MAC 3105-2A Print Name _____
Quiz 7
07/06/2017 Signature _____

UNLESS SPECIAL INSTRUCTED, WE ONLY CONSIDER **REAL** NUMBERS.

1. Let A be a 5×5 matrix as follows.

$$\begin{bmatrix} 2 & 0 & 0 & 0 & 0 \\ 1 & 2 & 1 & 0 & 0 \\ -1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 2 & 2 \\ 0 & 0 & 0 & -2 & 1 \end{bmatrix}$$

(1) Find all the eigenvalues of A.
(2) For each eigenvalue, find a basis for its eigen-space.
(3) Is A diagonalizable ? If not, Explain why. If it is, find the matrix P and D such that $A = PDP^{-1}$. Here D is diagonal, and P is an invertible matrix.

2. Let A be a 3×3 matrix as follows.

$$\begin{bmatrix} 2 & 3/2 & 0 \\ -2 & -2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

(1) Find the diagonalization of A, i.e., find an invertible matrix P and a diagonal matrix D such that $A = PDP^{-1}$.
(2) Find A^{2017}, i.e.,$A \times A \times \cdots \times A$ multiplied 2017 times.

3. A is a 5×5 matrix that has eigenvale 2 of multiplicity 5, and is diagonalizable. List all the possible A's.