

## Quiz 5

Math 54-Lec 3, Linear Algebra, Fall 2017

SECTION:

NAME:

You have 30 minutes to complete this quiz. To receive full credit, you must justify your answers.

**Problem 1.**(12 points)

(a.)(8 points) Find the eigenvalues of the matrix  $A$  below and find a basis for each eigen-space. Hence, is  $A$  diagonalizable?

$$A = \begin{bmatrix} 3 & 0 & 0 \\ -3 & 4 & 9 \\ 0 & 0 & 3 \end{bmatrix}$$

(b.)(4 points) Compute  $A^{10}\vec{x}$  for  $\vec{x} = \begin{bmatrix} 3 \\ 1 \\ 1 \end{bmatrix}$ .

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**Problem 2.**(1 point each) Label the following statements true or false. If the statement is true, explain why. If it is false, explain why or provide a counterexample. Correct answers without justification will receive no credit.

- (a.) If  $A$  is an  $n \times n$  diagonalizable matrix, then  $A$  is invertible.
- (b.) If  $\lambda$  is eigenvalue of an  $n \times n$  matrix  $A$ , then the linear transformation defined by the matrix  $(A - \lambda I)$  is not injective.
- (c.) If  $\lambda_0$  is a eigenvalue of a matrix  $A$ , then the multiplicity of  $\lambda_0$  as the root of the characteristic polynomial of  $A$  is the equal to the dimension of the eigenspace corresponding to  $\lambda_0$ .