Name ________________________

Mathematics 1553

Quiz 4

Prof. Margalit

Section E1/Arjun E2/Qianli E3/Kemi E4/Martin E5/Bharat (circle one!)

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1. What does it mean for vectors $v_1, \ldots, v_k$ to be *linearly independent*? Give the definition.

2. Which of the following sets of vectors are linearly independent? *Hint: No calculations are required.*

$$\left\{ \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 10 \\ 20 \\ 30 \end{pmatrix} \right\}$$

DEPENDENT INDEPENDENT

$$\left\{ \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \right\}$$

DEPENDENT INDEPENDENT

$$\left\{ \begin{pmatrix} 9 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 7 \\ 1 \\ 7 \end{pmatrix}, \begin{pmatrix} 2 \\ 4 \\ 6 \end{pmatrix} \right\}$$

DEPENDENT INDEPENDENT

Turn the page!

3. Suppose that A is a 3×2 matrix and that T is the linear transformation $T(v) = Av$.

What is the domain of T?

Is it possible for T to be one-to-one?

YES NO

4. Write down the standard matrix for the linear transformation $T : \mathbb{R}^2 \to \mathbb{R}^2$ that rotates clockwise by $\pi/2$ and then orthogonally projects to the x-axis.