Eigen Value and Eigen Vector

- Find the eigen value and eigen vector of the following matrix:
  a. $A = \begin{pmatrix} 3 & 1 & -1 \\ -7 & 5 & -1 \\ -6 & 6 & 2 \end{pmatrix}$
  b. $B = \begin{pmatrix} 3 & -1 \\ 1 & 1 \end{pmatrix}$
  c. $C = \begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix}$
  d. $D = \begin{pmatrix} 1 & 0 & -2 \\ 0 & 0 & 0 \\ -2 & 0 & 4 \end{pmatrix}$
  e. $E = \begin{pmatrix} 3 & 1 & 1 \\ 2 & 4 & 2 \\ 1 & 1 & 3 \end{pmatrix}$
  f. $F = \begin{pmatrix} 8 & 2 & -2 \\ 3 & 3 & -1 \\ 24 & 8 & -6 \end{pmatrix}$

- Verify the Cayley-Hamilton theorem for the following matrix:
  a. $A = \begin{pmatrix} 1 & 2 \\ -1 & 1 \end{pmatrix}$
  b. $B = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 1 \\ 3 & 1 & 1 \end{pmatrix}$
  c. $C = \begin{pmatrix} 1 & 2 & 2 \\ 3 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$

- Find the inverse of the matrix $A = \begin{pmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{pmatrix}$ using Cayley-Hamilton theorem