ДЗ #9

Задача #1

$\sqrt[5]{\frac{3-i}{4-5i}} = \sqrt[5]{\frac{3-i}{4-5i} \cdot \frac{4+5i}{4+5i}} = \sqrt[5]{\frac{17}{41} + \frac{11}{41}}$

$|z| = \sqrt{\frac{440}{441}} = \sqrt{\frac{10}{41}}$

$\varphi = \operatorname{arctg} \frac{11}{17}$

$\sqrt[10]{\frac{10}{41}} \left(\cos\left(\frac{\operatorname{arctg} \frac{11}{17}}{5} \right) + i \sin\left(\frac{\operatorname{arctan} \frac{11}{17}}{5} \right) \right)$

$\sqrt[10]{\frac{10}{41}} (\cos(0,1148) + i \sin(0,1148)) = 0,86 + 0,09i$

Задача #3

$z = -4 = -4 + 0 \cdot i$

$|z| = \sqrt{16} = 4$

$a < 0 \quad b \geq 0 \Rightarrow \varphi = \pi - \operatorname{arctg}\left(\frac{b}{|a|}\right) =$

$= \pi - 0 = \pi = 3,14$

Задача #5

$$\begin{cases} x_1 - x_2 - 2x_3 + 3x_5 = 0 \\ -x_1 + x_2 + 2x_3 - 3x_5 = 0 \\ x_1 - x_2 - 2x_3 + 3x_5 = 0 \\ x_1 - x_2 - 2x_3 + 3x_5 = 0 \end{cases}$$

$$\begin{vmatrix} 1 & -1 & -2 & 0 & 3 \\ -1 & 1 & 2 & 0 & -3 \\ 1 & -1 & -2 & 0 & 3 \\ 1 & -1 & -2 & 0 & 3 \\ 0 & 0 & 0 & 0 & 0 \end{vmatrix} \sim \begin{vmatrix} 1 & -1 & -2 & 0 & 3 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{vmatrix}$$

$x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5$

$1x_1 - 1c_1 - 2c_2 + 0c_3 + 3c_4 = 0$

$$\begin{aligned} x_1 &= 1c_1 + 2c_2 - 0c_3 - 3c_4 \\ x_2 &= 1c_1 + 0c_2 + 0c_3 + 0c_4 \\ x_3 &= 0c_1 + 1c_2 + 0c_3 + 0c_4 \\ x_4 &= 0c_1 + 0c_2 + 1c_3 + 0c_4 \\ x_5 &= 0c_1 + 0c_2 + 0c_3 + 1c_4 \end{aligned}$$

Задача # 2

$$\begin{cases} x_1 - x_2 + 2x_4 - x_5 = 0 \\ x_2 - 2x_3 - 3x_4 + 5x_5 = 0 \\ x_3 - x_2 + x_3 + 3x_4 - 3x_5 = 0 \\ -x_1 + 2x_3 + x_4 - 4x_5 = 0 \\ -2x_1 + 2x_2 - 2x_3 - 6x_4 + 6x_5 = 0 \end{cases}$$

$$\begin{vmatrix} 1 & -1 & 0 & 2 & -1 \\ 0 & 1 & -2 & -3 & 5 \\ 1 & -1 & 1 & 3 & -3 \\ -1 & 0 & 2 & 1 & -4 \\ -2 & 2 & -2 & -6 & 6 \end{vmatrix} \sim \begin{array}{c} x_1 \; x_2 \; x_3 \; x_4 \; x_5 \\ c_1 \; c_2 \end{array} \begin{vmatrix} 1 & -1 & 0 & 2 & -1 \\ 0 & 1 & -2 & -3 & 5 \\ 0 & 0 & 1 & 1 & -2 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{vmatrix}$$

$$\begin{cases} x_1 - x_2 + 2c_1 - c_2 = 0 \\ x_2 - 2x_3 - 3c_1 + 5c_2 = 0 \\ x_3 + c_1 - 2c_2 = 0 \end{cases} \Rightarrow \begin{cases} x_3 = -c_1 + 2c_2 \\ x_2 = c_1 - c_2 \\ x_3 = -c_1 \end{cases}$$

$$\begin{aligned} x_1 &= -1\,c_1 + 0\,c_2 \\ x_2 &= 1\,c_1 - 1\,c_2 \\ x_3 &= -1\,c_1 + 2\,c_2 \\ x_4 &= 1\,c_1 + 0\,c_2 \\ x_5 &= 0\,c_1 + 1\,c_2 \end{aligned}$$

Задача 4

$$\begin{cases} x_1 - x_2 - x_4 + 4x_5 = 0 \\ x_2 + x_4 - 4x_5 = 0 \\ -2x_1 + x_3 + 2x_5 = 0 \\ 3x_1 - x_2 - 2x_3 - x_4 + 2x_5 = 0 \\ -x_1 + 2x_2 + x_3 + 2x_4 - 7x_5 = 0 \end{cases}$$

$$\begin{vmatrix} 1 & -1 & 0 & -1 & 4 \\ 0 & 1 & 0 & 1 & -4 \\ -2 & 0 & 1 & 0 & 1 \\ 3 & -1 & -2 & -1 & 2 \\ -1 & 2 & 1 & 2 & -7 \end{vmatrix} \sim \begin{array}{c} x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5 \\ c_1 \quad c_2 \end{array} \begin{vmatrix} 1 & -1 & 0 & -1 & 4 \\ 0 & 1 & 0 & 1 & -4 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{vmatrix}$$

$$\begin{cases} x_1 - x_2 - c_1 + 4c_2 = 0 \\ x_2 + c_1 - 4c_2 = 0 \\ x_3 + c_2 = 0 \end{cases} \Rightarrow \begin{cases} x_1 = 0 \\ x_2 = -c_1 + 4c_2 \\ x_3 = -c_2 \end{cases}$$

$$\begin{aligned} x_1 &= 0c_1 + 0c_2 \\ x_2 &= -1c_1 + 4c_2 \\ x_3 &= 0c_1 - 1c_2 \\ x_4 &= 1c_1 + 0c_2 \\ x_5 &= 0c_1 + 1c_2 \end{aligned}$$

Задача #6

$$\begin{cases} x_1 - 2x_2 - 2x_3 - 2x_4 - 6x_5 = 0 \\ x_1 - x_2 - x_3 - 2x_4 - 4x_5 = 0 \\ x_2 + 2x_3 + 3x_5 = 0 \\ -3x_1 + 5x_2 + 5x_3 + 7x_4 + 16x_5 = 0 \\ -5x_1 + 7x_2 + 7x_3 + 11x_4 + 25x_5 = 0 \end{cases}$$

$$\begin{vmatrix} 1 & -2 & -2 & -2 & -6 \\ 1 & -1 & -1 & -2 & -4 \\ 0 & 1 & 2 & 0 & 3 \\ -3 & 5 & 5 & 7 & 16 \\ -5 & 7 & 7 & 11 & 25 \end{vmatrix} \sim \begin{vmatrix} 1 & -2 & -2 & -2 & -6 \\ 0 & 1 & 1 & 0 & 2 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{vmatrix}$$

$$\begin{cases} x_1 - 2x_2 - 2x_3 - 2x_4 - 6x_5 = 0 \\ x_2 + x_3 + 2x_5 = 0 \\ x_3 + x_5 = 0 \\ x_4 = 0 \\ x_5 = 0 \end{cases} \Rightarrow$$

$\Rightarrow x_1 = x_2 = x_3 = x_4 = x_5 = 0 \Rightarrow$ ФСР не имеем