Math 202 Quiz # 8

Name: _____ Section # _____ Ser. # _____

1. If $\begin{bmatrix} 1 & -3 & 4 \\ 2 & 5 & -1 \\ 0 & -4 & -2 \end{bmatrix} \begin{bmatrix} t \\ 2t-1 \\ -t \end{bmatrix} + \begin{bmatrix} -t \\ 1 \\ 4 \end{bmatrix} - \begin{bmatrix} 2 \\ 8 \\ -6 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, express t in terms of y.

Solution:

$$\begin{bmatrix} t-6t+3-4t \\ 2t+10t-5+t \\ -8t+4+2t \end{bmatrix} + \begin{bmatrix} -t+2 \\ 1-8 \\ 4-6 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$\begin{bmatrix} -10t+1 \\ 13t-12 \\ -6t+2 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$\Rightarrow \quad 13t-12 = y$$

$$t = \frac{y+12}{13}$$

2. Solve the following system:

$$\begin{aligned} 5x_1 + 4x_2 - 16x_3 &= -10 \\ x_1 - x_2 - 5x_3 &= 7 \\ x_2 + x_3 &= -5 \end{aligned}$$

Solution:

$$\left[\begin{array}{ccc|c} 5 & 4 & -16 & -10 \\ 1 & -1 & -5 & 7 \\ 0 & 1 & 1 & -5 \end{array}\right]$$

$$R_1 \leftrightarrow R_2 \quad \left[\begin{array}{ccc|c} 1 & -1 & -5 & 7 \\ 5 & 4 & -16 & -10 \\ 0 & 1 & 1 & -5 \end{array}\right]$$

$$-5R_1 + R_2 \quad \left[\begin{array}{ccc|c} 1 & -1 & -5 & 7 \\ 0 & 9 & 9 & -45 \\ 0 & 1 & 1 & -5 \end{array}\right]$$

$$\tfrac{1}{9}R_2 \quad \left[\begin{array}{ccc|c} 1 & -1 & -5 & 7 \\ 0 & 1 & 1 & -5 \\ 0 & 1 & 1 & -5 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} 1 & -1 & -5 & 7 \\ 0 & 1 & 1 & -5 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

$$R_2 + R_1 \quad \left[\begin{array}{ccc|c} 1 & 0 & -4 & 2 \\ 0 & 1 & 1 & -5 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

$$\Rightarrow \quad x_2 = -5 - x_3 \quad \& \quad x_1 = 2 + 4x_3$$

Then $x_3 = t$, we have the solution

$$\begin{aligned} x_1 &= 2 + 4t \\ x_2 &= -5 - t \\ x_3 &= t \end{aligned}$$