

Math 211, Spring 2017 — Quiz 1

February 3

Name: _____

Instructions. Please do both problems. No electronic devices are allowed.

Problem 1. Fill in the blanks in the following definition.

A matrix is in **reduced row-echelon form (RREF)** if

1. first non-zero entry in each row is 1 (called leading 1)
2. if column has leading 1, then all other entries in column are 0
3. if row has leading 1, then every row above has leading 1 further left.

Problem 2. Find the solution set of the following system of equations

$$x_1 + 2x_2 - 2x_3 - 3x_4 = -1$$

$$x_1 + 3x_2 - 3x_3 - 3x_4 = -1$$

$$-x_2 + x_3 + x_4 = 2.$$

Make sure to write your answer in set notation $\{\dots\}$.

$$\left[\begin{array}{cccc|c} 1 & 2 & -2 & -3 & -1 \\ 1 & 3 & -3 & -3 & -1 \\ 0 & -1 & 1 & 1 & 2 \end{array} \right]$$

$$\rightarrow -I \left[\begin{array}{cccc|c} 1 & 2 & -2 & -3 & -1 \\ 0 & 1 & -1 & 0 & 0 \\ 0 & -1 & 1 & 1 & 2 \end{array} \right]$$

$$\rightarrow -2II \left[\begin{array}{cccc|c} 1 & 0 & 0 & -3 & -1 \\ 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 2 \end{array} \right] + II$$

$$\rightarrow 3III \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 5 \\ 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 2 \end{array} \right]$$

$$x_1 = 5$$

$$x_2 = x_3$$

$$x_4 = 2$$

$$x_3 = t$$

The solution set is

$$\left\{ \begin{bmatrix} 5 \\ t \\ t \\ 2 \end{bmatrix} : t \in \mathbb{R} \right\}$$