2017-yil matematika variant yechimlari (spectrum)

14-variant

Bizning kanal : @axborotnoma

Adminsratorlar hayati : @axborotnoma_bot

Matematika yordam guruhi : @axborotnomaguruhi

Reklama xizmati : @axborotnoma_reklama

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14-variant

1. [200;·1000] kesmada 2, 3, 5 va 7 sonlariga bo'linganda qoldiq 1 ga teng bo'ladigan natural sonlar nechta?

Yechish:

[200; 1000]

2, 3, 5, 7 sonlariga bo'lganda qoldiq 1 ga teng bo'lgan sonlarni topamiz.

1) $2 \cdot 3 \cdot 5 \cdot 7 + 1 = 211$, $2 \cdot 3 \cdot 5 \cdot 7 = 210$

2) $210 + 211 = 421$

3) $421 + 210 = 631$

4) $631 + 210 = 841$

[200; 1000]

oraliqda 2, 3, 5, 7 sonlariga bo'lganda qoldiq 1 chiqadigan sonlar 211, 421, 631, 841. Demak, 4 ta son.

Javob: 4.

2. $(\cos 5)^{x^2-x} > 1 - \sin^2 5$ tengsizlikning nechta juft butun yechimi mavjud?

Yechish:

$(\cos 5)^{x^2-x} > 1 - \sin^2 5$

1) $\cos^2 5 + \sin^2 5 = 1$

2) $(\cos 5)^{x^2-x} > \cos^2 5 + \sin^2 5 - \sin^2 5$

$(\cos 5)^{x^2-x} > \cos^2 5$, $0 < \cos 5 < 1$.

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$x^2 - x < 2$
$x^2 - x - 2 < 0,\ (x+1)(x-2) < 0$
$-1 < x < 2.\ x \in (-1; 2)$
3) $(-1; 2)$ oraliqdagi juft son faqat 0.

Javob: 1 ta.

3. Yuk tashish mashinasi 240 km yo'lni bosib o'tishi kerak edi. Mashina yo'lning o'rtasida 30 daqiqa to'xtab qolgach tezligini 20 km/soat ga oshirib, belgilangan joyga o'z vaqtida yetib keldi. Mashina yo'lning ikkinchi yarmini bosib o'tishiga ketgan vaqtni (soat) toping.

Yechish:
$S = 240$ km, υ – yuk mashinasi tezligi.

$$\frac{120}{\upsilon} + \frac{120}{\upsilon+20} = \frac{240}{\upsilon} - \frac{1}{2},\ \frac{120}{\upsilon} - \frac{120}{\upsilon+20} = \frac{1}{2}$$

$120 \cdot 20 \cdot 2 = \upsilon(\upsilon + 20)$
$\upsilon^2 + 20\upsilon - 4800 = 0$
$\upsilon_1 = 60$

$$t_1 = \frac{120}{60} = 2 \text{ soat}$$

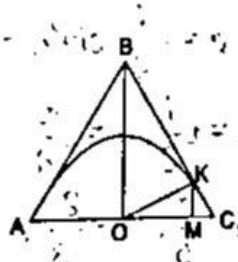
$\upsilon_2 = \upsilon + 20 = 60 + 20 = 80$

$$t_2 = \frac{120}{80} = \frac{3}{2} = 1{,}5 \text{ soat}.$$

Javob: 1,5.

4. Teng yonli uchburchakga markazi asosida joylashgan ichki yarim aylana chizilgan. Yon tomonining uzunligi 10 ga, asosi esa 12 ga teng. Shu aylananing yon tomonlari bilan urinish nuqtalardan asosigacha bo'lgan masofani toping.

