MATH 332
Quiz I
September 1, 1989

Name Key

1. Write the augmented matrix for the following system of linear equation

$$2x_1 + 3x_3 + x_5 = 3$$
$$-x_2 + x_3 - 2x_5 = 4$$
$$10x_1 + x_4 = 0$$

$$\left[\begin{array}{ccccc|c} 2 & 0 & 3 & 0 & 1 & 3 \\ 0 & -1 & 1 & 0 & -2 & 4 \\ 10 & 0 & 0 & 1 & 0 & 0 \end{array}\right]$$

2 missed

2. How many solutions are there for the system of equations associated with each of the following augmented matices? [x = a nonzero number.]

a. $\left[\begin{array}{ccc|c} x & x & x & x \\ 0 & x & x & x \\ 0 & 0 & x & x \end{array}\right]$ 1

b. $\left[\begin{array}{ccc|c} x & x & x & x \\ 0 & 0 & x & x \\ 0 & 0 & 0 & x \end{array}\right]$ none

c. $\left[\begin{array}{cccc|c} x & x & x & x & x \\ 0 & x & x & x & x \\ 0 & 0 & x & x & x \end{array}\right]$ ∞

1/3 got

3. Find all solutions (if any) for the system with augmented matrix:

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

$x_5 = t$

$x_4 - 2t = 0 \quad x_4 = 2t$

$2x_3 + 2(2t) + 3t = -2$

$2x_3 + 7t = -2 \quad x_3 = -\frac{7}{2}t - 1$

$x_1 + 2s + 3\left(-\frac{7}{2}t - 1\right) - 2t = 3$

$x_1 + 2s - \frac{21}{2}t - 3 - 2t = 3$

$x_1 = -2s + \frac{25}{2}t + 6$

$x_2 = s$

$x_3 = -\frac{7}{2}t - 1$

$x_4 = 2t$

$x_5 = t$

must (small errors)

4. Find all solutions (if any) for the following system of equations:

$$2x_1 + 3x_2 + x_3 = 0$$
$$-2x_1 - 2x_2 + x_3 = 2$$
$$4x_1 + 9x_2 + 10x_3 = 3$$

$$\left[\begin{array}{ccc|c} 2 & 3 & 1 & 0 \\ -2 & -2 & 1 & 2 \\ 4 & 9 & 10 & 3 \end{array}\right] \xrightarrow[(3)-4(1)]{(2)+(1)} \left[\begin{array}{ccc|c} 2 & 3 & 1 & 0 \\ 0 & 1 & 2 & 2 \\ 0 & 3 & 8 & 3 \end{array}\right] \longrightarrow \xrightarrow{(3)-3(2)} \left[\begin{array}{ccc|c} 2 & 3 & 1 & 0 \\ 0 & 1 & 2 & 2 \\ 0 & 0 & 2 & -3 \end{array}\right]$$

$2x_3 = -3 \quad x_3 = -\frac{3}{2}$

$x_2 + 2\left(-\frac{3}{2}\right) = 2$

$x_2 - 3 = 2 \quad x_2 = 5$

$2x_1 + 3(5) + 1\left(-\frac{3}{2}\right) = 0$

$2x_1 + 15 - \frac{3}{2} = 0$

$2x_1 = -\frac{30+3}{2} = -\frac{27}{2}$

$x_1 = -\frac{27}{4}$

$\left(-\frac{27}{4}, 5, -\frac{3}{2}\right)$

all but 3