

№3\*

Решить систему линейных уравнений методом И-разложения

$$\begin{cases} 2x_1 + x_2 + 3x_3 = 1 \\ 11x_1 + 7x_2 + 5x_3 = -6 \\ 9x_1 + 8x_2 + 4x_3 = -5 \end{cases}$$

$$A = LU$$

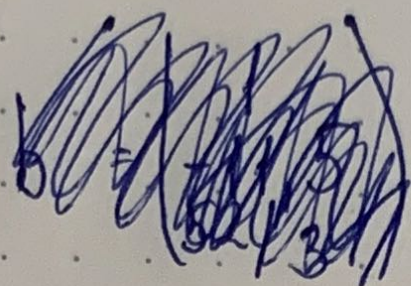
$$Ly = b$$

$$Ux = y$$

$$A = \begin{pmatrix} 2 & 1 & 3 \\ 11 & 7 & 5 \\ 9 & 8 & 4 \end{pmatrix} \xrightarrow[\text{III} - \frac{9}{2}\text{I}]{\text{II} - \frac{11}{2}\text{I}} \begin{pmatrix} 2 & 1 & 3 \\ 0 & 1,5 & -11,5 \\ 0 & 3,5 & -9,5 \end{pmatrix} \xrightarrow{\text{III} - \frac{7}{3}\text{II}} \begin{pmatrix} 2 & 1 & 3 \\ 0 & 1,5 & -11,5 \\ 0 & 0 & 52/3 \end{pmatrix} = U$$

$$Ly = b$$

$$L = \begin{pmatrix} 1 & 0 & 0 \\ 11/2 & 1 & 0 \\ 9/2 & 7/3 & 1 \end{pmatrix}$$



$$\begin{cases} y_1 = 1 \\ 11/2 y_1 + y_2 = -6 \\ 9/2 y_1 + 7/3 y_2 + y_3 = -5 \end{cases}$$

$$\begin{cases} y_1 = 1 \\ y_2 = -6 - 11/2 = -11,5 \\ y_3 = -5 - 9/2 - 7/3 \cdot (-11,5) = \frac{161}{6} - \frac{9}{2} - 5 = \frac{67}{3} - \frac{15}{3} = \frac{52}{3} \end{cases}$$

$$\begin{cases} y_1 = 1 \\ y_2 = -11,5 \\ y_3 = 52/3 \end{cases}$$

$$Ux = y$$

$$\begin{cases} 2x_1 + x_2 + 3x_3 = 1 \\ 1,5x_2 - 11,5x_3 = -11,5 \\ 52/3 x_3 = 52/3 \end{cases}$$

$$\begin{cases} x_1 = -2/2 = -1 \\ x_2 = 0 \\ x_3 = 1 \end{cases}$$

Проверка:

$$\begin{cases} 2 \cdot (-1) + 0 + 3 \cdot 1 = 1 \\ 11 \cdot (-1) + 7 \cdot 0 + 5 \cdot 1 = -6 \\ 9 \cdot (-1) + 8 \cdot 0 + 4 \cdot 1 = -5 \end{cases}$$

Верно!