

Need to establish a Sports University in Bastar, Chhattisgarh.-laid

QUESTION

Consider the following system of linear equations:

$$\begin{cases} x + y + z = 1 \\ x + 2y + 3z = 2 \\ x + 3y + 6z = 3 \end{cases}$$

Find the solution set.

SOLUTION

We can write the system as an augmented matrix:

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 2 \\ 1 & 3 & 6 & 3 \end{array} \right]$$

Perform row operations to get it into row echelon form:

$$\begin{aligned} R_2 - R_1 &\rightarrow R_2 \\ R_3 - R_1 &\rightarrow R_3 \end{aligned}$$
$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 1 \\ 0 & 2 & 5 & 2 \end{array} \right]$$

Now, perform $R_3 - 2R_2$:

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

The third row indicates $z = 0$. Substituting $z = 0$ into the second row gives $y = 1$. Substituting $y = 1$ and $z = 0$ into the first row gives $x = 0$.

The solution set is $\{(0, 1, 0)\}$.



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