

314 '03-QUIZ 1

Name:_____

October 9, 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.

$$x_1 + 11x_2 + 2x_3 = 14$$

$$-x_1 + 3x_2 + 2x_3 = 4$$

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

Solution

$$\begin{array}{l} -1 \begin{pmatrix} 1 & 11 & 2 & | & 14 \\ -1 & 3 & 2 & | & 4 \\ 2 & 2 & 1 & -2 & | & 1 \end{pmatrix} \rightarrow -3/2 \begin{pmatrix} 1 & 11 & 2 & | & 14 \\ 0 & 14 & 4 & | & 18 \\ 0 & -21 & -6 & | & -27 \end{pmatrix} \rightarrow \\ 1/14* \begin{pmatrix} 1 & 11 & 2 & | & 14 \\ 0 & 14 & 4 & | & 18 \\ 0 & 0 & 0 & | & 0 \end{pmatrix} \rightarrow -11 \begin{pmatrix} 1 & 11 & 2 & | & 14 \\ 0 & 1 & 2/7 & | & 9/7 \\ 0 & 0 & 0 & | & 0 \end{pmatrix} \rightarrow \\ \begin{pmatrix} 1 & 0 & -8/7 & | & -1/7 \\ 0 & 1 & 2/7 & | & 9/7 \\ 0 & 0 & 0 & | & 0 \end{pmatrix} \rightarrow \begin{cases} x_3 = \alpha \\ x_2 = 9/7 - 2/7\alpha \\ x_1 = -1/7 + 8/7\alpha \end{cases} \end{array}$$

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

$$\begin{aligned}-2 \begin{pmatrix} 1 & 2 & | & 1 \\ -2 & 1 & | & 3 \\ 8 & -5 & | & 4 \end{pmatrix} &\rightarrow -21/5 \begin{pmatrix} 1 & 2 & | & 1 \\ 0 & 5 & | & 5 \\ 0 & -21 & | & -4 \end{pmatrix} \rightarrow \\ &\begin{pmatrix} 1 & 2 & | & 1 \\ 0 & 5 & | & 5 \\ 0 & 0 & | & 17 \end{pmatrix} \rightarrow \text{System is Inconsistent}\end{aligned}$$