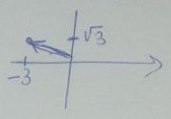
Курс 2 № 32 стр 18

$z = -3 + \sqrt{3}i \quad n = 6$



$x = -3 \quad y = \sqrt{3}$

$|z| = \sqrt{x^2 + y^2} = \sqrt{(-3)^2 + (\sqrt{3})^2} = \sqrt{9+3} =$

$= \sqrt{12} = \sqrt{4 \cdot 3} = 2\sqrt{3}$

$\varphi = \operatorname{arctg} \frac{y}{x} = \operatorname{arctg} \frac{\sqrt{3}}{-3} = \operatorname{arctg}\left(-\frac{1}{\sqrt{3}}\right) =$

$= +\frac{5\pi}{6}$

$\boxed{z = |z| \cdot (\cos\varphi + i \sin\varphi)}$

$z = 2\sqrt{3} \cdot \left(\cos\frac{5\pi}{6} + i \sin\frac{5\pi}{6}\right)$

$\boxed{z = |z| \cdot e^{i\varphi}} \Rightarrow z = 2\sqrt{3} e^{\frac{5\pi}{6}i}$

$z^n = |z|^n \cdot (\cos n\varphi + i \sin n\varphi)$

$z^6 = (2\sqrt{3})^6 \cdot \left(\cos 6 \cdot \frac{5\pi}{6} + i \sin 6 \cdot \frac{5\pi}{6}\right) =$

$= 2^6 \cdot (\sqrt{3})^6 \cdot (\cos 5\pi + i \sin 5\pi) =$

$= 32 \cdot 27 \cdot (-1 + i \cdot 0) = -864 + 0i$

$W_k = \sqrt[n]{z} = \sqrt[n]{|z|} \cdot \left(\cos\frac{\varphi + 2\pi k}{n} + i \sin\frac{\varphi + 2\pi k}{n}\right)$

$n = 3 \quad k = 0, 1, 2$

$W_0 = \sqrt[3]{2\sqrt{3}} \cdot \left(\cos\frac{\frac{5\pi}{6} + 2\pi \cdot 0}{3} + i \sin\frac{\frac{5\pi}{6} + 2\pi \cdot 0}{3}\right) =$

$= \sqrt[3]{2\sqrt{3}} \cdot \left(\cos\frac{5\pi}{18} + i \sin\frac{5\pi}{18}\right)$

$W_1 = \sqrt[3]{2\sqrt{3}} \cdot \left(\cos\frac{17\pi}{18} + i \sin\frac{17\pi}{18}\right)$

$W_2 = \sqrt[3]{2\sqrt{3}} \left(\cos\frac{29\pi}{18} + i \sin\frac{29\pi}{18}\right)$

№42 начало кр 2 (стр 19

1) $\lim\limits_{x\to\infty} \frac{x^4+2x^2-1}{100x^4+x-2} = \lim\limits_{x\to\infty} \frac{\frac{x^4}{x^4}+\frac{2x^2}{x^4}-\frac{1}{x^4}}{\frac{100x^4}{x^4}+\frac{x}{x^4}-\frac{2}{x^4}} =$

$= \lim\limits_{x\to\infty} \frac{1+\frac{2}{x^2}-\frac{1}{x^4}}{100+\frac{1}{x^3}-\frac{2}{x^4}} = \frac{1+\frac{2}{\infty^2}-\frac{1}{\infty^4}}{100+\frac{1}{\infty^3}-\frac{2}{\infty^4}} =$

$= \frac{1+0-0}{100+0-0} = \frac{1}{100} = 0{,}01$

• 2) $\lim\limits_{x\to-1} \frac{x^3+1}{x^2-x-2} = \lim\limits_{x\to-1} \frac{(x^3+1)\cdot(x^2-x\cdot1+1^2)}{(x+1)\cdot(x-2)} =$

$x^2-x-2=0$

$D = (-1)^2-4\cdot1\cdot(-2) = 9$

$x_1 = \frac{-(-1)+\sqrt{9}}{2\cdot1} = \frac{1+3}{2} = 2 \qquad x_2 = \frac{-(-1)-\sqrt{9}}{2\cdot1} = \frac{1-3}{2} = -1$

$x^2-x-2 = (x-2)(x+1)$

• $= \lim\limits_{x\to-1} \frac{x^2-x+1}{x-2} = \frac{(-1)^2-(-1)+1}{-1-2} = \frac{3}{-3} = -1$

3) $\lim\limits_{x\to0} \frac{\sqrt{1+x^2}-1}{\sqrt{4-x^2}-2} = \lim\limits_{x\to0} \frac{(\sqrt{1+x^2}-1)\cdot(\sqrt{4-x^2}+2)}{(\sqrt{4-x^2}-2)(\sqrt{4-x^2}+2)} =$

$= \lim\limits_{x\to0} \frac{(\sqrt{1+x^2}-1)\cdot(\sqrt{4-x^2}+2)\cdot(\sqrt{1+x^2}+1)}{((\sqrt{4-x^2})^2-2^2)\cdot(\sqrt{1+x^2}+1)} =$

