In all homework problems, it is not sufficient to show only the answers. *You must show your work.* These exercises are based on Chapter Five.II from the text.

For each of the matrices below

(a) calculate the characteristic polynomial of A,

(b) find the eigenvalues of A,

(c) find a basis for each eigenspace of A,

(d) determine whether or not A is diagonalizable. If A is diagonalizable, then find an invertible matrix P and a diagonal matrix D such that $P^1 AP = D$.

1. $A = \begin{bmatrix} -1 & -2 \\ 6 & 6 \end{bmatrix}$

2. $A = \begin{bmatrix} 11 & 25 \\ -4 & -9 \end{bmatrix}$

3. $A = \begin{bmatrix} -1 & -3 & -3 \\ 3 & 5 & 3 \\ -1 & -1 & 1 \end{bmatrix}$

4. $A = \begin{bmatrix} 2 & 5 & 10 \\ 1 & 2 & 4 \\ -1 & -1 & -4 \end{bmatrix}$

5. $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 5 & 5 \\ 0 & 0 & -1 \end{bmatrix}$