Yechish:
ABC uchburchak teng yonli
$AB = BC = 10$
$AC = 12$
$KM = ?$



1) ΔBOC to'g'ri burchakli

$$OK = r,\ OK = \frac{BO \cdot OC}{BC}$$

$$OC = \frac{AC}{2} = 6.$$

$$BO = \sqrt{BC^2 - OC^2} = \sqrt{10^2 - 6^2} = 8.$$

$$OK = \frac{8 \cdot 6}{10} = 4{,}8$$

2) ΔOKC to'g'ri burchakli $KM = \frac{OK \cdot KC}{OC}$

3) $KC = \frac{OC^2}{BC} = \frac{6^2}{10} = 3{,}6$

$$KM = \frac{4{,}8 \cdot 3{,}6}{6} = 2{,}88.$$

Javob: 2,88.

5. Qarang: **5-variant 24-savol (42-bet).**

6. Qarang: **5-variant 21-savol (41-bet).**

7. m, n natural sonlar $m^2 = n^2 + 173$ tenglikni qanoatlantirsa, m – n ni toping.

Yechish:
$m, n \in N,\ m^2 = n^2 + 173,\ m - n = ?$
173 tub son. $1 \cdot 173 = 173$
$m^2 - n^2 = 173$
$(m-n)(m+n) = 1 \cdot 173$

$$\begin{cases} m - n = 1 \\ m + n = 173 \end{cases}$$

Javob: 1.

8. Tenglamani yeching: $2x^2 - 3 \cdot |x| = x$.

Yechish:
$2x^2 - 3 \cdot |x| = x$
1) $x \geq 0$ bo'lganda
$2x^2 - 3x = x$
$2x^2 - 4x = 0$
$2x(x-2) = 0$
$x = 0,\ x = 2$
2) $x < 0$ bo'lganda
$2x^2 + 3x = x$
$2x^2 + 2x = 0$
$2x(x+1) = 0$
$x = 0,\ x = -1$
Tenglamaning yechimlari $-1, 0, 2$.

Javob: $-1, 0, 2$.

9. $\sqrt[17]{\frac{36^{34}}{4^{51}}} \cdot \sqrt[3]{\frac{1}{2^6}}$ ifodaning qiymatini toping.

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Yechish:

Ildiz xossasiga ko'ra $\sqrt[n]{\frac{a}{b}}=\frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

$$\sqrt[17]{\frac{36^{34}}{4^{51}}}-\sqrt[3]{\frac{1}{2^6}}=\frac{\sqrt[17]{36^{34}}}{\sqrt[17]{4^{51}}}-\frac{1}{\sqrt[3]{2^6}}=$$

$$=\frac{36^2}{4^3}-\frac{1}{2^2}=\frac{4^2\cdot 9^2}{4^3}-\frac{1}{4}=\frac{81-1}{4}=20.$$

Javob: 20.

10. Qarang: 9-variant 17-savol (70-bet).

11. $y=\ln(2x-3|x-3|)$ funksiyaning aniqlanish sohasiga tegishli bo'lgan barcha butun sonlar yig'indisini toping.

Yechish:

1) $2x-3|x-3|>0$

$3|x-3|<2x$

2) $x<0$, Ø.

Modul doimo musbat

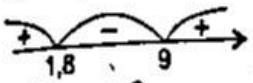
$x>0$ da.

$9(x-3)^2<4x^2$

$5x^2-54x+81<0$

$x_1=9,$

$x_2=1{,}8.$



$1{,}8<x<9$

$x\in(1{,}8;\ 9)$

3) *butun yechimlari yig'indisi:*

$$\frac{2+8}{2}\cdot 7=35.$$

Javob: 35.

12. Asos tomonlari 2 sm va 6 sm bo'lgan muntazam uchburchakli kesik piramida yon yog'i katta asosi bilan 60° li burchak tashkil qiladi. Kesik piramida balandligini toping.