$= \lim\limits_{x\to0} \frac{((\sqrt{1+x^2})^2-1^2)\cdot(\sqrt{4-x^2}+2)}{(4-x^2-4)\cdot(\sqrt{1+x^2}+1)} = \lim\limits_{x\to0} \frac{x^2\cdot(\sqrt{4-x^2}+2)}{-x^2\cdot(\sqrt{1+x^2}+1)} =$

$= \lim\limits_{x\to0} \frac{\sqrt{4-x^2}+2}{-1(\sqrt{1+x^2}+1)} = \frac{\sqrt{4-0^2}+2}{-(\sqrt{1+0^2}+1)} = \frac{4}{-2} = -2$

КР №1 Задание 1 Вариант №2 (стр 1)

A(1; -2; 1) B(3; -1; -2) C(8; -5; 6)
D(2; -1; -2)

$\overline{AB} = (3-1; -1-(-2); -2-1) = (2; 1; -3)$

$\overline{AC} = (8-1; -5-(-2); 6-1) = (7; -3; 5)$

1) $\overline{BA} = -\overline{AB} = (-2; -1; 3)$

• $\overline{BD} = (2-3; -1-(-1); -2-2) = (-1; 0; -4)$

$\overline{BA} \cdot \overline{BD} = (-2; -1; 3) \cdot (-1; 0; -4) =$

$= -2 \cdot (-1) - 1 \cdot 0 + 3 \cdot (-4) = +2 + 0 - 12 = -10$

$|\overline{BA}| = \sqrt{(-2)^2 + (-1)^2 + 3^2} = \sqrt{4+1+9} = \sqrt{14}$

$|\overline{BD}| = \sqrt{(-1)^2 + 0^2 + (-4)^2} = \sqrt{1+0+16} = \sqrt{17}$

• $\cos \widehat{\overline{BA}\,\overline{BD}} = \frac{\overline{BA} \cdot \overline{BD}}{|\overline{BA}| \cdot |\overline{BD}|} = \frac{-10}{\sqrt{14} \cdot \sqrt{17}} = \frac{-10}{\sqrt{238}}$

$\widehat{\overline{BA}\,\overline{BD}} = \arccos \frac{-10}{\sqrt{238}}$

2) $S_{ABC} = \frac{1}{2} |[\overline{AB} \times \overline{AC}]|$

$[\overline{AB} \times \overline{AC}] = \begin{vmatrix} i & j & k \\ 2 & 1 & -3 \\ 7 & -3 & 5 \end{vmatrix} = i \cdot \begin{vmatrix} 1 & -3 \\ -3 & 5 \end{vmatrix} - j \cdot \begin{vmatrix} 2 & -3 \\ 7 & 5 \end{vmatrix} +$

$+ k \cdot \begin{vmatrix} 2 & 1 \\ 7 & -3 \end{vmatrix} = i \cdot (1 \cdot 5 - (-3) \cdot (-3)) - j \cdot (2 \cdot 5 - 7 \cdot (-3)) +$

$+ k \cdot (2 \cdot (-3) - 7 \cdot 1) = i \cdot (5-9) - j \cdot (10+21) +$

$+ k \cdot (-6-7) = i \cdot (-4) - j \cdot 31 + k \cdot (-13) = (-4; -31; -13)$

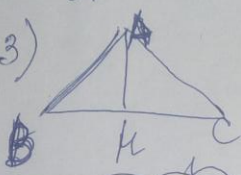
КР№1 Задание 1 вар 2 (стр 2 перекат 2 колеса)

$$S_{ABC} = \frac{1}{2}\left|[\overline{AB} \times \overline{AC}]\right| = \frac{1}{2}\left|(-4; -31; -13)\right| =$$

$$= \frac{1}{2} \cdot \sqrt{(-4)^2 + (-31)^2 + (-13)^2} = \frac{1}{2}\sqrt{4 + 961 + 169} =$$

$$= \frac{1}{2}\sqrt{1130}$$

● 3)



$AH \perp BC \Rightarrow \overline{AH} \cdot \overline{BC} = 0$

$H \in BC \quad H(x_H; y_H; z_H)$

$$BC: \frac{x-3}{8-3} = \frac{y-(-1)}{-5-(-1)} = \frac{z-(-2)}{6-(-2)}$$

$$\frac{x-3}{5} = \frac{y+1}{-4} = \frac{z+2}{8} \Rightarrow \begin{cases} x = 5t+3 \\ y = -4t-1 \\ z = 8t-2 \end{cases}$$

