

Linear Algebra I: Homework 9

Due Friday, October 27, 2017

1. Find the eigenvalues and their corresponding eigenspaces for the matrix,

$$C = \begin{pmatrix} 2 & 0 & -2 \\ 0 & 2 & 2 \\ 0 & 0 & 3 \end{pmatrix}.$$

2. Remember that the eigenvalues of the matrix,

$$A = \begin{pmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{pmatrix}$$

are $\lambda = 4, -2, -2$, with eigenvector for $\lambda = 4$,

$$\begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix}$$

and eigenvectors for $\lambda = -2$,

$$\begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix} \quad \text{and} \quad \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}.$$

Find an invertible matrix P and a diagonal matrix D so that $A = PDP^{-1}$.

3. Can the matrix

$$M = \begin{pmatrix} 9 & 1 \\ -1 & 11 \end{pmatrix}$$

be diagonalized? Explain why or why not.

4. Can the matrix

$$N = \begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}$$

be diagonalized? Explain why or why not.

5. For n a positive integer and B the matrix,

$$B = \begin{pmatrix} 1 & 0 & -2 \\ 0 & -1 & 2 \\ -1 & 0 & 2 \end{pmatrix}$$

find a formula for B^n .