

Diagonalization and Matrix Similarity

Linear Algebra

College of the Atlantic

1. Consider the matrix

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 1 & 2 & 1 \\ -1 & 0 & 1 \end{bmatrix} \quad (1)$$

Find the eigenvalues and eigenvectors of A . Then find the matrices P and D such that

$$A = PDP^{-1}, \quad (2)$$

where D is a diagonal matrix.

2. Using Eq. (2), determine an expression for A^2 .

3. What is D^{-1} , where D is the matrix you found in question 1? Justify your answer. Then determine an expression for A^{-1} .

4. Consider the matrix

$$B = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix} \quad (3)$$

- Find the eigenvalues of B .
- Find an eigenvector corresponding to the larger eigenvalue.
- How do you feel about this state of affairs?