Math002B Assignment 5.3 Name_________________________

Instructions: Give complete solutions to the following problems be sure to provide all the necessary steps to support your answers.

1. Let $A = PDP^{-1}$, and compute A^5

$$\mathbf{A} = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}$$

2. Which of the following matrices is diagonalizable. Prove your answer

$$\mathbf{A} = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}, \mathbf{B} = \begin{bmatrix} 2 & -2 \\ 2 & 2 \end{bmatrix}, \mathbf{C} = \begin{bmatrix} 2 & -3 \\ 1 & -1 \end{bmatrix}, \mathbf{D} = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 1 & 2 \end{bmatrix}$$

2. Find a matric P that diagonalizes **A**, and compute $\mathbf{P^{-1}AP}$.

$$\mathbf{A}=\begin{bmatrix}2 & 2 & -1\\ 1 & 3 & -1\\ -1 & -2 & 2\end{bmatrix}, \lambda=1,5$$

3. Compute A^K.

$$\mathbf{A}=\begin{bmatrix}0 & 0 & -2\\ 1 & 2 & 1\\ 1 & 0 & 3\end{bmatrix}, k=5,$$

4. Consider the Matrix A

$$A=\begin{bmatrix}1 & 2\\ 2 & -2\end{bmatrix}$$

a. Find a Basis for the Eigenspace of A, Call it $\{u_1, u_2\}$

b. Normalize the vectors in the Basis of the Eigen space of A. Call it $\{q_1, q_2\}$

c. Compute $\lambda_1 q_1 q_1^T + \lambda_2 q_2 q_2^T$

d. Compare the answer to c with the Matrix A.