● $\overline{BC} = (5; -4; 8) \qquad A(1; -2; 1)$

$\overline{AH} = (x_H - 1; y_H - (-2); z_H - 1) = (x_H - 1; y_H + 2; z_H - 1)$

$$5 \cdot (x_H - 1) + (-4) \cdot (y_H + 2) + 8 \cdot (z_H - 1) = 0$$

$$5x_H - 5 - 4y_H - 8 + 8z_H - 8 = 0$$

$$5 \cdot (5t+3) - 5 - 4 \cdot (-4t-1) - 8 + 8 \cdot (8t-2) - 8 = 0$$

$$25t + 15 - 5 + 16t + 4 - 8 + 64t - 16 - 8 = 0$$

$$105t - 18 = 0 \Rightarrow t = \frac{18}{105} = \frac{6}{35}$$

$$x_H = 5 \cdot \frac{6}{35} + 3 = \frac{6}{7} + 3 = \frac{27}{7} \qquad y_H = -4 \cdot \frac{6}{35} - 1 = \frac{-59}{35}$$

$$z_H = 8 \cdot \frac{6}{35} - 2 = \frac{48 - 70}{35} = \frac{-22}{35} \qquad H\left(\frac{27}{7}; \frac{-59}{35}; \frac{-22}{35}\right)$$

пункт 3 окончание

$A(1;-2;1)$ $H\left(\frac{27}{7};\frac{-59}{35};\frac{-22}{35}\right)$

$$\frac{X-1}{\frac{27}{7}-1} = \frac{y-(-2)}{\frac{-59}{35}-(-2)} = \frac{z-1}{\frac{-22}{35}-1}$$

- $$\frac{X-1}{\frac{20}{7}} = \frac{y+2}{\frac{11}{35}} = \frac{z-1}{\frac{-57}{35}} \quad \Big| \cdot 35$$

$$\frac{X-1}{100} = \frac{y+2}{11} = \frac{z-1}{-57}$$

- уравнение высоты AH.

к/р №1 Задание 1 вар. 2

пункт 4

$$V_{ABCD} = \frac{1}{6}\left|[\overline{AB} \times \overline{AC}] \cdot \overline{AD}\right|$$

$$[\overline{AB} \times \overline{AC}] = (-4; -31; -13)$$

$$\overline{AD} = (2-1; -1-(-2); -2-1) = (1; 1; -3)$$

- $[\overline{AB} \times \overline{AC}] \cdot \overline{AD} = (-4; -31; -13) \cdot (1; 1; -3) =$
$= -4 \cdot 1 - 31 \cdot 1 - 13 \cdot (-3) = -4 - 31 + 39 = 4$

$$V_{ABCD} = \frac{1}{6} \cdot 4 = \frac{2}{3} \text{ куб. ед.}$$

пункт 5 $DH \perp ABC$

$\overline{N} = [\overline{AB} \times \overline{AC}] \perp ABC$

- $DH \parallel N$ $\overline{N}(-4; -31; -13)$

$D(2; -1; -2)$

$$\frac{x-2}{-4} = \frac{y-(-1)}{-31} = \frac{z-(-2)}{-13} \quad | \cdot (-1)$$

$$\frac{x-2}{4} = \frac{y+1}{31} = \frac{z+2}{13} : DH$$

Задание №2 Вариант 2

$A(-2;1;2)$ $B(5;2;3)$ $C(0;0;5)$
$D(3;3;6)$

$$ABC: \begin{vmatrix} x-x_A & y-y_A & z-z_A \\ x_B-x_A & y_B-y_A & z_B-z_A \\ x_C-x_A & y_C-y_A & z_C-z_A \end{vmatrix} = 0$$

- $$\begin{vmatrix} x-(-2) & y-1 & z-2 \\ 5-(-2) & 2-1 & 3-2 \\ 0-(-2) & 0-1 & 5-2 \end{vmatrix} = 0$$

$$\begin{vmatrix} x+2 & y-1 & z-2 \\ 7 & 1 & 1 \\ 2 & -1 & 3 \end{vmatrix} = 0$$

- $$(x+2)\cdot\begin{vmatrix} 1 & 1 \\ -1 & 3 \end{vmatrix} - (y-1)\cdot\begin{vmatrix} 7 & 1 \\ 2 & 3 \end{vmatrix} + (z-2)\cdot\begin{vmatrix} 7 & 1 \\ 2 & -1 \end{vmatrix} = 0$$

$$(x+2)\cdot(1\cdot 3-(-1)\cdot 1) - (y-1)\cdot(7\cdot 3-2\cdot 1) + (z-2)\cdot(7\cdot(-1)-2\cdot 1) = 0$$

$$(x+2)\cdot 4 - (y-1)\cdot 19 + (z-2)\cdot(-9) = 0$$

$$4x+8-19y+19-9z+18=0$$

плоскость $4x-19y-9z+45=0$

точка $D(3;3;6)$

$$d = \frac{|4\cdot 3-19\cdot 3-9\cdot 6+45|}{\sqrt{4^2+(-19)^2+(-9)^2}} = \frac{|12-57-54+45|}{\sqrt{16+361+81}} = \frac{54}{458}$$

~~стр~~ к/р 1 вариант 2 № 12 (стр 6

пункт 3

$D \in \alpha$ $\quad \alpha \parallel ABC \Rightarrow N_\alpha = N_{ABC} =$

$= [\overline{AB} \times \overline{AC}] = (+4; -19; -9)$

$D(3; 3; 6)$

α: $4(x-3) - 19(y-3) - 9(z-6) = 0$

$4x - 12 - 19y + 57 - 9z + 54 = 0$

α: $4x - 19y - 9z + 99 = 0$.

