

MATH 54 FALL 2017: DISCUSSION 205/208 QUIZ#2

GSI: CHRISTOPHER EUR, DATE: 9/8/2017

STUDENT NAME: _____

Problem 1. (6 points) Test whether the following matrix $A_{3 \times 4}$ has the following properties: (a) columns span \mathbb{R}^3 , (b) columns are linearly independent. Lastly, (c) explain what these results say about existence/uniqueness of the system $A\vec{x} = \vec{b}$ for an arbitrary vector $\vec{b} \in \mathbb{R}^3$.

$$A = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 2 & -1 & 3 \\ 0 & 1 & 4 & 0 \end{bmatrix}$$

Problem 2. (4 points) Show that a set of four vectors $\{v_1, \dots, v_4\}$ in \mathbb{R}^4 need not be linear independent even if any subset of three vectors are linearly independent. In other words, give an example of $v_1, \dots, v_4 \in \mathbb{R}^4$ such that any set of three vectors from the list is linearly independent, but $\{v_1, \dots, v_4\}$ is not. (Hint: Can 4 vectors in 3 dimensional space ever be linearly independent?)