Д/З 1С36 $A = \begin{pmatrix} 17 & -8 & 4 \\ -8 & 17 & -4 \\ 4 & -4 & 11 \end{pmatrix}$

$$|A-\lambda E| = \begin{vmatrix} 17-\lambda & -8 & 4 \\ -8 & 17-\lambda & -4 \\ 4 & -4 & 11-\lambda \end{vmatrix} = \begin{vmatrix} 9-\lambda & -8 & 4 \\ 9-\lambda & 17-\lambda & -4 \\ 0 & -4 & 11-\lambda \end{vmatrix} =$$

$$= \begin{vmatrix} 9-\lambda & -8 & 4 \\ 0 & 25-\lambda & -8 \\ 0 & -4 & 11-\lambda \end{vmatrix} = (9-\lambda)(25-\lambda)(11-\lambda) - 4\cdot 4(9-\lambda) =$$

$$= (9-\lambda)\left((25-\lambda)(11-\lambda) - 16\right) = (9-\lambda)(\lambda^2 - 36\lambda + 259) = (9-\lambda)(\lambda^2 - 36\lambda + 324 - 65) =$$

$$= (9-\lambda)\left((\lambda-18)^2 - 65\right) = (9-\lambda)(\lambda-18-\sqrt{65})(\lambda-18+\sqrt{65})$$

$\lambda_1 = 9,\ \lambda_2 = 27$

$$= (\lambda-27)(\lambda^2 - 18\lambda + 81) = -(\lambda-27)(\lambda-9)^2$$

$$|A-9E| = \begin{vmatrix} 8 & -8 & 4 \\ 8 & -8 & -4 \\ 4 & -4 & 2 \end{vmatrix} = (8, -8, 4) = (2, -2, 1)$$

x_1	x_2	x_3	
1	1	0	$= a_1$
$\frac{1}{2}$	0	$-\frac{1}{2}$	$= a_2$

$c_1 = \left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}, 0\right)$

$c_3 = \left(-\frac{1}{\sqrt{6}}, 0, \frac{2}{\sqrt{5}}\right)$

$|A - \lambda_2 E| = \begin{pmatrix} -10 & -6 & 4 \\ -6 & -10 & -4 \\ 4 & -4 & -14 \end{pmatrix} \sim \begin{pmatrix} -10 & -8 & 4 \\ 0 & -\frac{18}{5} & -\frac{36}{5} \\ 0 & -4 & -4 \end{pmatrix} \sim \begin{pmatrix} -10 & -10 & 0 \\ 0 & -4 & -4 \end{pmatrix} \sim$

$\sim \begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 2 \end{pmatrix} \Rightarrow c_2 = (2, -2, 1)$

$\frac{x_3}{1} \quad \frac{x_1}{1} \quad \frac{x_2}{-2}$

$c_1 = \left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}, 0\right)$

$c_2 = \left(-\frac{1}{\sqrt{5}}, 0, \frac{2}{\sqrt{5}}\right)$

$c_3 = (2, 2, 1)$

$\lambda_{11} = 0, \quad \lambda_{22} = -\frac{\sqrt{2}}{5}$

$b_1 = c_1$

$b_2 = c_2$

$b_3 \Rightarrow \lambda_{31} = 0, \quad \lambda_{32} = -\frac{\sqrt{10}}{10} \Rightarrow c_3 = \frac{\sqrt{10}}{10}\left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}, 0\right) =$

$= \left(-\frac{\sqrt{5}}{5}, 0, \frac{2\sqrt{5}}{5}\right) + \left(\frac{2\sqrt{5}}{10}, -\frac{2\sqrt{5}}{10}, 0\right) =$

$= \left(-\frac{\sqrt{5}}{10}, -\frac{\sqrt{5}}{10}, \frac{4\sqrt{5}}{5}\right)$

$B = (Q^{-1} A Q) \Rightarrow Q = \begin{pmatrix} \frac{\sqrt{2}}{2} & -\frac{\sqrt{5}}{5} & 2 \\ \frac{\sqrt{2}}{2} & 0 & -\frac{2}{3} \\ 0 & \frac{2\sqrt{5}}{5} & \frac{1}{3} \end{pmatrix}$

$Q^{-1} = \begin{pmatrix} \frac{4\sqrt{2}}{9} & \frac{\sqrt{5}}{9} & \frac{2\sqrt{5}}{9} \\ -\frac{\sqrt{5}}{9} & \frac{\sqrt{5}}{9} & \frac{4\sqrt{5}}{9} \\ \frac{2}{3} & -\frac{2}{3} & \frac{1}{3} \end{pmatrix}$

$B = \begin{pmatrix} 36 & 0 & 0 \\ 0 & 9 & 0 \\ 0 & 0 & 14 \end{pmatrix}$