1. Let

\[ A = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 2 \end{bmatrix} \]

Is the matrix \( A \) diagonalizable? If it is, find a diagonalizing matrix \( P \) and a diagonal matrix \( D \) such that \( P^{-1}AP = D \).

(10 pts)

Instructions: Show Your Work!