

17314

$$\begin{cases} 3x_1 + 2x_2 + 7x_3 + x_4 = 15 \\ 4x_1 + 6x_2 + 2x_3 + 2x_4 = 60 \\ 9x_1 + (-2)x_2 + 9x_3 + 3x_4 = 13 \\ 4x_1 + 2x_2 + 5x_3 + 5x_4 = 35 \end{cases}$$

$$A = \begin{pmatrix} 3 & 2 & 7 & 1 \\ 4 & 6 & 2 & 2 \\ 9 & -2 & 9 & 3 \\ 4 & 2 & 5 & 5 \end{pmatrix} \quad B = \begin{pmatrix} 15 \\ 60 \\ 13 \\ 35 \end{pmatrix}$$

$$\Delta = |A| = \begin{vmatrix} 3 & 2 & 7 & 1 \\ 4 & 6 & 2 & 2 \\ 9 & -2 & 9 & 3 \\ 4 & 2 & 5 & 5 \end{vmatrix} = \begin{vmatrix} 3 & 2 & 7 & 1 \\ 0 & \frac{10}{3} & -\frac{22}{3} & \frac{2}{3} \\ 0 & -8 & -12 & 0 \\ 0 & -\frac{2}{3} & -\frac{13}{3} & \frac{11}{3} \end{vmatrix} = \begin{vmatrix} 3 & 2 & 7 & 1 \\ 0 & \frac{10}{3} & -\frac{22}{3} & \frac{2}{3} \\ 0 & 0 & -29,6 & 1,6 \\ 0 & 0 & -5,8 & 3,8 \end{vmatrix} =$$

$$= \begin{vmatrix} 3 & 2 & 7 & 1 \\ 0 & \frac{10}{3} & -\frac{22}{3} & \frac{2}{3} \\ 0 & 0 & -29,6 & 1,6 \\ 0 & 0 & 0 & \frac{129}{37} \end{vmatrix} = \frac{3 \cdot \frac{10}{3} \cdot (-29,6) \cdot \frac{129}{37}}{-29,6 \cdot 1,6} = \frac{-296 \cdot 129}{37} =$$

$$= -1032 \neq 0 \Rightarrow \text{имеет единств. решение}$$

$$\Delta x_1 = \begin{vmatrix} 15 & 2 & 7 & 1 \\ 60 & 6 & 2 & 2 \\ 13 & -2 & 9 & 3 \\ 35 & 2 & 5 & 5 \end{vmatrix} = \begin{vmatrix} 15 & 2 & 7 & 1 \\ 0 & -2 & -26 & -2 \\ 0 & -56 & 44 & 32 \\ 0 & -8 & -34 & 8 \end{vmatrix} = \begin{vmatrix} 15 & 2 & 7 & 1 \\ 0 & -2 & -26 & -2 \\ 0 & 0 & \frac{772}{15} & \frac{88}{15} \\ 0 & 0 & \frac{70}{3} & \frac{16}{3} \end{vmatrix} =$$

$$= \begin{vmatrix} 15 & 2 & 7 & 1 \\ 0 & -2 & -26 & -2 \\ 0 & 0 & \frac{772}{15} & \frac{88}{15} \\ 0 & 0 & 0 & \frac{516}{193} \end{vmatrix} = \frac{15 \cdot (-2) \cdot \frac{772}{15} \cdot \frac{516}{193}}{\frac{772}{15} \cdot \frac{88}{15}} = -8 \cdot 516 = -4128$$

$$\Delta x_2 = \begin{vmatrix} 3 & 15 & 7 & 1 \\ 4 & 60 & 2 & 2 \\ 9 & 13 & 9 & 3 \\ 4 & 35 & 5 & 5 \end{vmatrix} = \begin{vmatrix} 3 & 15 & 7 & 1 \\ 0 & 40 & -\frac{22}{3} & \frac{2}{3} \\ 0 & -32 & -12 & 0 \\ 0 & 15 & -\frac{13}{3} & \frac{11}{3} \end{vmatrix} = \begin{vmatrix} 3 & 15 & 7 & 1 \\ 0 & 40 & -\frac{22}{3} & \frac{2}{3} \\ 0 & 0 & -\frac{268}{15} & \frac{8}{15} \\ 0 & 0 & -\frac{19}{12} & \frac{41}{12} \end{vmatrix} =$$



$$= \begin{vmatrix} 3 & 15 & 7 & 1 \\ 0 & 40 & -\frac{22}{3} & \frac{2}{3} \\ 0 & 0 & -\frac{268}{15} & \frac{8}{15} \\ 0 & 0 & 0 & \frac{903}{268} \end{vmatrix} = -\left(3 \cdot 40 \cdot \frac{903}{15}\right) = -903 \cdot 8 = -7224$$

$$\Delta X_3 = \begin{vmatrix} 3 & 2 & 15 & 1 \\ 4 & 6 & 60 & 2 \\ 9 & -2 & 13 & 3 \\ 4 & 2 & 35 & 5 \end{vmatrix} = \begin{vmatrix} 3 & 2 & 15 & 1 \\ 0 & \frac{10}{3} & 40 & \frac{2}{3} \\ 0 & -8 & -32 & 0 \\ 0 & -\frac{2}{3} & 15 & \frac{11}{3} \end{vmatrix} = \begin{vmatrix} 3 & 2 & 15 & 1 \\ 0 & \frac{10}{3} & 40 & \frac{2}{3} \\ 0 & -8 & -32 & 0 \\ 0 & 0 & 23 & 3,8 \end{vmatrix} =$$

$$= \begin{vmatrix} 3 & 2 & 15 & 1 \\ 0 & \frac{10}{3} & 40 & \frac{2}{3} \\ 0 & 0 & 64 & 1,6 \\ 0 & 0 & 0 & 3,225 \end{vmatrix} = 3 \cdot \frac{10}{3} \cdot 64 \cdot 3,225 = \frac{64 \cdot 90}{3} = \frac{16 \cdot 64 \cdot 129}{40} = 129 \cdot 16 = 2064$$

$$\Delta X_4 = \begin{vmatrix} 3 & 2 & 7 & 15 \\ 4 & 6 & 2 & 60 \\ 9 & -2 & 9 & 13 \\ 4 & 2 & 5 & 35 \end{vmatrix} = \begin{vmatrix} 3 & 2 & 7 & 15 \\ 0 & \frac{10}{3} & -\frac{22}{3} & 40 \\ 0 & -8 & -12 & -32 \\ 0 & -\frac{2}{3} & -\frac{13}{3} & 15 \end{vmatrix} = \begin{vmatrix} 3 & 2 & 7 & 15 \\ 0 & \frac{10}{3} & -\frac{22}{3} & 40 \\ 0 & 0 & -29,6 & 64 \\ 0 & 0 & 0 & \frac{387}{37} \end{vmatrix} =$$

$$= \frac{-296 \cdot 387}{37} = -3096$$

$$X_1 = \frac{\Delta X_1}{\Delta} = 4; X_2 = \frac{\Delta X_2}{\Delta} = 7; X_3 = \frac{\Delta X_3}{\Delta} = -2; X_4 = \frac{\Delta X_4}{\Delta} = 3.$$

$$\text{Ombem} = X = \begin{pmatrix} 4 \\ 7 \\ -2 \\ 3 \end{pmatrix}, \text{ grigoryan-14.m.}$$