2017-yil matematika variant yechimlari (spectrum)

30-variant

Bizning kanal : @axborotnoma

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Matematika yordam guruhi : @axborotnomaguruhi

Reklama xizmati : @axborotnoma_reklama

30-variant

1. Massasi 735 g va konsentratsiyasi 16% bo'lgan yodning spirtdagi eritmasiga qancha toza spirt qo'shilsa, uning konsentratsiyasi 10% bo'ladi?

Yechish:

$m = 735\ g$

$x = 16\%,\ y = 10\%,$

$a = ?$

Tenglama tuzamiz.

$m \cdot x\% = (m + a) \cdot y\%$

$735 \cdot 16\% = (735 + a) \cdot 10\%$

$735 \cdot \frac{16}{100} = (735 + a) \cdot \frac{10}{100}$

$8 \cdot 147 = 735 + a$

$a = 1176 - 735 = 441$

$a = 441\ g.$

Javob: 441 g.

2. $\frac{tg(\alpha+\beta) - tg\alpha - tg\beta}{tg\beta \cdot tg(\alpha+\beta)}$ ifodaning son qiymatini toping, bu yerda $\alpha = \frac{2\pi}{3}$, $\beta = \frac{3\pi}{5}$.

Yechish:

1) $tg(\alpha+\beta) = \frac{tg\alpha + tg\beta}{1 - tg\alpha \cdot tg\beta}$.

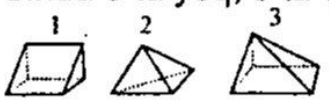
2) $tg(\alpha+\beta)-tg\alpha-tg\beta=$
$=tg(\alpha+\beta)-(tg\alpha+tg\beta)=$
$=(tg\alpha+tg\beta)\cdot\left(\frac{1}{1-tg\alpha tg\beta}-1\right)=$
$=(tg\alpha+tg\beta)\cdot\frac{tg\alpha\cdot tg\beta}{1-tg\alpha\cdot tg\beta}$

3) $\frac{(tg\alpha+tg\beta)\cdot tg\alpha\cdot tg\beta}{1-tg\alpha\cdot tg\beta}:(tg\beta\cdot tg(\alpha+\beta))=$
$\frac{(tg\alpha+tg\beta)\cdot tg\alpha\cdot tg\beta}{1-tg\alpha\cdot tg\beta}\cdot\frac{1-tg\alpha\cdot tg\beta}{tg\beta\cdot(tg\alpha+tg\beta)}=tg\alpha$

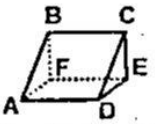
4) $\alpha=\frac{2\pi}{3}$ da $tg\frac{2\pi}{3}=-\sqrt{3}$

Javob: $-\sqrt{3}$.

3. Rasmda ko'rsatilgan ko'p yoqlardan qaysi birida 5 ta yoq, 9 ta qirra va 6 ta uchi bor?



Yechish:



A, B, C, D, E, F – 6 ta uchi.
ABE, DEC, ABCD, BCEF,
AFED – 5 ta yoq.
AB, BC, CD, AD, AF, FE, ED, BF,
CE – 9 ta qirra.

Javob: 1.

4. Qarang: 23-variant 13-savol (164-bet).

5. $\log_7(\log_2 10\cdot lg2)$ ni hisoblang.

Yechish:

1) $\log_2 10\cdot lg2=\log_2 10\cdot\frac{1}{\log_2 10}=1$

2) $\log_7 1=0$.

Javob: 0.

6. $\{x|x\in N, -5,8\le x<4,8\}$ to'plamni nechta usul bilan ikkita kesishmaydigan qism-to'plamlarga ajratish mumkin?

