Math 100, Quiz # 4

Spring 2014 Name:

1.[7 Points] Let $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$. Find the eigenvalues and corresponding basis vector(s). Is A diagonalizable? Why or why not?

2. [7 Points] Let $A = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$. Diagonalize A.

3. [8 Points] Find the eigenvalues of the matrix $\begin{bmatrix} 2 & 3 & 3 & 5 \\ 3 & 2 & 2 & 3 \\ 0 & 0 & 2 & 2 \\ 0 & 0 & 0 & 2 \end{bmatrix}$

4. [6 Points] Compute A^{50} where $A = \begin{bmatrix} 2 & 0 \\ 0 & -2 \end{bmatrix}$

5. [10 Points] Let $A = \begin{bmatrix} 1 & 2 & -1 \\ 1 & 0 & 1 \\ 4 & -4 & 5 \end{bmatrix}$. One of the eigenvalues of A is 3. Find the other two eigenvalues and basis for their corresponding eigenspaces.

6. [12 Points] Let $A = \begin{bmatrix} .6 & .3 \\ .4 & .7 \end{bmatrix}$. Let $\overrightarrow{x_0} = \begin{bmatrix} .5 \\ .5 \end{bmatrix}$. Let $\overrightarrow{v_1}$ and $\overrightarrow{v_2}$ be the basis vectors corresponding to the eigenvalues λ_1 and λ_2. Let $\overrightarrow{x_k} = A^k \overrightarrow{x_0}$. Find $\lim \overrightarrow{x_k}$ as $k \to \infty$ by expressing $\overrightarrow{x_0}$ in terms of $\overrightarrow{v_1}$ and $\overrightarrow{v_2}$.