

Answer on Question #72717 - Subject - Differential Equations

Given: $x + y = \frac{1}{9}, y + z = \frac{2}{9}, z + x = \frac{5}{9}.$

To Find: Find the solution.

Solution: To find the solution of the system, we will try to eliminate one variable using two equations. After getting new equation, solve the new equation with the remaining equation.

$$x + y = \frac{1}{9} \dots\dots\dots(1)$$

$$y + z = \frac{2}{9} \dots\dots\dots(2)$$

$$z + x = \frac{5}{9} \dots\dots\dots(3)$$

First solve equation (1) and (2) to eliminate 'y'

$$\begin{aligned} \therefore \quad & x + y = \frac{1}{9} \\ & y + z = \frac{2}{9} \end{aligned}$$

On subtraction, we get

$$x - z = \frac{-1}{9} \dots\dots\dots(4)$$

Now, solve equation 4 with equation 1,

On addition, we get

$$\begin{aligned} \therefore \quad & z + x = \frac{5}{9} \\ & x - z = \frac{-1}{9} \end{aligned} \quad \Rightarrow 2x = \frac{4}{9}$$
$$\Rightarrow x = \frac{2}{9}$$

Put the value of x in equation 1 and 3, we get

$$\frac{2}{9} + y = \frac{1}{9} \quad \Rightarrow y = \frac{1}{9} - \frac{2}{9}$$

$$\Rightarrow y = \frac{-1}{9}$$

And $z + \frac{2}{9} = \frac{5}{9} \quad \Rightarrow z = \frac{5}{9} - \frac{2}{9}$

$$\Rightarrow z = \frac{3}{9} = \frac{1}{3}$$

Hence, the solution of the system is $x = \frac{2}{9}, y = \frac{-1}{9}, z = \frac{1}{3}$.

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