пункт 4

$\left.\begin{array}{l} \beta \perp ABC \\ N_{ABC} \perp ABC \end{array}\right\} \Rightarrow \beta \parallel \overline{N_{ABC}}$

$N_{ABC} = (4; -19; -9)$ $\quad D(3; 3; 6)$

β: $\frac{x-3}{4} = \frac{y-3}{-19} = \frac{z-6}{-9}$

пункт 5 $\quad \overline{BC} = (0-5; 0-2; 5-3) = (-5; -2; 2)$

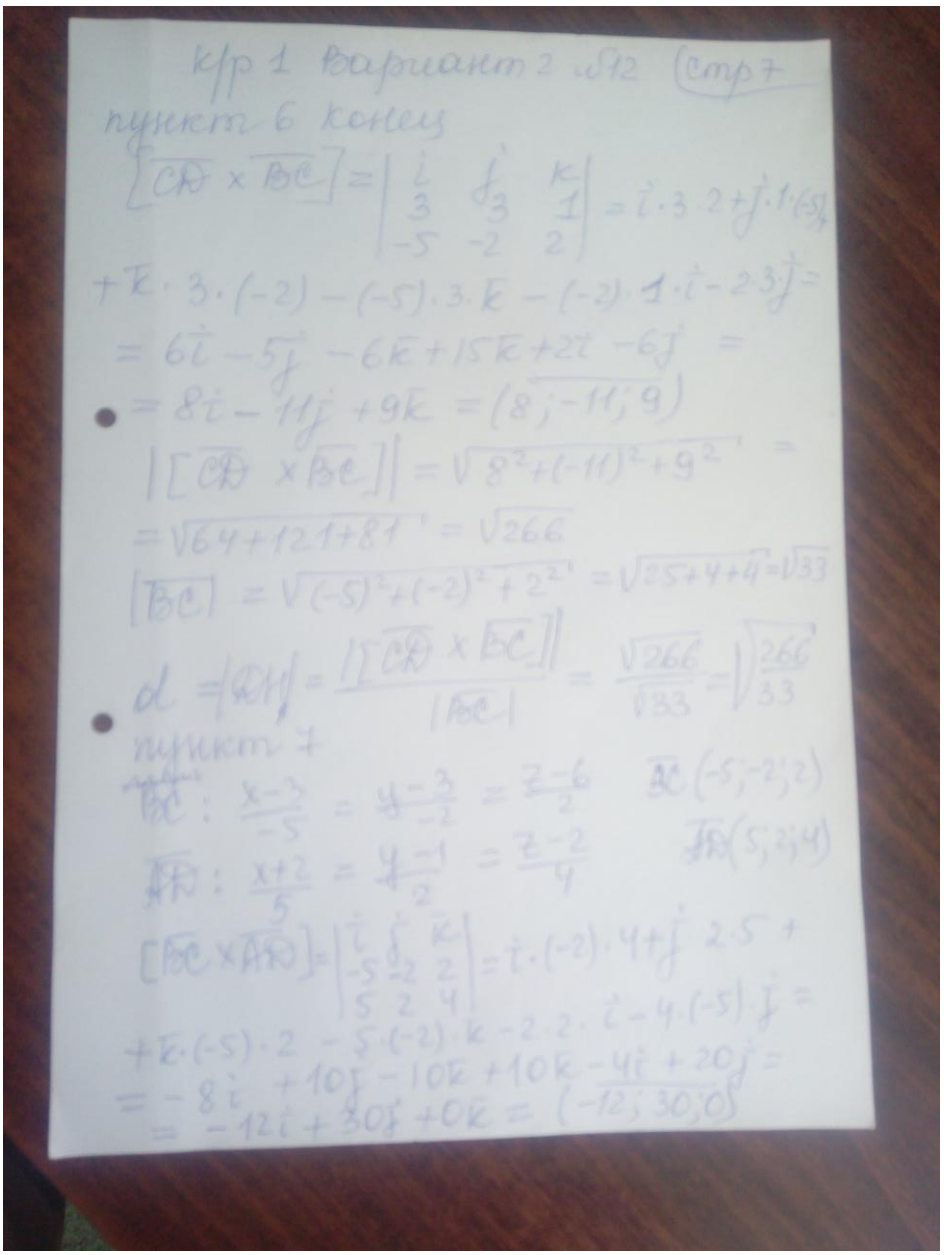
BC: $\frac{x-3}{-5} = \frac{y-3}{-2} = \frac{z-6}{2}$

