

Name: _____

Hammack

Score: 12/12

1. Use Gaussian Elimination or Gauss-Jordan Elimination to solve the following system.

Please show all work and indicate all row operations. Do not use calculators, phones, smartwatches, etc.

$$\begin{cases} 5w - 10x - 5y + 15z = 25 \\ -3w + 6x + 2y + z = 5 \end{cases}$$

$$\begin{bmatrix} 5 & -10 & -5 & 15 & | & 25 \\ -3 & 6 & 2 & 1 & | & 5 \end{bmatrix}$$

$$\frac{1}{5}R_1 \rightarrow R_1 \quad \begin{bmatrix} 1 & -2 & -1 & 3 & | & 5 \\ -3 & 6 & 2 & 1 & | & 5 \end{bmatrix}$$

$$R_2 + 3R_1 \rightarrow R_2 \quad \begin{bmatrix} 1 & -2 & -1 & 3 & | & 5 \\ 0 & 0 & -1 & 10 & | & 20 \end{bmatrix}$$

$$-R_2 \rightarrow R_2 \quad \begin{bmatrix} 1 & -2 & -1 & 3 & | & 5 \\ 0 & 0 & 1 & -10 & | & -20 \end{bmatrix}$$

$$R_1 + R_2 \rightarrow R_1 \quad \begin{bmatrix} 1 & -2 & 0 & -7 & | & -15 \\ 0 & 0 & 1 & -10 & | & -20 \end{bmatrix}$$

$$\text{The new system is } \begin{cases} w - 2x - 7z = -15 \\ y - 10z = -20 \end{cases}$$

$$\text{So } \begin{cases} w = 2x + 7z - 15 \\ y = 10z - 20 \end{cases}$$

Solution: $w = 2s + 7t - 15, \quad x = s, \quad y = 10t - 20, \quad z = t, \quad \text{where parameters } s \text{ and } t \text{ are real numbers}$