Задание №1

$A = \begin{pmatrix} -2 & -4 & 0 \\ 3 & -4 & 6 \\ 0 & 1 & -2 \end{pmatrix}$ $\det A = ?$

$\begin{pmatrix} -2 & -4 & 0 \\ 3 & -4 & 6 \\ 0 & 1 & -2 \end{pmatrix} \begin{matrix} \\ (+1) \\ \\ \end{matrix} \sim \begin{pmatrix} 1 & -8 & 6 \\ 3 & -4 & 6 \\ 0 & 1 & -2 \end{pmatrix} \begin{matrix} (-3) \\ \\ \\ \end{matrix}$

$\sim \begin{pmatrix} 1 & -8 & 6 \\ 0 & 20 & -12 \\ 0 & 1 & -2 \end{pmatrix} \begin{matrix} \\ (+7) \\ \\ \end{matrix} \sim \begin{pmatrix} 1 & -1 & 8 \\ 0 & 20 & 12 \\ 0 & 1 & -2 \end{pmatrix} \begin{matrix} (1) \\ \\ \\ \end{matrix}$

$\sim \begin{pmatrix} 1 & -8 & 6 \\ 0 & 20 & -12 \\ 0 & 1 & -2 \end{pmatrix} \begin{matrix} \\ (-19) \\ \\ \end{matrix} \sim \begin{pmatrix} 1 & -8 & 6 \\ 0 & 1 & 26 \\ 0 & 1 & -2 \end{pmatrix} \begin{matrix} \\ \\ (-1) \end{matrix}$

$= \begin{pmatrix} 1 & -8 & 6 \\ 0 & 1 & 26 \\ 0 & 0 & -28 \end{pmatrix}$

$\det A = 1 \cdot 1 \cdot (-28) = -28.$

№2

$x^2 = t$

$t^2 - 13t + 36 = 0$

$D = 169 - 4 \cdot 36 \cdot 1$

$D = 169 - 144 = 25$

$t_1 = \frac{13 - 5}{2} = 4$

$t_2 = \frac{13 + 5}{2} = 9$

$x^2_{1,2} = 4$ $\quad$ $x^2_{3,4} = 9.$

$x_{1,2} = \pm 2$ $\quad$ $x_{3,4} = \pm 3.$

№3

$(-8 - 4i - (-6 + 5i))(-6 - 10i - (-18 - 5i)) - (-6 + 5i)^2$

1) $(-8 - 4i - (-6 + 5i)) = -8 - 4i + 6 - 5i =$

$= -2 - 9i$

2) $(-6 - 10i - (-18 - 5i)) = -6 - 10i + 18 + 5i =$

$= 12 - 5i$

3) $(-2 - 9i)(12 - 5i) = -24 + 10i - 108i + 45i^2 =$

$= -24 - 98i - 45 = -69 - 98i$

4) ~~$(-6+5i)^2 = 36$~~

$(6+5i)^2 = (5i-6)^2 = 25i^2 - 60i +$

$+ 36 = -25 + 36 - 60i = 11 - 60i$

5) $-68 - 88i - 11 + 60i = -80 - 38i$

№ 4.

$-6(\cos(0{,}75\pi) + i\sin(0{,}75\pi)) =$

~~$p = -6$~~

~~$\varphi = 0{,}75\pi$~~

~~$\sin(0{,}75\pi) =$~~

$-6\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right) =$

$= -6\left(-\frac{\sqrt{2}}{2} + i\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{2}\,6}{2} + i\frac{\sqrt{2}\,6}{2} =$

$= 3\sqrt{2} - 3\sqrt{2}\,i = 4{,}24 - 4{,}24i$

№ 5.