Berilgan:

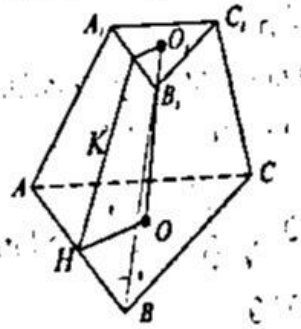
Muntazam kesik piramida

$a=2$ sm

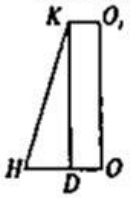
$b=6$ sm

$\angle KHO=60°$

$OO_1-?$



Yechish:



KH – apofema,

$KHOO_1$ – to'g'ri burchakli trapetsiya.

KO_1 – $A_1B_1C_1$ uchburchakka ichki chizilgan aylana radiusi,

HO – ABC uchburchakka ichki chizilgan aylana radiusi.

Muntazam uchburchakka ichki chizilgan aylana radiusi:

$$r=\frac{a\sqrt{3}}{6}\Rightarrow KO_1=\frac{2\sqrt{3}}{6}=\frac{\sqrt{3}}{3};$$

$$HO=\frac{6\sqrt{3}}{6}=\sqrt{3}$$

Kesik piramida balandligi ΔHKD *dan:*

$$\frac{KD}{HD}=tg\angle H\Rightarrow\frac{KD}{HO-DO}=tg60°$$

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

$$\Rightarrow OO_1=KD=2.$$

Javob: 2.

13. $\sin\alpha\cdot\cos\beta=-\frac{1}{4}$, $\alpha-\beta=-\frac{\pi}{2}$ bo'lsa, $\sin(\alpha+\beta)$ ning qiymatini toping.

Yechish:

$\sin\alpha\cdot\cos\beta=-\frac{1}{4}$, $\alpha-\beta=-\frac{\pi}{2}$

1) $\beta=\alpha+\frac{\pi}{2}$

$$\sin\alpha\cdot\cos\beta=\sin\alpha\cdot\cos\left(\alpha+\frac{\pi}{2}\right)=-\sin^2\alpha$$

$$-\sin^2\alpha=-\frac{1}{4},\ \sin^2\alpha=\frac{1}{4},$$

$$\sin\alpha=\pm\frac{1}{2},\ \alpha=\pm\frac{\pi}{6}$$

2) $\alpha=\frac{\pi}{6}$, $\beta=\frac{2\pi}{3}$,

$$\sin(\alpha+\beta)=\sin\left(\frac{\pi}{6}+\frac{2\pi}{3}\right)=0{,}5$$

$\alpha=-\frac{\pi}{6}$, $\beta=\frac{\pi}{3}$,

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$$\sin(\alpha+\beta)=\sin\left(-\frac{\pi}{6}+\frac{\pi}{3}\right)=0{,}5.$$

Javob: 0,5.

14. Qarang: **13-variant 12-savol (100-bet).**

15. Arifmetik progressiyada 10-hadi 7 ga, 7-hadi esa 10 ga teng. Progressiyaning 15-hadini toping.

Yechish:

$a_{10}=7,\ a_7=10,\ a_{15}=?$

1) $a_{10}=a_7+3d$

$$d=\frac{a_{10}-a_7}{3}=\frac{7-10}{3}=-1$$

2) $a_{15}=a_{10}+5d=7+5\cdot(-1)=7-5=2.$

Javob: 2.

16. Qarang: **6-variant 12-savol (47-bet).**

17. $\int_{-1}^{1}(5x^5-3x^3+x+1)dx$ aniq integralni hisoblang.

Yechish:

Integralni hisoblaymiz:

$$\int_{-1}^{1}(5x^5-3x^3+x+1)dx=$$

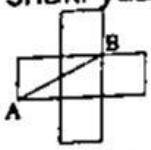
$$=\left(\frac{5x^6}{6}-\frac{3x^4}{4}+\frac{x^2}{2}+x\right)\Bigg|_{-1}^{1}=\frac{5}{6}-\frac{3}{4}+\frac{1}{2}+1-$$

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

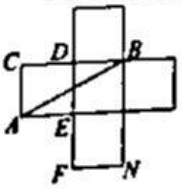
Javob: 2.