Yechish:
$\{x|x\in N, -5,8\le x<4,8\}$
$A=\{1, 2, 3, 4\}$

A to'plam 4 ta elementdan iborat. Qism to'plamlari soni 16 ta, ya'ni 1 ta elementdan iborat qism to'plamlari soni:

$C_4^1=\frac{4!}{1!(4-1)!}=\frac{3!\cdot 4}{3!}=4$, 4 ta

2 ta elementdan iborat qism to'plamlari soni:

$C_4^2=\frac{4!}{2!(4-2)!}=\frac{2!\cdot 3\cdot 4}{2!\cdot 1\cdot 2}=6$, 6 ta

3 elementdan iborat qism to'plamlari soni:

$C_4^3=\frac{4!}{3!(4-3)!}=\frac{3!\cdot 4}{3!\cdot 1!}=4$, 4 ta

4 elementdan iborat qism to'plamlari soni:

$C_4^4=\frac{4!}{4!(4-4)!}=1$, 1 ta

Bo'sh to'plam ham A to'plamning qism to'plami. Qism to'plamlari 16 ta, ikkita kesishmaydigan qism to'plamlari 8 ta.

Javob: 8.

7. Qarang: 1-variant 26-savol (8-bet).

8. Qarang: 28-variant 15-savol (190-bet).

9. Hisoblang:

$$\frac{(3\cdot\sqrt[3]{7}+3\cdot\sqrt[3]{3})(49^{\frac{1}{3}}-21^{\frac{1}{3}}+9^{\frac{1}{3}})}{(\sqrt{15}-\sqrt{10})^2(2\sqrt{15}+2\sqrt{10})^2}.$$

Yechish:

Qisqa ko'paytish formulalaridan foydalanib yechamiz.)

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

$=\left(a^{\frac{1}{3}}\right)^3+\left(b^{\frac{1}{3}}\right)^3=a+b.$

2) $\left(a^{\frac{1}{2}}-b^{\frac{1}{2}}\right)\left(a^{\frac{1}{2}}+b^{\frac{1}{2}}\right)=$

$=\left(a^{\frac{1}{2}}\right)^2-\left(b^{\frac{1}{2}}\right)^2=a-b.$

$$\frac{3\left(\sqrt[3]{7}+\sqrt[3]{3}\right)\cdot\left(7^{\frac{2}{3}}-(7\cdot 3)^{\frac{1}{3}}+3^{\frac{2}{3}}\right)}{\left(\sqrt{15}-\sqrt{10}\right)^2\cdot 2^2\left(\sqrt{15}+\sqrt{10}\right)^2}=$$

$$= \frac{3\left(\left(7^{\frac{1}{3}}\right)^3 + \left(3^{\frac{1}{3}}\right)^3\right)}{4\left(\left(\sqrt{15}-\sqrt{10}\right)\cdot\left(\sqrt{15}+\sqrt{10}\right)\right)^2} =$$

$$= \frac{3\cdot(7+3)}{4\cdot(15-10)^2} = \frac{3\cdot 10}{4\cdot 25} = 0{,}3$$

Javob: 0,3.

10. Soddalashtiring:

$$\cos\left(\frac{3\pi}{2}+\alpha\right)\sin\alpha + \sin^2(5\pi+\alpha) +$$

$$+ tg\left(\frac{3\pi}{2}+\alpha\right)\cdot tg(7\pi+\alpha).$$

Yechish:

1) $\cos\left(\frac{3\pi}{2}+\alpha\right) = \sin\alpha$, $\sin(5\pi+\alpha) = -\sin\alpha$.

$tg\left(\frac{3\pi}{2}+\alpha\right) = -ctg\alpha$, $tg(7\pi+\alpha) = tg\alpha$.

2) $\sin\alpha\cdot\sin\alpha + (-\sin\alpha)^2 + (-ctg\alpha)\cdot tg\alpha =$
$= \sin^2\alpha + \sin^2\alpha - 1 = 2\sin^2\alpha - 1 = -\cos 2\alpha.$

Javob: $-\cos 2\alpha$.

