5.8.43

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28th September, 2025

Question

The sum of three numbers is 6. If we multiply the third number by 3 and add the second number to it, we get 11. By adding the first and third numbers, we get double of the second number. Find the numbers.

Theoretical Solution

Given

$$x + y + z = 6 \tag{1}$$
$$0x + y + 3z = 11 \tag{2}$$
$$x - 2y + z = 0 \tag{3}$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 0 & 1 & 3 & 11 \\ 1 & -2 & 1 & 0 \end{array}\right) \xleftrightarrow{R_3 \to R_3 - R_1} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 0 & 1 & 3 & 11 \\ 0 & -3 & 0 & -6 \end{array}\right) \tag{4}$$

$$\xleftrightarrow{R_3 \to -\frac{1}{3}R_3} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 0 & 1 & 3 & 11 \\ 0 & 1 & 0 & 2 \end{array}\right) \xleftrightarrow{R_2 \leftrightarrow R_3} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 0 & 1 & 0 & 2 \\ 0 & 1 & 3 & 11 \end{array}\right) \tag{5}$$

Theoretical Solution

$$\xleftrightarrow[R_3 \to R_3 - R_2]{R_1 \to R_1 - R_2} \left(\begin{array}{ccc|c} 1 & 0 & 1 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 3 & 9 \end{array}\right) \xleftrightarrow{R_3 \to \frac{1}{3}R_3} \left(\begin{array}{ccc|c} 1 & 0 & 1 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \end{array}\right) \tag{6}$$

$$\xleftrightarrow{R_1 \to R_1 - R_3} \left(\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \end{array}\right) \tag{7}$$

Example

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$$

$\therefore$ The required numbers are 1,2 and 3.

Plot

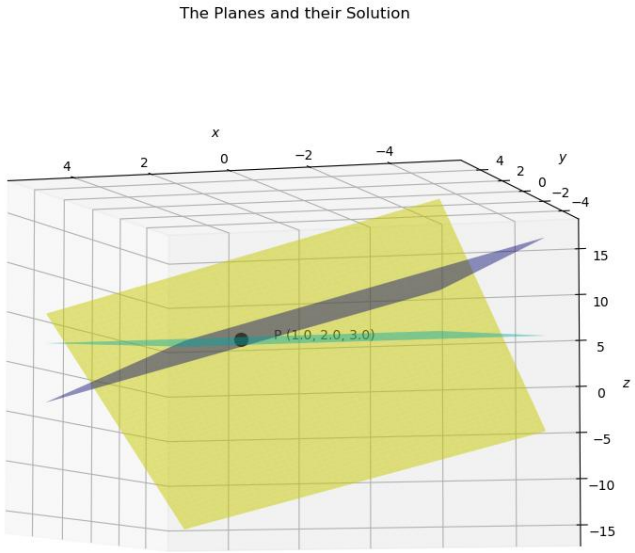

Figure: Plot