18. Qarang: **1-variant 16-savol (6-bet).**

19. Beshta bir xil kvadratdan rasmdagidek shakl hosil qilingan. Agar $AB=3\sqrt{2}$ bo'lsa, shakl yuzini toping.



Yechish:



Beshta bir xil kvadrat.

$AB=3\sqrt{2}$

$AC=EF=AE=a,\ CB=2a$

ΔACB to'g'ri burchakli

$$AB^2=(2a)^2+a^2=5a^2.$$

$$AB=a\sqrt{5},\ 3\sqrt{2}=a\sqrt{5},\ a=\frac{3\sqrt{2}}{\sqrt{5}}$$

$$S=5a^2=5\cdot\left(\frac{3\sqrt{2}}{\sqrt{5}}\right)^2=5\cdot\frac{9\cdot2}{5}=18.$$

Javob: 18.

20. $\frac{18-3n}{n}$ $(n\in N)$ ifodaning barcha natural qiymatlarining o'rta arifmetik qiymatini toping.

Yechish:

$\frac{18-3n}{n},\ n\in N,\ x\in N.$

1) $x=\frac{18}{n}-3.$

18 ning natural bo'luvchilari

$n=1,\ 2,\ 3,\ 6,\ 9,\ 18.$

2) $n=1$ da, $x=\frac{18}{1}-3=15\in N$

$n=2$ da, $x=\frac{18}{2}-3=6\in N$

$n=3$ da, $x=\frac{18}{3}-3=3\in N$

$n=6$ da, $x=\frac{18}{6}-3=0\notin N$

3) *ifodaning natural qiymatlari 15, 6, 3.*

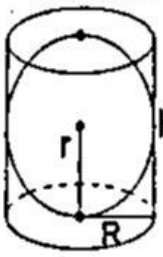
O'rta arifmetigi $\frac{15+6+3}{3}=\frac{24}{3}=8.$

Javob: 8.

21. Qarang: **7-variant 1-savol (52-bet).**

22. Silindr sharga tashqi chizilgan. Silindr hajmi 66 ga teng. Shar hajmini toping.

Yechish:



R – *silindr asos radiusi*

r – *shar radiusi*

$H=2R$

$V_{sh}=66$

$V=?$

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1) $V = \pi R^2 H = 2\pi R^3$

2) $V_{sh} = \frac{4}{3}\pi r^3 \Rightarrow \frac{4}{3}\pi r^3 = 66,\ \pi r^3 = \frac{99}{2}$

3) $r = R$

$V = 2\pi R^3 = 2\pi r^3 = 2 \cdot \frac{99}{2} = 99.$

Javob: 99.

23. $y = 6x + 3$ va $y = -8 - 2x$ funksiyalarning grafiklari qaysi koordinatalar choragida kesishadi?

Yechish:

$y = 6x + 3$, $y = -8 - 2x$ funksiya grafiklari kesishish nuqtalarini topamiz.

$6x + 3 = -8 - 2x$

$8x = -11,\ x = -\frac{11}{8}$

$y = 6 \cdot \left(-\frac{11}{8}\right) + 3 = -\frac{33}{4} + 3 = -\frac{21}{4}$

$x < 0$, $y < 0$ bo'lsa, nuqta III chorakda bo'ladi.

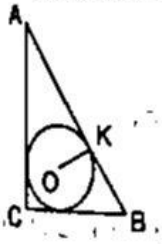
$\left(-1\frac{3}{8}; -5\frac{1}{4}\right)$ *III chorakda tegishli.*

Javob: III.

24. Qarang: 2-variant 4-savol (12-bet).

25. Gipotenuzasi 15 ga, ichki chizilgan aylananing radiusi esa 3 ga teng bo'lgan to'g'ri burchakli uchburchakning eng kichik o'tkir burchakning tangensini toping.

