Answer on Question #82857 - Math - Linear Algebra

1. We present the equation in the form of a 3 by 3 matrix:

$$\left[\begin{array}{ccc|c} 2 & 1 & -1 & 11 \\ 1 & -2 & 2 & -2 \\ 3 & -1 & 3 & 5 \end{array}\right]$$

2. For convenience, we change the 1st and second line:

$$\left[\begin{array}{ccc|c} 1 & -2 & 2 & -2 \\ 2 & 1 & -1 & 11 \\ 3 & -1 & 3 & 5 \end{array}\right]$$

3. Multiply the 1st row by -2 and -3 and add to the second and third row respectively:

$$\left[\begin{array}{ccc|c} 1 & -2 & 2 & -2 \\ 0 & 5 & -5 & 15 \\ 0 & 5 & -3 & 11 \end{array}\right]$$

4. Multiply the 2nd row by -1 and add to the 3rd. Divide the 2nd line by 5:

$$\left[\begin{array}{ccc|c} 1 & -2 & 2 & -2 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 2 & -4 \end{array}\right]$$

5. Divide the 3rd line by 2:

$$\left[\begin{array}{ccc|c} 1 & -2 & 2 & -2 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 1 & -2 \end{array}\right]$$

6. Add the third line to the second. Multiply the 3rd row by -2 and add to 1st:

$$\left[\begin{array}{ccc|c} 1 & -2 & 0 & 2 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & -2 \end{array}\right]$$

7. Multiply the 2nd row by 2 and add to 1st:

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

Answer: $\begin{cases} x = 4 \\ y = 1 \\ z = -2 \end{cases}$