

HOMEWORK HELP

$$4. \begin{bmatrix} 3 & 4 & 5 & | & 18 \\ 2 & -1 & 8 & | & 13 \\ 5 & -2 & 7 & | & 20 \end{bmatrix}$$

You will have to use fractions on this problem no matter how you start. HINT: keep the fractions as improper fractions.

$$\frac{1}{3}R_1 \rightarrow R_1 \quad \begin{bmatrix} 1 & \frac{4}{3} & \frac{5}{3} & | & 6 \\ 2 & -1 & 8 & | & 13 \\ 5 & -2 & 7 & | & 20 \end{bmatrix}$$

$$\begin{aligned} -2R_1 + R_2 &\rightarrow R_2 \\ -5R_1 + R_3 &\rightarrow R_3 \end{aligned} \quad \begin{bmatrix} 1 & \frac{4}{3} & \frac{5}{3} & | & 6 \\ 0 & -\frac{11}{3} & \frac{14}{3} & | & 1 \\ 0 & -\frac{26}{3} & -\frac{4}{3} & | & -10 \end{bmatrix}$$

$$-\frac{3}{11}R_2 \rightarrow R_2 \quad \begin{bmatrix} 1 & \frac{4}{3} & \frac{5}{3} & | & 6 \\ 0 & 1 & -\frac{14}{11} & | & -\frac{3}{11} \\ 0 & -\frac{26}{3} & -\frac{4}{3} & | & -10 \end{bmatrix}$$

$$\begin{aligned} -\frac{4}{3}R_2 + R_1 &\rightarrow R_1 \\ \frac{26}{3}R_2 + R_3 &\rightarrow R_3 \end{aligned} \quad \begin{bmatrix} 1 & 0 & \frac{37}{11} & | & \frac{70}{11} \\ 0 & 1 & -\frac{14}{11} & | & -\frac{3}{11} \\ 0 & 0 & -\frac{136}{11} & | & -\frac{136}{11} \end{bmatrix}$$

$$-\frac{11}{136}R_3 \rightarrow R_3 \quad \begin{bmatrix} 1 & 0 & \frac{37}{11} & | & \frac{70}{11} \\ 0 & 1 & -\frac{14}{11} & | & -\frac{3}{11} \\ 0 & 0 & 1 & | & 1 \end{bmatrix}$$

$$\begin{aligned} \frac{14}{11}R_3 + R_2 &\rightarrow R_2 \\ -\frac{11}{37}R_3 + R_1 &\rightarrow R_1 \end{aligned} \quad \begin{bmatrix} 1 & 0 & 0 & | & 3 \\ 0 & 1 & 0 & | & 1 \\ 0 & 0 & 1 & | & 1 \end{bmatrix}$$

$$\begin{aligned} x &= 3 \\ y &= 1 \\ z &= 1 \end{aligned}$$

CHALLENGE PROBLEM:

set up a matrix with 4 variables: w, x, y, z .

$$\begin{aligned} 2x + y = 3 &\Rightarrow 0w + 2x + 2y + 0z = 3 \\ y - z = 1 &\Rightarrow 0w + 0x + 1y - 1z = 1 \\ x + 2w = 0 &\Rightarrow 2w + 1x + 0y + 0z = 0 \\ 3z = w &\Rightarrow -1w + 0x + 0y + 3z = 0 \end{aligned}$$

$$\begin{bmatrix} 0 & 2 & 1 & 0 & 1 & 3 \\ 0 & 0 & 1 & -1 & 1 & 1 \\ 2 & 1 & 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 3 & 1 & 0 \end{bmatrix}$$