11. Qarang: 19-variant 12-savol (137-bet).

12. $f(x) = 11^{\log_{11}(x+7)+\log_{\frac{1}{11}}\frac{x+7}{x^3-21x}}$ funksiyaning maksimum qiymatini toping.

Yechish:

Darajani soddalashtirib olamiz.

1) $\log_{11}(x+7) + \log_{\frac{1}{11}}\left(\frac{x+7}{x^3-21x}\right) =$

$= \log_{11}(x+7) - \log_{11}\left(\frac{x+7}{x^3-21x}\right) =$

$= \log_{11}(x+7) : \left(\frac{x+7}{x^3-21x}\right) = \log_{11}(x^3-21x)$

2) $11^{\log_{11}(x^3-21x)} = x^3 - 21x$

3) aniqlanish sohasi $\begin{cases} x+7>0 \\ \frac{x+7}{x^2-21x} > 0 \end{cases}$

$x \in (-\sqrt{21}; 0) \cup (\sqrt{21}; \infty)$

4) $f(x) = x^3 - 21x$ funksiya hosilasini topamiz

$f'(x) = 3x^2 - 21$

5) Stationar nuqtalarini topamiz

$3x^2 - 21 = 0$, $x = \pm\sqrt{7}$

6) Maksimum nuqtasini topamiz

$$\underset{-\sqrt{7}}{+} \quad \underset{\sqrt{7}}{-} \quad \underset{\sqrt{7}}{+}$$

$x = -\sqrt{7}$ max

$x = \sqrt{7}$ min

7) funksiyaning maksimum qiymatini topamiz

$f\left(-\sqrt{7}\right) = \left(-\sqrt{7}\right)^3 - 21\cdot\left(-\sqrt{7}\right) =$

$= 7\sqrt{7} + 21\sqrt{7} = 14\sqrt{7}$.

Javob: $14\sqrt{7}$.

13. Qarang: 27-variant 19-savol (187-bet).

14. Qarang: 20-variant 25-savol (146-bet).

15. Agar $a = \sqrt[3]{2}$, $b = \sqrt[3]{4}$ va $c = 2$ bo'lsa,

$$\frac{1}{a(a-b)(a-c)} + \frac{1}{b(b-a)(b-c)} + \frac{1}{c(c-a)(c-b)}$$

ifodaning qiymatini toping.

Yechish:

1) $\frac{1}{a(a-b)(a-c)} + \frac{1}{b(b-a)(b-c)} +$

$+ \frac{1}{c(c-a)(c-b)} =$

$= \frac{bc(b-c) - ac(a-c) + ab(a-b)}{abc(a-b)(b-c)(a-c)} =$

$= \frac{b^2c - bc^2 - a^2c + ac^2 + a^2b - ab^2}{abc(a-b)(b-c)(a-c)} =$

$= \frac{(a-b)(b-c)(a-c)}{abc(a-b)(b-c)(a-c)} = \frac{1}{abc}$

2) $\frac{1}{abc} = \frac{1}{\sqrt[3]{2}\cdot\sqrt[3]{4}\cdot 2} = \frac{1}{\sqrt[3]{2\cdot 4}\cdot 2} = \frac{1}{4}$

Javob: $\frac{1}{4}$.

16. Qarang: 18-variant 27-savol (134-bet).

17. Qarang: 24-variant 1-savol (168-bet).

18. x va y $\begin{cases}\log_4(x-y)=1\\ \log_3 x-\log_3 y=2\end{cases}$ tenglamalar sistemasining yechimlari bo'lsa, x + y ni toping.