$$\begin{cases} \xi_1 = -1 \\ -2\xi_1 + \xi_2 = 1 \\ 3\xi_1 - \xi_2 + \xi_3 = -2 \end{cases}$$

$$A = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 3 & -1 & 1 \end{pmatrix} \quad X = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{pmatrix} \quad B = \begin{pmatrix} -1 \\ 1 \\ -2 \end{pmatrix}$$

$$X = A^{-1} B.$$

$$A^{-1} = \frac{1}{\det A} A^*$$

$$\det A = 1 \cdot 1 \cdot 1 = 1.$$

$$A^{-1} \to \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & 0 & 0 \\ -2 & 1 & 0 & 0 & 1 & 0 \\ 3 & -1 & 1 & 0 & 0 & 1 \end{array}\right) \begin{matrix} \\ (+2), \\ \\ \end{matrix} \begin{matrix} \\ (-3), \\ \\ \end{matrix}$$

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

$$A^{-1} = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & 1 & 1 \end{pmatrix}.$$

$$X = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & 1 & 1 \end{pmatrix} \begin{pmatrix} -1 \\ 1 \\ -2 \end{pmatrix} = \begin{pmatrix} -1+0+0 \\ -2+1+0 \\ 1+1-2 \end{pmatrix} = \begin{pmatrix} -1 \\ -1 \\ 0 \end{pmatrix}$$

№6.

$$(x^5 + 2x^4 - 2x^3 - 4x^2 + x + 2) \,/\, (x^3 + 2x^2 - x - 2)$$

$x^5 + 2x^4 - x^3 - 2x^2$ | $x^2 - 1$

$-x^3 - 2x^2 + x + 2$

$-x^3 - 2x^2 + x + 2$

0

Ответ: $x^2 - 1$.

№7

$$-A = \begin{pmatrix} -1 & 0 & 0 \\ 2 & -1 & 0 \\ -3 & 1 & -1 \end{pmatrix} \quad -2B = \begin{pmatrix} -2 & -2 & 8 \\ 4 & 2 & -12 \\ -4 & -2 & 10 \end{pmatrix} =$$

$$-3C = \begin{pmatrix} -3 & 0 & 3 \\ 3 & -3 & 3 \\ -6 & 3 & -3 \end{pmatrix} =$$

$$-A - 2B = \begin{pmatrix} -1 & 0 & 0 \\ 2 & -1 & 0 \\ -3 & 1 & -1 \end{pmatrix} + \begin{pmatrix} 2 & -2 & 8 \\ 4 & 2 & -12 \\ -4 & -2 & 10 \end{pmatrix} =$$

$$= \begin{pmatrix} -3 & -2 & 8 \\ 6 & 1 & -12 \\ -7 & -1 & 9 \end{pmatrix}$$

$$-A-2B-3C = \begin{pmatrix} -3 & -2 & 8 \\ 6 & 1 & -12 \\ -7 & -1 & 9 \end{pmatrix} + \begin{pmatrix} -3 & 0 & 3 \\ 3 & -3 & 3 \\ -6 & 3 & -3 \end{pmatrix} = \begin{pmatrix} -6 & -2 & 11 \\ 9 & -2 & -9 \\ -13 & 2 & 6 \end{pmatrix}.$$

№8

$$(1 \quad 4 \quad -3) \cdot \begin{pmatrix} 1 & 2 \\ -1 & 4 \\ -1 & -2 \end{pmatrix} \cdot \begin{pmatrix} -3 & 4 \\ -1 & -2 \end{pmatrix} =$$

$$= \left(1 \cdot 1 + 4 \cdot (-1) + (-3) \cdot (-1) \quad 1 \cdot 2 + 4 \cdot 4 + (-3)(-2) \right) \times$$

$$\times \begin{pmatrix} -3 & 4 \\ -1 & -2 \end{pmatrix} = \left(1 - 4 + 3 \quad 2 + 16 + 6 \right) \begin{pmatrix} -3 & 4 \\ -1 & -2 \end{pmatrix} =$$

$$= (0 \quad 24) \begin{pmatrix} -3 & 4 \\ -1 & -2 \end{pmatrix} = (0 + (-24) \quad 0 + (-48)) =$$

$$= (-24 \quad -48).$$