пункт 6 $\quad d = |DH_1| = \frac{|[\overline{CD} \times \overline{BC}]|}{|BC|}$

$H \in$ пр ABC $\quad DH_1 \perp ABC$ $\quad BC$

$\overline{CD} = (3-0; 3-0; 6-5) = (3; 3; 1)$

$\overline{BC} = (-5; -2; 2)$



к/р 1 вариант 2 №12 (стр 7 пункт 6 конец

$[\overline{CD} \times \overline{BC}] = \begin{vmatrix} i & j & k \\ 3 & 3 & 1 \\ -5 & -2 & 2 \end{vmatrix} = i \cdot 3 \cdot 2 + j \cdot 1 \cdot (-5) + k \cdot 3 \cdot (-2) - (-5) \cdot 3 \cdot k - (-2) \cdot 1 \cdot i - 2 \cdot 3 \cdot j =$

$= 6i - 5j - 6k + 15k + 2i - 6j =$

$= 8i - 11j + 9k = (8; -11; 9)$

$|[\overline{CD} \times \overline{BC}]| = \sqrt{8^2 + (-11)^2 + 9^2} =$

$= \sqrt{64 + 121 + 81} = \sqrt{266}$

$|\overline{BC}| = \sqrt{(-5)^2 + (-2)^2 + 2^2} = \sqrt{25 + 4 + 4} = \sqrt{33}$

$d = |\overline{CH}| = \frac{|[\overline{CD} \times \overline{BC}]|}{|\overline{BC}|} = \frac{\sqrt{266}}{\sqrt{33}} = \sqrt{\frac{266}{33}}$

пункт 7

$\overline{BC}: \frac{x-3}{-5} = \frac{y-3}{-2} = \frac{z-6}{2}$ $\overline{BC}(-5; -2; 2)$

$\overline{AD}: \frac{x+2}{5} = \frac{y-1}{2} = \frac{z-2}{4}$ $\overline{AD}(5; 2; 4)$

$[\overline{BC} \times \overline{AD}] = \begin{vmatrix} i & j & k \\ -5 & -2 & 2 \\ 5 & 2 & 4 \end{vmatrix} = i \cdot (-2) \cdot 4 + j \cdot 2 \cdot 5 + k \cdot (-5) \cdot 2 - 5 \cdot (-2) \cdot k - 2 \cdot 2 \cdot i - 4 \cdot (-5) \cdot j =$

$= -8i + 10j - 10k + 10k - 4i + 20j =$

$= -12i + 30j + 0k = (-12; 30; 0)$

кр 1 вариант 2 № 12 стр 8

пусть 7 конец

$h = [\overline{BC} \times \overline{AD}] = (-12; 30; 0)$

$D(3; 3; 6)$

$\alpha: -12(x-3) + 30(y-3) + 0 \cdot (z-6) = 0$

$-12x + 36 + 30y - 90 + 0 = 0$

$-12x + 30y - 54 = 0 \quad | : (-6)$

$2x - 5y + 9 = 0$

$2x - 5y + 0z + 9 = 0$

$\frac{1}{\sqrt{2^2 + (-5)^2 + 0^2}} = \frac{1}{\sqrt{29}}$ нормирующий множитель

$\frac{2}{\sqrt{29}}x - \frac{5}{\sqrt{29}}y + 0z + \frac{9}{\sqrt{29}} = 0 \quad B(5; 2; 3)$

$d = \left| \frac{2}{\sqrt{29}} \cdot 5 - \frac{5}{\sqrt{29}} \cdot 2 + 0 \cdot 2 + \frac{9}{\sqrt{29}} \right| =$

$= \frac{9}{\sqrt{29}}$ расстояние между скрещивающимися прямыми BC и AD

кр №1 в №2 задан 22 (стр 9

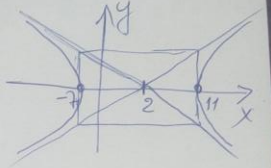
$x^2 - 9y^2 - 4x - 77 = 0$

$(x^2 - 4x) - 9y^2 - 77 = 0$

$(x^2 - 4x + 4 - 4) - 9y^2 - 77 = 0$

$(x-2)^2 - 4 - 9y^2 - 77 = 0$

$(x-2)^2 - 9y^2 = 81$



- $\frac{(x-2)^2}{81} - \frac{9y^2}{81} = \frac{81}{81}$

$\frac{(x-2)^2}{81} - \frac{y^2}{9} = 1$ гипербола

$a^2 = 81$ $b^2 = 9$

$a = \sqrt{81} = 9$ большая полуось

$b = \sqrt{9} = 3$ малая полуось

- $(+2; 0)$ центр гиперболы.

$-9+2 = -7$ $(-7; 0)$ и $(11; 0)$ вершины

$+9+2 = 11$

$c = \sqrt{a^2 + b^2} = \sqrt{81+9} = \sqrt{90} = 3\sqrt{10}$

$F_1 = (-c+2; 0) = (-3\sqrt{10}+2; 0)$

$F_2 = (+c+2; 0) = (+3\sqrt{10}+2; 0)$ } фокусы

$x - 2 = x'$ $y = y'$ $\frac{(x')^2}{81} - \frac{(y')^2}{9} = 1$

каноническое уравн. в новой системе

$\varepsilon = \frac{c}{a} = \frac{\sqrt{a^2+b^2}}{a} = \frac{3\sqrt{10}}{9} = \frac{\sqrt{10}}{3}$