Yechish:



ABC uchburchak to'g'ri burchakli.
$\angle C = 90°$.
$AB = c = 15$
$OK = r = 3$
$tg\alpha = ?$

1) $AC = b$, $CB = a$,

$r = \frac{a + b - c}{2}$

$a + b = 2r + c,$

$a + b = 2 \cdot 3 + 15 = 21.$

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

$a^2 + b^2 = 15^2 = 225$

3) $\begin{cases} a + b = 21 \\ a^2 + b^2 = 225 \end{cases} \Rightarrow \begin{matrix} a = 9, \\ b = 12 \end{matrix}$

$\begin{matrix} a = 12, \\ b = 9 \end{matrix}$

$a < b$, $a = 9$, $b = 12$.

4) $tg\alpha = \frac{a}{b} = \frac{9}{12} = \frac{3}{4} = 0{,}75.$

Javob: 0,75.

26. Qarang: 12-variant 15-savol (92-bet).

27. Ichki burchaklari yig'indisi 1440° bo'lgan ko'pburchakning diagonallari sonini toping.

Yechish:

1) ko'pburchak ichki burchaklari yig'indisi $180°(n - 2)$.

$180°(n - 2) = 1440°,$

$n - 2 = 8,\ n = 10.$

2) ko'pburchak diagonallari soni

$\frac{n(n-3)}{2} = \frac{10 \cdot (10-3)}{2} = \frac{10 \cdot 7}{2} = 35.$

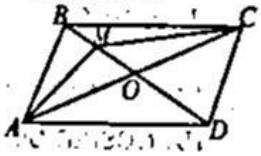
Javob: 35.

28. Qarang: 1-variant 22-savol (7-bet).

29. ABCD parallelogramm berilgan. M nuqta BD diagonalda yotadi, bunda MD:BM = 2:1. Agar ADCM to'rburchak yuzi 10 ga teng bo'lsa, ABCD parallelogram yuzini toping.

Berilgan:
ABCD – prallelogramm
MD:BM = 2:1
$S_{ADCM} = 10$
$S_{ABCD} = ?$

Yechish:



1) $BD = BM + MD = x + 2x = 3x$

$\alpha = \angle AOB$

2) $S_{ABCD} = \frac{3x \cdot AC}{2} \cdot \sin\alpha$

$S_{ADCM} = \frac{2x \cdot AC}{2} \cdot \sin\alpha$

3) $\frac{S_{ABCD}}{10} = \frac{3}{2},\ S_{ABCD} = 15.$

Javob: 15.

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30. Funksiyalardan nechtasi toq?

1) $f(x) = 2 - |x|$; 2) $f(x) = \frac{|\sin x|}{\sin x}$;
3) $f(x) = \cos 2x$; 4) $f(x) = x + \sin x$;
5) $f(x) = \sqrt[3]{x+1} + \sqrt[3]{-x+1}$;
6) $f(x) = 2^x + 2^{-x}$.

Yechish:

1) $f(x) = 2 - |x|$,
$f(-x) = 2 - |-x| = 2 - |x|$
$f(x) = f(-x)$ *juft funksiya*

2) $f(x) = \frac{|\sin x|}{\sin x}$,

$f(-x) = \frac{|\sin(-x)|}{\sin(-x)} = \frac{|-\sin x|}{-\sin x} = -\frac{|\sin x|}{\sin x}$

