

Name: _____
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Quiz 1

Question 1. (3 marks) Find the solution set for the following linear equation:

$$3x_1 - 4x_2 - \frac{5}{7}x_3 - x_4 = 13$$

$$\text{Let } x_1 = s, x_2 = t, x_3 = r$$

$$3s - 4t - \frac{5}{7}r - x_4 = 13$$

$$-x_4 = 13 - 3s + 4t + \frac{5}{7}r$$

$$x_4 = -13 + 3s - 4t - \frac{5}{7}r$$

$$\therefore (x_1, x_2, x_3, x_4) = (s, t, r, -13 + 3s - 4t - \frac{5}{7}r)$$

$$s, t, r \in \mathbb{R}$$

Question 2. (3 marks) Write the augmented matrix for the following system of linear equations:

$$\begin{array}{rclclcl} x_1 & -5x_2 & & +6x_4 & -x_5 & = & 1 \\ 3x_1 & \frac{1}{2}x_2 & & +x_4 & -10x_5 & = & 0 \\ & x_2 & -x_3 & & +5x_5 & = & -8 \end{array}$$

$$\left[\begin{array}{cccccc|c} 1 & -5 & 0 & 6 & -1 & 1 \\ 3 & \frac{1}{2} & 0 & 1 & -10 & 0 \\ 0 & 1 & -1 & 0 & 5 & -8 \end{array} \right]$$

Question 3. (4 marks) Solve the linear system that has the following augmented matrix in reduced row-echelon form:

$$\left[\begin{array}{cccccc|c} 1 & 0 & 3 & 0 & -5 & 2 \\ 0 & 1 & 2 & 0 & 0 & -1 \\ 0 & 0 & 0 & 1 & 0 & 4 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array} \right]$$

FREE VARIABLES

$$\text{LET } x_3 = s, x_5 = t$$

$$x_1 + 3x_3 - 5x_5 = 2$$

$$\begin{aligned} x_1 &= 2 - 3x_3 + 5x_5 \\ &= 2 - 3s + 5t \end{aligned}$$

$$x_2 + 2x_3 = -1$$

$$x_4 = 4$$

$$\begin{aligned} x_2 &= -1 - 2x_3 \\ &= -1 - 2s \end{aligned}$$

$$\therefore (x_1, x_2, x_3, x_4) = (2 - 3s + 5t, -1 - 2s, s, 4, t) \quad s, t \in \mathbb{R}$$