

Задача 5.)

(1.)  $A = (1, 2, 5, 10)$

$B = (7, -3, 4, 8)$

$2 \cdot A = (2, 4, 10, 20)$

$A + B = (8, -1, 9, 18)$

$A \times B = 1 \times 7 + 2 \times (-3) + 5 \times 4 + 8 \times 10 = 101$

$$(5E)^{-1} = 5 \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}^{-1} = \begin{pmatrix} 5 & 0 & 0 & 0 & 0 \\ 0 & 5 & 0 & 0 & 0 \\ 0 & 0 & 5 & 0 & 0 \\ 0 & 0 & 0 & 5 & 0 \\ 0 & 0 & 0 & 0 & 5 \end{pmatrix}^{-1}$$

$$\begin{pmatrix} 5 & 0 & 0 & 0 & 0 \\ 0 & 5 & 0 & 0 & 0 \\ 0 & 0 & 5 & 0 & 0 \\ 0 & 0 & 0 & 5 & 0 \\ 0 & 0 & 0 & 0 & 5 \end{pmatrix} \times \begin{pmatrix} X \\ X \\ X \\ X \\ X \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

Для 1<sup>го</sup> элемента  $5 \cdot x_{00} + 0 \cdot x_{10} + \dots + 0 \cdot x_{40} = 1 \Rightarrow x_{00} = \frac{1}{5}$

Для 2<sup>го</sup> элемента  $5 \cdot x_{01} + 0 \cdot x_{11} + \dots + 0 \cdot x_{41} = 0 \Rightarrow x_{01} = 0$

и т.д. В итоге:  $(5E)^{-1} = \begin{pmatrix} \frac{1}{5} & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{5} & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{5} & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{5} & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{5} \end{pmatrix}$

(2)

$$\det \begin{vmatrix} 1 & 2 & 3 \\ 4 & 0 & 6 \\ 7 & 8 & 9 \end{vmatrix} = 1 \cdot \begin{vmatrix} 0 & 6 \\ 8 & 9 \end{vmatrix} - 2 \cdot \begin{vmatrix} 4 & 6 \\ 7 & 9 \end{vmatrix} + 3 \cdot \begin{vmatrix} 4 & 0 \\ 7 & 8 \end{vmatrix} =$$

$$= 1 \cdot (0 - 48) - 2 \cdot (36 - 42) + 3 \cdot (32 - 0 \cdot 7) = -48 + 12 + 96 =$$

$$= 60$$

$$\textcircled{3.} \quad \textcircled{3.1} \quad \begin{vmatrix} 1 & 2 & 3 \\ 4 & 0 & 6 \\ 7 & 8 & 9 \end{vmatrix} = A$$

$\det A = 60$  - из прошлого задания

$$M = \begin{pmatrix} -48 & -6 & 32 \\ -6 & -12 & -6 \\ 12 & -6 & -8 \end{pmatrix}$$

$$A_* = \begin{pmatrix} -48 & 6 & -32 \\ 6 & -12 & 6 \\ 12 & 6 & -8 \end{pmatrix}$$

$$A_*^T = \begin{pmatrix} -48 & 6 & 12 \\ 6 & -12 & 6 \\ -32 & 6 & -8 \end{pmatrix}$$

$$A^{-1} = A_*^T / 60 = \begin{pmatrix} -\frac{48}{60} & \frac{1}{10} & \frac{12}{60} \\ \frac{1}{10} & -\frac{12}{60} & \frac{1}{10} \\ -\frac{32}{60} & \frac{1}{10} & -\frac{8}{60} \end{pmatrix} = \begin{pmatrix} -0,8 & 0,1 & 0,2 \\ 0,1 & -0,2 & 0,1 \\ -\frac{8}{15} & 0,1 & -\frac{2}{15} \end{pmatrix}$$

$$\textcircled{3.2} \quad A = \begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 5 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \quad - \text{ранг матрицы} = 1$$

$$\textcircled{4.} \quad \bar{A} = (1, 5); \quad \bar{B} = (2, 8)$$

$$\bar{A} \cdot \bar{B} = 1 \cdot 2 + 5 \cdot 8 = 42$$

$$(5) \quad \bar{a} = (1, 5, 0); \quad \bar{b} = (2, 8, 7); \quad \bar{c} = (7, 1.5, 3)$$

$$(a, b, c) = \begin{vmatrix} 1 & 5 & 0 \\ 2 & 8 & 7 \\ 7 & 1.5 & 3 \end{vmatrix} = 7 \cdot 3.5 - \frac{3}{2} \cdot 7 + 3(-2) = 228.5$$