**MTH 330** **Quiz #4** April 20, 2018

NAME: _____

1. Consider the following matrix:

$$\mathbf{A} = \begin{pmatrix} 5 & 0 & 0 \\ 0 & 1 & 2 \\ 0 & 2 & 4 \end{pmatrix}$$

   (a) Find all eigenvalues and corrsponding eigenvectors of $\mathbf{A}$.

   (b) Is $\mathbf{A}$ *diagonalizable*? Why? Why not?

   (c) If so, write down the matrix $\mathbf{P}$ such that $\mathbf{P}^{-1}\mathbf{A}\mathbf{P} = \mathbf{D}$.

   (d) Without calculating $\mathbf{P}^{-1}$ what is the diagonal matrix $\mathbf{D}$ corresponding to your $\mathbf{P}$.

2. A $5 \times 5$ matrix of real numbers, $\mathbf{A}$, is found to have the following eigenvalues: $\lambda_1 = -2, \lambda_2 = -1, \lambda_3 = 0, \lambda_4 = 1, \lambda_5 = 2$.

   (a) Explain why $\mathbf{A}$ is, or is NOT, *diagonalizable*.

   (b) Explain why $\mathbf{A}$ is, or is NOT, *invertible*.

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NAME: _____

1. Consider the following matrix:

$$\mathbf{A} = \begin{pmatrix} 1 & 3 & 0 \\ 3 & 9 & 0 \\ 0 & 0 & 2 \end{pmatrix}$$

   (a) Find all eigenvalues and corrsponding eigenvectors of $\mathbf{A}$.

   (b) Is $\mathbf{A}$ *diagonalizable*? Why? Why not?

   (c) If so, write down the matrix $\mathbf{P}$ such that $\mathbf{P}^{-1}\mathbf{A}\mathbf{P} = \mathbf{D}$.

   (d) Without calculating $\mathbf{P}^{-1}$ what is the diagonal matrix $\mathbf{D}$ corresponding to your $\mathbf{P}$.

2. A $5 \times 5$ matrix of real numbers, $\mathbf{A}$, is found to have the following eigenvalues: $\lambda_1 = 1, \lambda_2 = 2, \lambda_3 = 3, \lambda_4 = 4, \lambda_5 = -1$.

   (a) Explain why $\mathbf{A}$ is, or is NOT, *diagonalizable*.

   (b) Explain why $\mathbf{A}$ is, or is NOT, *invertible*.

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NAME: _____

1. Consider the following matrix:

$$\mathbf{A} = \begin{pmatrix} 3 & 0 & 0 \\ 0 & 1 & 3 \\ 0 & 3 & 9 \end{pmatrix}$$

   (a) Find all eigenvalues and corrsponding eigenvectors of $\mathbf{A}$.

   (b) Is $\mathbf{A}$ *diagonalizable*? Why? Why not?

   (c) If so, write down the matrix $\mathbf{P}$ such that $\mathbf{P}^{-1}\mathbf{A}\mathbf{P} = \mathbf{D}$.

   (d) Without calculating $\mathbf{P}^{-1}$ what is the diagonal matrix $\mathbf{D}$ corresponding to your $\mathbf{P}$.

2. A $5 \times 5$ matrix of real numbers, $\mathbf{A}$, is found to have the following eigenvalues: $\lambda_1 = 0, \lambda_2 = 1, \lambda_3 = 2, \lambda_4 = 3, \lambda_5 = 4$.

   (a) Explain why $\mathbf{A}$ is, or is NOT, *diagonalizable*.

   (b) Explain why $\mathbf{A}$ is, or is NOT, *invertible*.