Yechish:

$\begin{cases}\log_4(x-y)=1\\ \log_3 x-\log_3 y=2\end{cases}$

$x+y=?$

1) aniqlanish sohasi

$\begin{cases}x>0\\ y>0\\ x-y>0\end{cases} \Rightarrow \begin{cases}x>0\\ y>0\\ x>y\end{cases}$

2) $\begin{cases}x-y=4\\ \frac{x}{y}=9\end{cases} \Rightarrow \begin{cases}x-y=4\\ x=9y\end{cases} \Rightarrow \begin{cases}y=\frac{1}{2}\\ x=\frac{9}{2}\end{cases}$

3) $x+y=\frac{1}{2}+\frac{9}{2}=\frac{10}{2}=5$

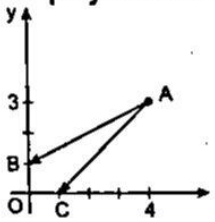
Javob: 5.

19. Qarang: 14-variant 30-savol (110-bet).

20. Qarang: 20-variant 11-savol (144-bet).

21. Qarang: 2-variant 16-savol (15-bet).

22. $\overline{AB}\cdot\overline{AC}$ vektorlarning skalyar ko'paytmasini toping.



Yechish:

$A(4;3),\ C(1;0),\ B(0;1)$

$\overline{AB}=(-4;-2)$

$\overline{AC}=(-3;-3)$

$\overline{AB}\cdot\overline{AC}=-4\cdot(-3)+(-2)\cdot(-3)=12+6=18.$

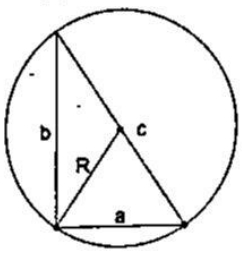
Javob: 18.

23. Qarang: 28-variant 22-savol (191-bet).

24. Qarang: 14-variant 27-savol (109-bet).

25. To'g'ri burchakli uchburchakning katetlari uzunliklari $5x^2-9x+1=0$ tenglamaning ildizlariga teng. Shu uchburchakka tashqi chizilgan doira yuzini toping.

Yechish:



$5x^2-9x+1=0$ tenglama ildizlarini topamiz:

$x_{1,2}=\frac{9\pm\sqrt{9^2-4\cdot5\cdot1}}{2\cdot5}=\frac{9\pm\sqrt{61}}{10}$

$a=\frac{9+\sqrt{61}}{10},\ b=\frac{9-\sqrt{61}}{10}$

$c^2=a^2+b^2=\left(\frac{9+\sqrt{61}}{10}\right)^2+\left(\frac{9-\sqrt{61}}{10}\right)^2$

$c^2=2{,}84$

$R=\frac{c}{2}$

$S_d=\pi R^2=\pi\frac{c^2}{4}=\pi\cdot\frac{2{,}84}{4}=0{,}71\pi.$

Javob: $0{,}71\pi$.

26. Qarang: 2-variant 17-savol (15-bet).

27. Qarang: 18-variant 26-savol (133-bet).

28. Qarang: 2-variant 29-savol (17-bet).

29. To'g'ri burchakli uchburchakning gipotenuzasi 25 ga, unga ichki chizilgan aylana radiusi 4 ga teng. Uchburchakning perimetrini toping.

Berilgan:

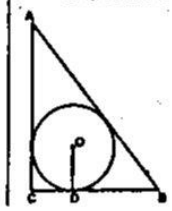
ΔABC to'g'ri burchakli

$AB=25$

$OD=r=4$

$P=?$

Yechish:



$P=AB+AC+BC$

$r=\frac{AC+BC-AB}{2}$

$4 \cdot 2 = AC + BC - 25$, $AC + BC = 33$
$P = 25 + 33 = 58$.

Javob: 58.

30. $\cos x < 1 + \frac{1}{2 - \sin^2 x}$ tengsizlikni yeching.

Yechish:
1) tengsizlikning o'ng tomonidagi ifoda $0 \le \sin^2 x \le 1$

$y_1 = 1 + \frac{1}{2 - \sin^2 x}$,

$1\frac{1}{2} < y_1 < 2$.

