac{dx}{16}}{1+\frac{x^2}{16}} = \frac{1}{16}\int \frac{dx}{1+\left(\frac{x}{4}\right)^2} =$

$= \frac{1}{16} arctg\frac{x}{4} + C$

Javob: $\frac{1}{16} arctg\frac{x}{4} + C$.

13. **Qarang: 3-variant 9-savol (21-bet).**

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

15. **Qarang: 23-variant 4-savol (162-bet).**

16. Agar $f(2x) = 6x^3 + 4x^2 + 2x + 1$ bo'lsa, $f'(2) - f(2)$ ni toping.

Yechish:

$f(2x) = 6x^3 + 4x^2 + 2x + 1$

$f'(2) - f(2) = ?$

1) $2x = a,\ x = a/2.$

2) $f(a) = 6 \cdot \frac{a^3}{8} + 4 \cdot \frac{a^2}{4} + 2 \cdot \frac{a}{2} + 1 =$

$= \frac{3}{4}a^3 + a^2 + a + 1.$

3) $f'(a) = \left(\frac{3}{4}a^3 + a^2 + a + 1\right)' = \frac{9}{4}a^2 + 2a + 1.$

4) $f'(2) = \frac{9}{4} \cdot 2^2 + 2 \cdot 2 + 1 = 9 + 4 + 1 = 14.$

5) $f(2) = \frac{3}{4} \cdot 2^3 + 2^2 + 2 + 1 = 6 + 4 + 2 + 1 = 13.$

6) $f'(2) - f(2) = 14 - 13 = 1.$

Javob: 1.

17. **Qarang: 10-variant 20-savol (78-bet).**

18. a, b manfiy butun sonlar uchun $a = b + 3$ va $a + b - c = 13$ bo'lsa, c ning eng katta qiymatini toping.

Yechish:

$a, b \in Z,\ a < 0,\ b < 0$

$a = b + 3,\ a + b - c = 13,\ c \to max$

$b + 3 + b - c = 13,\ 2b - c = 10$

$a - b = 3,\ a < 0,\ b < 0,\ a = -1,$

$b = -4$ da c eng katta qiymatga erishadi.

$-1 - 4 - c = 13,\ c = -18.$

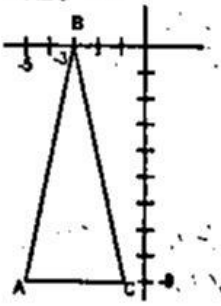
Javob: –18.

19. A(–5; –9), B(–3; 0), C(–1; –9) nuqtalarni tutashtirishdan hosil bo'lgan uchburchak yuzini toping.

Yechish:

$A(-5; -9),\ B(-3; 0),\ C(-1; -9),$

$S_{ABC} = ?$



ΔABC teng yonli, AC – asos,
$|AC| = 4$
BD – balandlik, $|BD| = 9$

$$S_{ABC} = \frac{|AC| \cdot |BD|}{2} = \frac{4 \cdot 9}{2} = 18.$$

Javob: 18.

20. Qarang: 18-variant 11-savol (131-bet).

21. Qarang: 22-variant 21-savol (158-bet).

22. Agar a = 11,4 va b = –1,4 bo'lsa, $a^3 + a^2b - ab^2 - b^3$ ni hisoblang.

Yechish:
1) $a^3 + a^2b - ab^2 - b^3 = a^2(a + b) - b^2(a + b) = (a + b)(a^2 - b^2) = (a + b)(a + b)(a - b) = (a + b)^2(a - b)$
2) $a = 11,4$ va $b = -1,4$ da
$(11,4 - 1,4)^2(11,4 + 1,4) = 10^2 \cdot 12,8 = 12,8 \cdot 100 = 1280.$

Javob: 1280.

23. Qarang: 10-variant 24-savol (79-bet).

24. Qarang: 12-variant 27-savol (95-bet).

25. $\begin{cases} 10^y = y^x \\ x + 3\lg y = 13 \end{cases}$ bo'lsa, (x + y) qiymatini toping.

Yechish:

$$\begin{cases} 10^y = y^x \\ x + 3\lg y = 13 \end{cases}$$

$(x + y) = ?$
1) aniqlanish sohasi $y > 0$.
2) tanlash yo'li bilan yechamiz: $x = 10$ va $y = 10$ tenglamalar sistemasini qanoatlantiradi. $x + y = 10 + 10 = 20$.

Javob: 20.

26. Qarang: 4-variant 28-savol (34-bet).

27. Qarang: 5-variant 22-savol (41-bet).

28. Qarang: 20-variant 5-savol (144-bet).

29. Ikki shar radiuslari 24 va 45 ga teng. Sirti ushbu ikki shar sirtlar yig'indisiga teng bo'lgan sharning radiusini toping.

Yechish:
R_1, R_2 – shar radiuslari.
$R_1 = 24, R_2 = 45$
$S = S_1 + S_2$
$R = ?$
$S_1 = 4\pi R_1^2, S_2 = 4\pi R_2^2$
$S = 4\pi(R_1^2 + R_2^2) = 4\pi R^2.$

$$R = \sqrt{R_1^2 + R_2^2} = \sqrt{24^2 + 45^2} = \sqrt{2601} = 51.$$

Javob: 51.

30. y = arctgx funksiya grafigi berilgan bo'lib, uni parallel ko'chirish yordamida y = arctg(x – a) – b funksiya grafigi hosil qilingan. Bunday parallel ko'chirishda koordinata boshi qanday nuqtaga ko'chadi?

Yechish:
y = arctgx parallel ko'chirilganda y = arctg(x – a) – b funksiya hosil bo'ldi. Koordinata boshi (0; 0) nuqta parallel ko'chirish natijasida (a; –b) nuqtaga o'tadi.

Javob: (a; –b).

31. Qarang: 23-variant 34-savol (168-bet).

32. Qarang: 22-variant 35-savol (161-bet).

33. Qarang: 3-variant 31-savol (26-bet).

34. Microsoft Excel 2003 dasturida A1=1024, A2=КОРЕНЬ(A1); A3=ПСТР(A1;ЗНАЧЕН(ПСТР (A2;1;1));2) bo'lsa, A3 katakchadagi formula natijasi nechaga teng bo'ladi?

Yechish:
A1=1024, A2=КОРЕНЬ(A1),
A3=ПСТР(A1;ЗНАЧЕН(ПСТР (A2;1;1));2)
КОРЕНЬ – kvadrat ildizni hisoblaydi;

ПСТР – satrning ko'rsatilgan pozitsiyasidan so'ralgan uzunlikdagi qismsatrni beradi;
ЗНАЧЕН – matnli argumentni son ko'rinishiga o'giradi.
Formulani bo'laklarga ajratib, har bir bo'lagini tahlil qilamiz:
A2 = КОРЕНЬ(A1) = КОРЕНЬ (1024) = 32;
ПСТР (A2;1;1) = ПСТР (32;1;1)) = '3';
ЗНАЧЕН(ПСТР (A2;1;1)) = 3;
A3=ПСТР(A1;ЗНАЧЕН(ПСТР (A2;1;1));2) A3=ПСТР(1024;3;2)
bo'ladi, ya'ni A3 katakchada 1024 sonining 3 pozitsiyasidan boshlab 2 ta simvol ajratiladi.
Formula natijasi 24 ga teng bo'ladi.

Javob: 24.

35. Qarang: 8-variant 33-savol (67-bet).

36. Qarang: 1-variant 33-savol (10-bet).