Задача 4

$\vec{a}\ (3,4)$ и $\vec{b}\ (-5,0)$

$\vec{e_1}\ \vec{e_2}$ $|\vec{e_1}| = 4$ $|\vec{e_2}| = 2$ $\angle(\vec{e_1}, \vec{e_2}) = \frac{\pi}{4}$

$(a,b)(3\vec{e_1}, 4\vec{e_2})(-5\vec{e_1}\ 0) =$

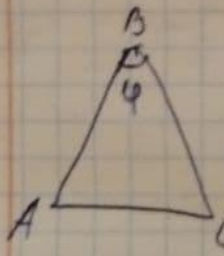
$= -15|\vec{e_1}|^2 - 20(\vec{e_2}, \vec{e_1}) = -15 - 20 \cdot 2 \cdot 4 \cdot \frac{\sqrt{2}}{2}$

$= -15 - 80\sqrt{2} \approx -128{,}13$

Задача 6

$\angle ABC - ?$ $A(-4,5,-1)$ $B(-3,4,-1)$

$C(-6,0,+4)$



$AB = \sqrt{2}$

$BC = \sqrt{34}$

$AC = \sqrt{38}$

$AC^2 = AB^2 + BC^2 - 2AB\,BC\cos\varphi$

$38 = 2 + 34 - 2\sqrt{68}\cos\varphi$

$18 - \sqrt{68}\cos\varphi = 19 \quad -\sqrt{68}\cos\varphi = 1$

$\cos\varphi = -\frac{1}{\sqrt{68}} \approx -0{,}121$

Zagara 7

$\vec{a}(0, -3, -3)$ $\vec{b}(1, 1, -1)$

$(\vec{x}, \vec{c}) = -1$ $\vec{c}(-1, 1, -1)$

$$[a, b] = \begin{vmatrix} i & j & k \\ 0 & -3 & -3 \\ 1 & 1 & -1 \end{vmatrix} = \{6; -3; 3\}$$

$\vec{x}(6x; -3x; 3x)$

$6x - 3x + 3x = -1$ $\quad x = -\frac{1}{6}$

$\vec{x}(-1; 1/2; -\frac{1}{2})$

Задача 5

$A(1, 0, -5)$

$B(-370256, 92565, -370265)$

$C(-370291, 92573, -370231)$

$D(-31, 8, 29)$

$|AB| = 21\sqrt{641158714}$

$|BC| = \sqrt{2445}$

$|AC| = \sqrt{28275521669}$ $\Rightarrow$ Тупоугольный случай

$|CD| = 92565\sqrt{33}$

Задача 3

$AXB = C$

$A\begin{vmatrix} 1 & -1 \\ -1 & 2 \end{vmatrix} \quad B = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} \quad C = \begin{vmatrix} 1 & -1 \\ 0 & 1 \end{vmatrix}$

$AX = \begin{vmatrix} 1 & -\frac{1}{2} \\ -1 & 2 \end{vmatrix} \cdot \begin{vmatrix} x_1 & x_2 \\ x_3 & x_4 \end{vmatrix} = \begin{vmatrix} x_1 - x_3 & x_2 - x_4 \\ 8x_3 - x_1 & 8x_4 - x_2 \end{vmatrix}$

$\begin{vmatrix} x_1 - x_3 & x_2 - x_4 \\ 8x_3 - x_1 & 8x_4 - x_2 \end{vmatrix} \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} = \begin{vmatrix} x_1 - x_3 & x_2 - x_4 \\ 8x_3 - x_4 & 2x_4 - x_2 \end{vmatrix}$

$$\begin{vmatrix} x_1 - x_3 & x_2 - x_4 \\ 2x_3 - x_4 & 2x_4 - x_2 \end{vmatrix} = \begin{vmatrix} 1 & -1 \\ 0 & 1 \end{vmatrix}$$

$x_1 - x_3 = 1$ $\quad 2x_3 - x_4 = 0$ $\quad x_2 - x_4 = -1$

$2x_4 - x_2 = 1$

$2x_3 = x_4 \Rightarrow$

$$\begin{cases} x_1 - x_3 = 1 \\ x_2 - 2x_3 = -1 \\ 4x_3 - x_2 = 1 \end{cases} \Rightarrow \begin{cases} x_1 - x_3 = 1 \\ 2x_3 = 0 \end{cases} \Rightarrow x_3 = x_4 = 0$$