$f(x) = -f(-x)$ *toq funksiya*

3) $f(x) = \cos 2x$, $f(-x) = \cos(-2x) = \cos 2x$
$f(x) = f(-x)$ *juft funksiya*
4) $f(x) = x + \sin x$
$f(-x) = -x + \sin(-x) = -x - \sin x = -(x + \sin x)$
$f(x) = -f(-x)$ *toq funksiya*
5) $f(x) = \sqrt[3]{x+1} + \sqrt[3]{-x+1}$,
$f(-x) = \sqrt[3]{-x+1} + \sqrt[3]{-(-x)+1} =$
$= \sqrt[3]{-x+1} + \sqrt[3]{x+1}$
$f(x) = f(-x)$ *juft funksiya*
6) $f(x) = 2^x + 2^{-x}$
$f(-x) = 2^{-x} + 2^{-(-x)} = 2^{-x} + 2^x$
$f(x) = f(-x)$ *juft funksiya*
Funksiyalardan ikkitasi toq:
$f(x) = \frac{|\sin x|}{\sin x}$ *va* $f(x) = x + \sin x$.

Javob: 2.

31. Qarang: 4-variant 36-savol (36-bet).

32. Qarang: 9-variant 32-savol (73-bet).

33. Paskal. Dastur natijasini aniqlang.

```
Var k:byte; F:array[1..10] of byte;
Begin Randomize; F[1]:=Random(1);
F[2]:=Random(2)+1; For k:=3 To 7
Do F[k]: F[k–1]+F[k-2]; Write(F[7]); readln;
End.
```

Yechish:

Dasturda k – 0..255 diapazondagi butun va F – 10 ta 0..255 diapazondagi butun sondan iborat massivdan foydalanilgan.
Randomize – tasodifiy sonlar generatori.
F[1]:=Random(1) – [0;1) oraliqdan, ya'ni 0 qiymatini qabul qiladi. Demak, F[1]=0 bo'ladi.
F[2]:=Random(2)+1 =2 bo'ladi.
For k:=3 To 7 Do F[k]:=F[k–1]+F[k-2];
k:=3 dan 7 gacha ketma-ket o'zgarganda har bir k uchun F[k-1] ga F[k-2] ni qo'shib qiymatini F[k] ga ta'minlaydi.

K	F[k-1]	F[k-2]	F[k]
3	1	0	1
4	1	1	2
5	2	1	3
6	3	2	5
7	5	3	8

Write (F[7]) – F massivni 7-elementining qiymatini, ya'ni 8 ni ekranda aks ettiradi.

Javob: 8.

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34. A="Command.com – buyruq satrining interpretatoridir." B="To'liq nomi C:\Test\DTM\testdtm.doc bo'lgan faylning joriy katalogi DTM katalogidir." C="Doppix dasturi ma'lumotlar omborini boshqarish tizimidir." Shu mulohazalar asosida quyidagi mantiqiy ifodaning natijasini toping:
A and (B or C) and (not A or B)

Yechish:
Mulohazalarni tahlil qilamiz:
A="Command.com – buyruq satrining interpretatoridir." – rost (1)
B="To'liq nomi C:\Test\DTM\testdtm.doc bo'lgan faylning joriy katalogi DTM katalogidir." – rost (1)
C="Doppix dasturi ma'lumotlar omborini boshqarish sistemasidir." – yolg'on (0)
Shu mulohazalar asosida quyidagi mantiqiy ifodaning natijasini topamiz:
A and (B or C) and (not A or B) = 1 and (1 or 0) and (not 1 or 1) = 1 and 1 and 1 = 1.

Javob: rost.

35. Kompyuterga o'rnatilgan dasturiy ta'minotni o'chirish jarayoni ... deyiladi.

Yechish:
Javoblarni tahlil qilamiz:
A) defragmentatsiya – qattiq diskdagi fragmentlangan fayllarni birlashtirish;
B) arxivlash – faylni siqish;
C) installyatsiya – yangi dasturiy ta'minot o'rnatish;
D) deinstallyatsiya – o'rnatilgan dasturiy ta'minotni o'chirish;
Demak, kompyuterga o'rnatilgan dasturiy ta'minotni o'chirish jarayoni deinstallyatsiya deyilarkan.

Javob: deinstallyatsiya.

36. Qarang: 12-variant 34-savol (97-bet).

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