Вариант 2 № 32. стр 10

$A(-2;2) \in$ параболе. $O(0;0) \in$ парб

$y = kx^2$

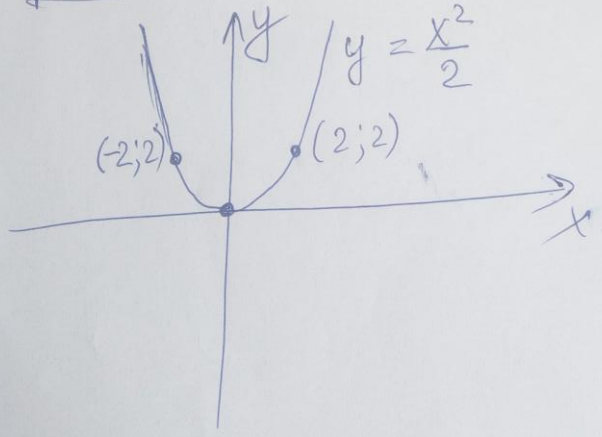
$2 = k \cdot (-2)^2$

$2 = k \cdot 4$

$k = \frac{2}{4} = \frac{1}{2}$

$y = \frac{1}{2}x^2$

$y = \frac{x^2}{2}$ Искомая парабола



Вариант 2 №42

$$A=\begin{pmatrix}3 & 2 & -1\\ 2 & 1 & 3\\ 5 & -2 & 1\end{pmatrix} \quad B=\begin{pmatrix}4 & -5 & 4\\ 1 & -2 & 3\\ 1 & 3 & 0\end{pmatrix}$$

$2A^T - A\cdot B$

$$A^T=\begin{pmatrix}3 & 2 & -1\\ 2 & 1 & 3\\ 5 & -2 & 1\end{pmatrix}^T=\begin{pmatrix}3 & 2 & 5\\ 2 & 1 & -2\\ -1 & 3 & 1\end{pmatrix}$$

$$2\cdot A^T=2\cdot\begin{pmatrix}3 & 2 & 5\\ 2 & 1 & -2\\ -1 & 3 & 1\end{pmatrix}=\begin{pmatrix}2\cdot3 & 2\cdot2 & 2\cdot5\\ 2\cdot2 & 2\cdot1 & 2\cdot(-2)\\ 2\cdot(-1) & 2\cdot3 & 2\cdot1\end{pmatrix}=$$

$$=\begin{pmatrix}6 & 4 & 10\\ 4 & 2 & -4\\ -2 & 6 & 2\end{pmatrix}$$

$$A\cdot B=\begin{pmatrix}3 & 2 & -1\\ 2 & 1 & 3\\ 5 & -2 & 1\end{pmatrix}\cdot\begin{pmatrix}4 & -5 & 4\\ 1 & -2 & 3\\ 1 & 3 & 0\end{pmatrix}=\begin{pmatrix}13 & -10 & 18\\ 12 & -3 & 11\\ 19 & -18 & 14\end{pmatrix}$$

$a_{11}=3\cdot4+2\cdot1+(-1)\cdot1=12+2-1=13$

$a_{12}=3\cdot(-5)+2\cdot(-2)+3\cdot3=-15-4+9=-10$

$a_{13}=3\cdot4+2\cdot3-1\cdot0=12+6-0=18$

$a_{21}=2\cdot4+1\cdot1+3\cdot1=8+1+3=12$

$a_{22}=2\cdot(-5)+1\cdot(-2)+3\cdot3=-10-2+9=-3$

$a_{23}=2\cdot4+1\cdot3+3\cdot0=8+3+0=11$

$a_{31}=5\cdot4+(-2)\cdot1+1\cdot1=20-2+1=19$

$a_{32}=5\cdot(-5)+(-2)\cdot(-2)+1\cdot3=-25+4+3=-18$

$a_{33}=5\cdot4+(-2)\cdot3+1\cdot0=20-6+0=14$

$$2A^T-AB=\begin{pmatrix}6 & 4 & 10\\ 4 & 2 & -4\\ -2 & 6 & 2\end{pmatrix}-\begin{pmatrix}13 & -10 & 18\\ 12 & -3 & 11\\ 19 & -18 & 14\end{pmatrix}=\begin{pmatrix}-7 & 14 & -8\\ -8 & 5 & -15\\ -21 & 24 & -12\end{pmatrix}$$

Вариант №2 начало №52 стр 12

$\begin{cases} 2x-2y+z=6 \\ 6x-y=24 \\ x+z=2 \end{cases}$ а) Гаусса б) обратной матрицы

а) A расш $= \left(\begin{array}{ccc|c} 2 & -2 & 1 & 6 \\ 6 & -1 & 0 & 24 \\ 1 & 0 & 1 & 2 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & 0 & 1 & 2 \\ 2 & -2 & 1 & 6 \\ 6 & -1 & 0 & 24 \end{array}\right) \cdot(-2) \cdot(-6) \sim$

