314-QUIZ 1

Name:____

September 10, 2003

1 $< 13pts >$

For the following system, derive the reduced row echelon form and determine whether the system is consistent. If so find all solutions.

$$\begin{aligned} x_1 + 11x_2 + 2x_3 &= 14 \\ -x_1 + 3x_2 + 2x_3 &= 4 \\ 2x_1 + x_2 - 2x_3 &= 1 \end{aligned}$$

Solution

$$\begin{array}{r} \\ -1 \\ 2 \end{array} \left(\begin{array}{rrrcr} 1 & 11 & 2 & | & 14 \\ -1 & 3 & 2 & | & 4 \\ 2 & 1 & -2 & | & 1 \end{array}\right) \to \begin{array}{r} \\ \\ -3/2 \end{array} \left(\begin{array}{rrrcr} 1 & 11 & 2 & | & 14 \\ 0 & 14 & 4 & | & 18 \\ 0 & -21 & -6 & | & -27 \end{array}\right) \to$$

$$\begin{array}{r} \\ 1/14* \\ \\ \end{array} \left(\begin{array}{rrrcr} 1 & 11 & 2 & | & 14 \\ 0 & 14 & 4 & | & 18 \\ 0 & 0 & 0 & | & 0 \end{array}\right) \to \begin{array}{r} -11 \\ \\ \\ \end{array} \left(\begin{array}{rrrcr} 1 & 11 & 2 & | & 14 \\ 0 & 1 & 2/7 & | & 9/7 \\ 0 & 0 & 0 & | & 0 \end{array}\right) \to$$

$$\left(\begin{array}{rrrcr} 1 & 0 & -8/7 & | & -1/7 \\ 0 & 1 & 2/7 & | & 9/7 \\ 0 & 0 & 0 & | & 0 \end{array}\right) \to \left\{ \begin{array}{rcr} x_3 & = & \alpha \\ x_2 & = & 9/7 - 2/7\alpha \\ x_1 & = & -1/7 + 8/7\alpha \end{array} \right.$$

2 $< 12pts >$

For the following system, derive the reduced row echelon form and determine whether the system is consistent. If so find all solutions.

$$\begin{aligned} x_1 + 2x_2 &= 1 \\ -2x_1 + x_2 &= 3 \\ 8x_1 - 5x_2 &= 4 \end{aligned}$$

Solution

$$\begin{array}{c} \\ -2 \\ 8 \end{array} \left(\begin{array}{rrcr} 1 & 2 & | & 1 \\ -2 & 1 & | & 3 \\ 8 & -5 & | & 4 \end{array} \right) \rightarrow \quad \begin{array}{c} \\ \\ -21/5 \end{array} \left(\begin{array}{rrcr} 1 & 2 & | & 1 \\ 0 & 5 & | & 5 \\ 0 & -21 & | & -4 \end{array} \right) \rightarrow$$

$$\left(\begin{array}{rrcr} 1 & 2 & | & 1 \\ 0 & 5 & | & 5 \\ 0 & 0 & | & 17 \end{array} \right) \rightarrow \text{System is Inconsistent}$$