$x_1 = 1$

$x_2 = -1$

$$\Rightarrow X = \begin{vmatrix} 1 & -1 \\ 0 & 0 \end{vmatrix}$$

Задача 8

~~AB~~ $A(-4, 3, -4)$ $B(-7, -1, -2)$

$C(-7, 3, 0)$ $D(-2, 5, -8)$

$\vec{AB} = B - A = \{-3; -4; 2\}$

$\vec{AC} = C - A = \{-3; 0; 4\}$

$\vec{AD} = D - A = \{2; 2; -4\}$

$\vec{BC} = C - B = \{0; 4; 2\}$

$\vec{BD} = D - B = \{5; 6; -6\}$

$\vec{CD} = D - C = \{5; 2; -8\}$

$$V = \frac{1}{6}\begin{vmatrix} -3 & -4 & 2 \\ -3 & 0 & 4 \\ 2 & 2 & -4 \end{vmatrix} = (-3)\cdot 0\cdot(-4) + (-4)\cdot 4\cdot 2 + 2\cdot(-5)\cdot 2 -$$

$$- 2\cdot 0\cdot 2 - (-4)\cdot(-3)\cdot(-4) - (-3)\cdot 4\cdot 2 =$$

$$= \frac{1}{6}\cdot 28 = \frac{14}{3} \approx 4{,}7$$

Задача 2

$$\begin{vmatrix} 3 & 4 & 0 & 0 \\ -6 & -4 & -1 & 0 \\ -24 & -10 & -7 & 3 \\ -120 & -100 & -31 & 9 \end{vmatrix} = \begin{vmatrix} 3 & 4 & 0 & 0 \\ 0 & 4 & -1 & 0 \\ 0 & 12 & -7 & 3 \\ 0 & 60 & -31 & 9 \end{vmatrix} \cdot (-3) \cdot (-5)$$

$$= \begin{vmatrix} 3 & 4 & 0 & 0 \\ 0 & 4 & -1 & 0 \\ 0 & 0 & -4 & 3 \\ 0 & 0 & -16 & 9 \end{vmatrix} \cdot (-4) = \begin{vmatrix} 3 & 4 & 0 & 0 \\ 0 & 4 & -1 & 0 \\ 0 & 0 & -4 & 3 \\ 0 & 0 & 0 & -3 \end{vmatrix} = 3 \cdot 4 \cdot (-4) \cdot (-3) = 144$$

Задача 1

$A^T B = (AB^T)^T + 3D \cdot 3E \cdot (-2F)$

$A = \begin{vmatrix} 1 & -1 \\ -1 & 2 \end{vmatrix}$ $\quad B = \begin{vmatrix} 1 & -2 \\ -2 & 5 \end{vmatrix}$

$D = \begin{vmatrix} 3 & -1 & 3 \\ -3 & -1 & -2 \end{vmatrix}$ $\quad E = \begin{vmatrix} -4 \\ -4 \\ -3 \end{vmatrix}$ $\quad F = \begin{vmatrix} -4 & -1 \end{vmatrix}$

1) $A^T B = \begin{vmatrix} 1 & -1 \\ -1 & 2 \end{vmatrix} \begin{vmatrix} 1 & -2 \\ -2 & 5 \end{vmatrix} = \begin{vmatrix} 3 & -7 \\ -5 & 12 \end{vmatrix}$

2) $(AB^T)^T = \left(\begin{vmatrix} 1 & -1 \\ -1 & 2 \end{vmatrix}, \begin{vmatrix} 1 & -2 \\ -2 & 5 \end{vmatrix} \right)^T = \begin{vmatrix} 3 & -5 \\ -7 & 12 \end{vmatrix}$

1) − 2) $= \begin{vmatrix} 3 & -7 \\ -5 & 12 \end{vmatrix} - \begin{vmatrix} 3 & -5 \\ -7 & 12 \end{vmatrix} = \begin{vmatrix} 0 & -2 \\ 2 & 0 \end{vmatrix}$

3) $3D = \begin{vmatrix} 9 & -3 & 9 \\ -9 & -3 & -6 \end{vmatrix}$ $\quad$ 4) $3E = \begin{vmatrix} -12 \\ -12 \\ -9 \end{vmatrix}$

5) 3) $\cdot$ 4) $= \begin{vmatrix} 9 & -3 & 9 \\ -9 & -3 & -6 \end{vmatrix} \cdot \begin{vmatrix} -12 \\ -12 \\ -9 \end{vmatrix} = \begin{vmatrix} -153 \\ 198 \end{vmatrix}$

$$-2F = \begin{vmatrix} 8 & 4 \end{vmatrix}$$

$$\begin{vmatrix} -153 \\ 198 \end{vmatrix} \cdot \begin{vmatrix} 8 & 4 \end{vmatrix} = \begin{vmatrix} -1224 & -612 \\ 1584 & 792 \end{vmatrix}$$

$$\begin{vmatrix} 0 & -2 \\ 2 & 0 \end{vmatrix} + \begin{vmatrix} -1224 & -612 \\ 1584 & 792 \end{vmatrix} = \begin{vmatrix} -1224 & -614 \\ 1586 & 792 \end{vmatrix}$$