$\sim \left(\begin{array}{ccc|c} 1 & 0 & 1 & 2 \\ 0 & -2 & -1 & 2 \\ 0 & -1 & -6 & 12 \end{array}\right) \cdot 1 \cdot(-2) \sim \left(\begin{array}{ccc|c} 1 & 0 & 1 & 2 \\ 0 & -2 & -1 & 2 \\ 0 & 0 & 11 & -22 \end{array}\right) :(-1) :11 \sim$

$\sim \left(\begin{array}{ccc|c} 1 & 0 & 1 & 2 \\ 0 & 2 & +1 & -2 \\ 0 & 0 & 1 & -2 \end{array}\right) \cdot(-1) \sim \left(\begin{array}{ccc|c} 1 & 0 & 0 & 4 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 1 & -2 \end{array}\right) :2 \sim$

$\sim \left(\begin{array}{ccc|c} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & -2 \end{array}\right)$ $\begin{array}{l} x=4 \\ y=0 \\ z=-2 \end{array}$

б) $A = \begin{pmatrix} 2 & -2 & 1 \\ 6 & -1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ $B = \begin{pmatrix} 6 \\ 24 \\ 2 \end{pmatrix}$ $A \cdot \begin{pmatrix} x \\ y \\ z \end{pmatrix} = B$

$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = A^{-1} \cdot B$ $A^{-1} = \frac{1}{|A|} \cdot \begin{pmatrix} A_{11} & A_{21} & A_{31} \\ A_{12} & A_{22} & A_{32} \\ A_{13} & A_{23} & A_{33} \end{pmatrix}$

$A_{11} = (-1)^{1+1} \cdot M_{11} = (-1)^2 \cdot \begin{vmatrix} -1 & 0 \\ 0 & 1 \end{vmatrix} = 1 \cdot (-1 \cdot 1 - 0 \cdot 0) = -1$

$A_{12} = (-1)^{1+2} \cdot M_{12} = (-1)^3 \cdot \begin{vmatrix} 6 & 0 \\ 1 & 1 \end{vmatrix} = -1 \cdot (6 \cdot 1 - 1 \cdot 0) = -6$

$A_{13} = (-1)^{1+3} \cdot M_{13} = (-1)^4 \cdot \begin{vmatrix} 6 & -1 \\ 1 & 0 \end{vmatrix} = 1 \cdot (6 \cdot 0 - 1 \cdot (-1)) = 1$

$A_{21} = (-1)^{2+1} \cdot M_{21} = (-1)^3 \cdot \begin{vmatrix} -2 & 1 \\ 0 & 1 \end{vmatrix} = -1 (-2 - 0) = 2$

Вариант №2 №52 конец стр 13

$A_{22} = (-1)^{2+2} \cdot M_{22} = (-1)^4 \cdot \begin{vmatrix} 2 & 1 \\ 1 & 1 \end{vmatrix} = 1(2 \cdot 1 - 1 \cdot 1) = 1$

$A_{23} = (-1)^{2+3} \cdot M_{23} = (-1)^5 \cdot \begin{vmatrix} 2 & -2 \\ 1 & 0 \end{vmatrix} = -1(2 \cdot 0 - 1 \cdot (-2)) = -1 \cdot (0+2) = -2$

$A_{31} = (-1)^{3+1} \cdot M_{31} = (-1)^4 \cdot \begin{vmatrix} -2 & 1 \\ -1 & 0 \end{vmatrix} = 1 \cdot (-2 \cdot 0 - (-1) \cdot 1) = 1 \cdot (0+1) = 1$

- $A_{32} = (-1)^{3+2} \cdot M_{32} = (-1)^5 \cdot \begin{vmatrix} 2 & 1 \\ 6 & 0 \end{vmatrix} = -1 \cdot (2 \cdot 0 - 6 \cdot 1) = 6$

$A_{33} = (-1)^{3+3} \cdot M_{33} = (-1)^6 \cdot \begin{vmatrix} 2 & -2 \\ 6 & -1 \end{vmatrix} = 1 \cdot (2 \cdot (-1) - 6 \cdot (-2)) = 1 \cdot (-2 + 12) = 10$

- $|A| = \begin{vmatrix} 2 & -2 & 1 \\ 6 & -1 & 0 \\ 1 & 0 & 1 \end{vmatrix} = \begin{vmatrix} 1 & -2 & 1 \\ 6 & -1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = (-1)^{3+3} \cdot 1 \cdot \begin{vmatrix} 1 & -2 \\ 6 & -1 \end{vmatrix} = 1 \cdot (1 \cdot (-1) - 6 \cdot (-2)) = 13$

(·(-1))

$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \frac{1}{13} \cdot \begin{pmatrix} -1 & 2 & 1 \\ -6 & 1 & 6 \\ 1 & -2 & 10 \end{pmatrix} \cdot \begin{pmatrix} 6 \\ 24 \\ 2 \end{pmatrix} = \frac{1}{13} \cdot \begin{pmatrix} 52 \\ 0 \\ -26 \end{pmatrix} = \begin{pmatrix} 4 \\ 0 \\ 2 \end{pmatrix}$

