

Math 202 Quiz # 6

Name: _____ Section # _____ Serial # _____

Use Gauss-Jordan reduction method to solve the following system:

$$2x_1 - 3x_2 + 2x_3 = 14$$

$$x_1 + 2x_2 + 3x_3 = 6$$

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

Solution:

$$\begin{bmatrix} 2 & -3 & 2 & 14 \\ 1 & 2 & 3 & 6 \\ 3 & 1 & -1 & -2 \end{bmatrix} R_1 \leftrightarrow R_2 \begin{bmatrix} 1 & 2 & 3 & 6 \\ 2 & -3 & 2 & 14 \\ 3 & 1 & -1 & -2 \end{bmatrix}$$

$$\begin{matrix} -2R_1 + R_2 \\ -3R_1 + R_3 \end{matrix} \begin{bmatrix} 1 & 2 & 3 & 6 \\ 0 & -7 & -4 & 2 \\ 0 & -5 & -10 & -20 \end{bmatrix} R_3 \leftrightarrow R_2 \begin{bmatrix} 1 & 2 & 3 & 6 \\ 0 & -5 & -10 & -20 \\ 0 & -7 & -4 & 2 \end{bmatrix}$$

$$\frac{-1}{5}R_2 \begin{bmatrix} 1 & 2 & 3 & 6 \\ 0 & 1 & 2 & 4 \\ 0 & -7 & -4 & 2 \end{bmatrix} \xrightarrow{7R_2 + R_3} \begin{bmatrix} 1 & 2 & 3 & 6 \\ 0 & 1 & 2 & 4 \\ 0 & 0 & 10 & 30 \end{bmatrix}$$

$$\frac{1}{10}R_3 \begin{bmatrix} 1 & 2 & 3 & 6 \\ 0 & 1 & 2 & 4 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

$$\xrightarrow{-2R_2 + R_1} \begin{bmatrix} 1 & 0 & -1 & -2 \\ 0 & 1 & 2 & 4 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

$$\xrightarrow{\begin{matrix} R_3 + R_1 \\ -2R_3 + R_2 \end{matrix}} \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

Solution:

$$\Rightarrow \begin{aligned} x_1 &= 1 \\ x_2 &= -2 \\ x_3 &= 3 \end{aligned}$$