

$$a) \bar{a}_1 = (1, 2, 3) \quad \bar{a}_2 = (4, 5, 6) \quad \bar{a}_3 = (7, 8, 9) \quad \bar{x} = (0, 1, -1)$$

$$A = \begin{pmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{pmatrix} \quad \det A = \begin{vmatrix} 5 & 8 \\ 6 & 9 \end{vmatrix} - 4 \begin{vmatrix} 2 & 8 \\ 3 & 9 \end{vmatrix} + 7 \begin{vmatrix} 2 & 5 \\ 3 & 6 \end{vmatrix} = (45 - 48) - 4(18 - 24) + 7(12 - 15) = -3 + 24 - 21 = 0 \Rightarrow \bar{a}_1, \bar{a}_2, \bar{a}_3 \text{ не зли. баз.}$$

$$b) \bar{a}_1 = (0, 1, 1) \quad \bar{a}_2 = (1, 0, -1) \quad \bar{a}_3 = (2, -1, 1)$$

$$A = \begin{pmatrix} 0 & 1 & 2 \\ 1 & 0 & -1 \\ 1 & -1 & 1 \end{pmatrix} \quad \det A = - \begin{vmatrix} 1 & -1 \\ 1 & 1 \end{vmatrix} + 2 \begin{vmatrix} 1 & 0 \\ 1 & -1 \end{vmatrix} = -(1+1) + 2(-1) = -2-2 = -4$$

$$\begin{cases} 0 = \beta + \gamma \\ 1 = \alpha + \gamma \\ -1 = 2\alpha + \beta + \gamma \end{cases} \Rightarrow \begin{cases} \beta + \gamma = 0 \\ \alpha + \gamma = 1 \\ 2\alpha - \beta + \gamma = -1 \end{cases} \quad \Delta x = \begin{vmatrix} 0 & 1 & 2 \\ 1 & 0 & -1 \\ -1 & -1 & 1 \end{vmatrix} = - \begin{vmatrix} 1 & -1 \\ -1 & 1 \end{vmatrix} + 2 \begin{vmatrix} 1 & 0 \\ 1 & -1 \end{vmatrix} = -(1-1) + 2(-1) = -2$$

$$\alpha = \frac{\Delta x}{\Delta} = \frac{-2}{-4} = \frac{1}{2}$$

$$\Delta \beta = \begin{vmatrix} 0 & 0 & 2 \\ 1 & 1 & -1 \\ 1 & -1 & 1 \end{vmatrix} = 2 \begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix} = 2(-1-1) = -4 \Rightarrow \beta = \frac{-4}{-4} = 1$$

$$\Delta \gamma = \begin{vmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 1 & -1 & -1 \end{vmatrix} = - \begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix} = -(-1-1) = 2 \Rightarrow \gamma = \frac{2}{-4} = -\frac{1}{2}$$

$$\text{Ответ: } \frac{1}{2} \bar{a}_1 + \bar{a}_2 - \frac{1}{2} \bar{a}_3$$

$\sqrt{4}$

$$\bar{e}_1 = \left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right) \quad \bar{e}_2 = \left(\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}} \right) \quad \text{Док-во: } \bar{e}_1, \bar{e}_2 \perp$$

$$\langle \bar{e}_1, \bar{e}_2 \rangle = \frac{1}{\sqrt{2}} \cdot \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} \cdot \left(-\frac{1}{\sqrt{2}} \right) = \frac{1}{2} - \frac{1}{2} = 0 \Rightarrow \bar{e}_1 \perp \bar{e}_2$$

$\sqrt{5}$

$$Z = B(x) = B(x+50)$$

$$Z = B(x) = B(x+(x+50))$$

$$\textcircled{3} B(x+50) = B(x) + B(50)$$

$$\textcircled{1} B(x+(x+50)) = B(x) + B(x+50)$$

$$\textcircled{2} \lambda B$$

$$\textcircled{2} B(\lambda x) = \lambda x + 50$$

$$\lambda B(x) = \lambda(x+50) = \lambda x + 50\lambda \quad | \Rightarrow \text{не зли. л.л.к. простр}$$