$-1 \cdot 6 + 2 \cdot 24 + 1 \cdot 2 = 52$ $\quad x = 4$

$-6 \cdot 6 + 1 \cdot 24 + 6 \cdot 2 = 0$ $\quad y = 0$

$1 \cdot 6 - 2 \cdot 24 + 10 \cdot 2 = -26$ $\quad z = 2$

Вариант №2 №62

$$\begin{cases} 2x+y-z=2 \\ x-y+2z=1 \\ 3x+z=3 \end{cases} \quad A=\begin{pmatrix} 2 & 1 & -1 \\ 1 & -1 & 2 \\ 3 & 0 & 1 \end{pmatrix} \quad B=\begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}$$

$$A_{расш}=\left(\begin{array}{ccc|c} 2 & 1 & -1 & 2 \\ 1 & -1 & 2 & 1 \\ 3 & 0 & 1 & 3 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & -1 & 2 & 1 \\ 2 & 1 & -1 & 2 \\ 3 & 0 & 1 & 2 \end{array}\right) \sim$$

$$\sim \left(\begin{array}{ccc|c} 1 & -1 & 2 & 1 \\ 0 & 3 & -5 & 0 \\ 0 & 3 & -5 & -1 \end{array}\right) \sim \left(\begin{array}{ccc|c} 1 & -1 & 2 & 1 \\ 0 & 3 & -5 & 0 \\ 0 & 0 & 0 & -1 \end{array}\right)$$

$rang\ A \neq rang\ A_{расш} \Rightarrow$

$\Rightarrow$ система несовместна решений нет.

к/р 2 вар 2 №1 (стр 15

$y = \arcsin\frac{x-3}{2} + \frac{1}{\sqrt{x^2-4}}$

$-1 \le \frac{x-3}{2} \le 1 \quad | \cdot 2$

$-1 \cdot 2 \le \frac{x-3}{2} \cdot 2 \le 1 \cdot 2$

- $-2 \le x-3 \le 2 \quad | +3$

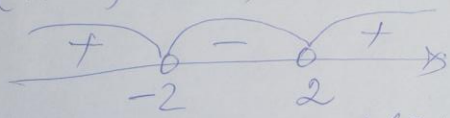
$-2+3 \le x-3+3 \le 2+3$

$1 \le x \le 5$

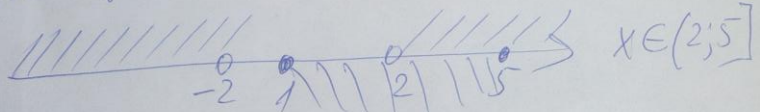
$x \in [1;5]$

$\begin{cases} \sqrt{x^2-4} \neq 0 \\ x^2-4 \geqslant 0 \end{cases} \Rightarrow \begin{matrix} x^2-4>0 \\ x^2-2^2>0 \end{matrix}$

- $(x-2)(x+2)>0$



$x \in (-\infty;-2) \cup (2;+\infty)$



$x \in (2;5]$

Ответ: ООО $(2;5]$

к/р №2 вар 2 №12 стр 16

а) $y = |x\cos x|$

$y(-x) = |-x\cos(-x)| = |-x\cos x| = |x\cos x| =$

$= y(x)$ четная

б) $y = \frac{2^x - 2^{-x}}{2}$

$y(-x) = \frac{2^{-x} - 2^{-(-x)}}{2} = \frac{2^{-x} - 2^{x}}{2} =$

$= \frac{-(2^x - 2^{-x})}{2} = -y(x)$ нечетная

в) $y = |x+1| \cdot x$

$y(-x) = |-x+1| \cdot (-x) = -|x-1| \cdot x \neq y(x)$

$\neq -y(x)$ не является четной и не является нечетной

кр2 №22 (стр 17

$$\frac{3-3i}{1+2i} - (-3+i)\cdot(4-5i) = \frac{(3-3i)\cdot(1-2i)}{(1+2i)\cdot(1-2i)} -$$

$$-(-3\cdot 4 - 3\cdot(-5i) + i\cdot 4 + i\cdot(-5i)) =$$

$$= \frac{3\cdot 1 + 3\cdot(-2i) - 3i\cdot 1 - 3i\cdot(-2i)}{1^2 - (2i)^2} -$$

$$-(-12 + 15i + 4i - 5i^2) =$$

$$= \frac{3 - 6i - 3i + 6i^2}{1 - 4i^2} - (-12 + 19i - 5\cdot(-1)) =$$

$$= \frac{3 - 9i + 6\cdot(-1)}{1 - 4\cdot(-1)} - (-12 + 19i + 5) =$$

$$= \frac{3 - 9i - 6}{1 + 4} - (-7 + 19i) =$$

$$= \frac{-3 - 9i}{5} + 7 - 19i = -\frac{3}{5} - \frac{9i}{5} +$$

$$+ 7 - 19i = -0{,}6 - 1{,}8i + 7 - 19i =$$

$$= 6{,}4 - 20{,}8i$$

Ответ: $6{,}4 - 20{,}8i$