

8/3 02.11

Задача III

1) Memory Teyaca

$$3) \begin{pmatrix} 2 & 1 & 4 & 2 \\ 5 & 2 & 1 & -11 \\ 1 & 1 & 6 & 3 \end{pmatrix} \sim \begin{pmatrix} 2 & 1 & 4 & 2 \\ 0 & -3 & -29 & -26 \\ 1 & 1 & 6 & 3 \end{pmatrix} \sim \begin{pmatrix} 0 & -1 & -7 & 4 \\ 0 & -3 & -29 & -26 \\ 1 & 1 & 6 & 3 \end{pmatrix}$$

$$\sim \begin{pmatrix} 1 & 1 & 6 & 3 \\ 0 & -3 & -29 & -26 \\ 0 & -1 & -7 & 4 \end{pmatrix} \sim \begin{pmatrix} 1 & 1 & 6 & 3 \\ 0 & -3 & -29 & -26 \\ 1 & 0 & -1 & 7 \end{pmatrix} \sim \begin{pmatrix} 1 & 1 & 6 & 3 \\ 0 & -3 & -29 & -26 \\ 0 & -1 & -7 & 4 \end{pmatrix}$$

$$3) \begin{pmatrix} 1 & 1 & 6 & 3 \\ 2 & 1 & 4 & 2 \\ 5 & 2 & 1 & -11 \end{pmatrix} \sim \begin{pmatrix} 1 & 1 & 6 & 3 \\ 0 & -1 & -5 & -4 \\ 0 & -3 & -29 & -26 \end{pmatrix}$$

$$3) \begin{pmatrix} 2 & 1 & 4 & 2 \\ 5 & 2 & 1 & -11 \\ 1 & 1 & 6 & 3 \end{pmatrix} \xrightarrow{-S_2, -\frac{1}{2}} \begin{pmatrix} 2 & 1 & 4 & 2 \\ 0 & -1/2 & -33/2 & -16 \\ 0 & 1/2 & 5/2 & 2 \end{pmatrix} \xrightarrow{+III} \begin{pmatrix} 2 & 1 & 4 & 2 \\ 0 & 0 & -29 & -14 \\ 0 & 1/2 & 5/2 & 2 \end{pmatrix} \sim$$

$$\sim \begin{pmatrix} 2 & 1 & 4 & 2 \\ 0 & -1/2 & -33/2 & -16 \\ 0 & 0 & -14 & -14 \end{pmatrix} \sim \begin{pmatrix} 1 & 1/2 & 2 & 1 \\ 0 & 1 & 33 & 32 \\ 0 & 0 & 1 & 1 \end{pmatrix}$$

$$x_3 = 1$$

$$x_2 + 33 = 32 \Rightarrow x_2 = -1$$

$$x_1 - 1/2 + 7/2 = 1 \Rightarrow x_1 = -2$$

$$x = \begin{pmatrix} -2 \\ -1 \\ 1 \end{pmatrix}$$

Проверка: $\begin{pmatrix} 2 & 1 & 4 & 2 \\ 5 & 2 & 1 & -11 \\ 1 & 1 & 6 & 3 \end{pmatrix} \begin{pmatrix} -2 \\ -1 \\ 1 \end{pmatrix} = \begin{pmatrix} -4-1+4 \\ -10-2+1 \\ -2-1+6 \end{pmatrix} = \begin{pmatrix} 2 \\ -11 \\ 3 \end{pmatrix}$ — Верно

2) Метод ортонормализации

$$A = \begin{pmatrix} 2 & 1 & 7 \\ 5 & 2 & 1 \\ 7 & 1 & 6 \end{pmatrix}$$

$$B = \begin{pmatrix} 2 \\ -11 \\ 3 \end{pmatrix}$$

$$1) \bar{r}_1 = \bar{a}_1 = \begin{pmatrix} 2 \\ 5 \\ 1 \end{pmatrix}$$

$$2) \bar{r}_2 = \bar{a}_2 - \bar{r}_1 \cdot \frac{(\bar{r}_1 \cdot \bar{a}_2)}{(\bar{r}_1 \cdot \bar{r}_1)} = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \\ 1 \end{pmatrix} \cdot \frac{13}{30} =$$

$$= \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix} - \begin{pmatrix} \frac{13}{15} \\ \frac{13}{6} \\ \frac{13}{30} \end{pmatrix} = \begin{pmatrix} 2/15 \\ -1/6 \\ 17/30 \end{pmatrix} = \begin{pmatrix} 28/30 \\ -5/30 \\ 17/30 \end{pmatrix}$$

$$3) \bar{r}_3 = \bar{a}_3 - \bar{r}_1 \cdot \frac{(\bar{r}_1 \cdot \bar{a}_3)}{(\bar{r}_1 \cdot \bar{r}_1)} - \bar{r}_2 \cdot \frac{(\bar{r}_2 \cdot \bar{a}_3)}{(\bar{r}_2 \cdot \bar{r}_2)} =$$

$$= \begin{pmatrix} 4 \\ 1 \\ 6 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \\ 1 \end{pmatrix} \cdot \frac{5}{6} - \begin{pmatrix} 28/30 \\ -5/30 \\ 17/30 \end{pmatrix} \cdot \frac{125}{11} =$$

$$= \begin{pmatrix} \frac{1260}{330} \\ \frac{630}{330} \\ -84 \\ 66 \\ \frac{420}{330} \end{pmatrix} = \begin{pmatrix} 1260 \\ 330 \\ -420 \\ 330 \\ \frac{420}{330} \end{pmatrix}$$

$$4) \quad x_3 = \frac{(\bar{r}_3 \cdot \bar{b})}{(\bar{r}_3 \cdot \bar{a}_3)} = \frac{\frac{5800}{30}}{\frac{5800}{30}} = 1 +$$

$$5) \quad \bar{b}^{(1)} = \bar{b} - \bar{a}_3 x_3 = \begin{pmatrix} 2 \\ -11 \\ 3 \end{pmatrix} - \begin{pmatrix} 4 \\ 1 \\ 6 \end{pmatrix} = \begin{pmatrix} -5 \\ -12 \\ -3 \end{pmatrix}$$

$$6) \quad x_2 = \frac{(\bar{r}_2 \cdot \bar{b}^{(1)})}{(\bar{r}_2 \cdot \bar{a}_2)} = \frac{-\frac{11}{30}}{\frac{11}{30}} = -1 +$$

$$7) \quad \bar{b}^{(2)} = \bar{b}^{(1)} - \bar{a}_2 x_2 = \begin{pmatrix} -5 \\ -12 \\ -3 \end{pmatrix} + \begin{pmatrix} -4 \\ -10 \\ -2 \end{pmatrix} + \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix} = \begin{pmatrix} -4 \\ -10 \\ -2 \end{pmatrix}$$

$$8) \quad x_1 = \frac{\bar{r}_1 \cdot \bar{b}^{(2)}}{\bar{r}_1 \cdot \bar{a}_1} = \frac{-60}{30} = -2 +$$