2) $-1 \le \cos x \le 1$ *bo'lganligi sababli* $\cos x < 1 + \frac{1}{2 - \sin^2 x}$ *tengsizlik x ning ixtiyoriy qiymatida o'rinli.*

Javob: $x \in (-\infty; \infty)$.

31. Ma'lumotlar ombori bilan bilimlar omborining o'rtasidagi asosiy farq nimada?

Yechish:
Ma'lumotlar ombori – bu ta'riflash, saqlash va boshqarishning umumiy prinsiplarini nazarda tutuvchi muayyan qoidalar bo'yicha tashkil etilgan, amaliy dasturlarga bog'liq bo'lmagan o'zaro bog'langan ma'lumotlar jamlanmasi. Ma'lumotlar ombori predmet sohaning axborot modeli hisoblanadi. Ma'lumotlar omboriga murojaat ma'lumotlar omborini boshqarish tizimi (MOBT) vositasida amalga oshiriladi.
Bilimlar ombori – predmet sohaning semantik modeli bo'lib, javoblari omborda oshkor ko'rinmaydigan savollarga javob bera oladi. Bilimlar ombori intellektual va ekspert tizimlarning asosiy komponenti sanaladi. Shu bilan birga to'laqonli bilimlar ombori (oddiy ma'lumotlar omboridan farqli ravishda) o'z ichiga nafaqat faktlarni, balki oldindan bor yoki yangi kiritilayotgan faktlar haqida avtomatik xulosa chiqarish imkonini beruvchi qoidalarni qamrab oladi. Ya'ni ma'lumotlarni semantik (ongli) qayta ishlash imkonini beradi.

Javob: bilimlar ombori axborotni yetishmayotgan faktlar bilan to'ldirib borish imkoniyatlariga ega.

32. MS ACCESS 2003 dasturida Maydon turlarini aniqlang:

Yechish:
Ma'lumotlar omborida ma'lumotlar xar bir ustun ya'ni maydon o'zining turiga ega, hamda ma'lumotlar saqlanadi. Xar bir maydonga quyidagi turni o'rnatish mumkin: OIE, MeMO, Matnli, sonli, vaqt va sana, mantiqiy, pul birlikli (денежный), schyotchik.

Javob: OIE, Memo, Matnli, sonli, vaqt va sanani ifodalovchi, mantiqiy, pul birliklarida ifodalangan, schyotchik.

33. Qarang: 4-variant 35-savol (36-bet).

34. Qarang: 5-variant 34-savol (44-bet).

35. Paskal tilida yozilgan dastur natijasini aniqlang.

```
Var N, k:byte; X:array[1..10] of byter;
Begin Randomize; N:=6;
X[1]:=random(Random(2))+1;
For k:=2 To N Do X[k]:=X[k-1]+k;
Write(X[5]-X[4]); Readln;
End.
```

Yechish:

Dasturda N, k – 0..255 diapazondagi butun o'zgaruchilar va X – 10 ta 0..255 diapazondagi butun sondan iborat massivdan foydalanilgan.
Randomize – tasodifiy sonlar generatori.
N:=6;
X[1]:=random(random(2))+1; {random(2) [0; 2) oraliqdan, ya'ni 0 yoki 1 qiymatlarni, random(random(2)) esa 0 qiymatni qabul qiladi. Demak, X[1]=1 bo'ladi}
For k:=2 To N Do X[k]:=X[k-1]+k;
k:=2 dan N, ya'ni 6 gacha ketma-ket o'zgarganda har bir k uchun X[k-1] ga k ni qo'shib qiymatini X[k] ta'minlaydi.

k	X[k]
1	1
2	3
3	6
4	10
5	15
6	21

Write(X[5]-X[4]); {X[5]-X[4] qiymatini, ya'ni (15-10=) 5 ni ekranda aks ettir}
Tamom.

Javob: 5.

36. Qarang: 22-variant 31-savol (160-bet).