

1. Find the eigenvalues and eigenvectors of $A = \begin{bmatrix} 1 & 2 \\ -2 & 1 \end{bmatrix}$.

2. Is the matrix $\begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ diagonalizable? Justify.