Problems of Diagonalization of matrices

1) Find the eigenvalues (characteristic values) of the following matrix:

$$A = \begin{pmatrix} 11 & 4 \\ 5 & 10 \end{pmatrix}$$

2) Find the eigenvalues (characteristic values) of the following matrix:

$$A = \begin{pmatrix} 7 & 0 & 6 \\ 5 & 2 & 6 \\ 1 & 1 & 8 \end{pmatrix}$$

3) Find the eigenvalues (characteristic values) and eigenvectors (characteristic vectors) of the following matrix:

$$A = \begin{pmatrix} 8 & 7 \\ 3 & 12 \end{pmatrix}$$

4) Find the eigenvalues (characteristic values) and eigenvectors (characteristic vectors) of the following matrix:

$$A = \begin{pmatrix} 3 & 0 & 0 \\ 10 & 5 & -4 \\ -8 & -1 & 8 \end{pmatrix}$$

Problems of Diagonalization of matrices

Answers:

1) $\lambda_1 = 6, \quad \lambda_2 = 15$

2) $\lambda_1 = 2, \quad \lambda_2 = 4, \quad \lambda_3 = 11$

3) $\lambda_1 = 5, \quad \lambda_2 = 15, \quad \mathbf{v}_1 = \begin{pmatrix} 7 \\ -3 \end{pmatrix}, \quad \mathbf{v}_2 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

4) $\lambda_1 = 3, \quad \lambda_2 = 4, \quad \lambda_3 = 9, \quad \mathbf{v}_1 = \begin{pmatrix} 1 \\ -3 \\ 1 \end{pmatrix}, \quad \mathbf{v}_2 = \begin{pmatrix} 0 \\ 4 \\ 1 \end{pmatrix}, \quad \mathbf{v}_3 = \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix}$