Linear Equation In Two Variables

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Class 10^{th} Maths - Chapter 3

This is Problem-1(i) from Exercise 3.3

Solve the equations:

$$x + y = 14 \tag{1}$$
$$x - y = 4 \tag{2}$$
$$\tag{3}$$

Solution:
Given Data: The equations can also be written as:

$$\mathbf{a_1} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \tag{4}$$
$$\mathbf{a_2} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \tag{5}$$
$$\mathbf{b} = \begin{pmatrix} 14 \\ 4 \end{pmatrix} \tag{6}$$
$$\tag{7}$$
$$x = \frac{\begin{vmatrix} \mathbf{b} & \mathbf{a_2} \end{vmatrix}}{\begin{vmatrix} \mathbf{a_1} & \mathbf{a_2} \end{vmatrix}} = \frac{\begin{vmatrix} 14 & 1 \\ 4 & -1 \end{vmatrix}}{\begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix}} = \frac{\begin{vmatrix} -14 & -4 \\ -1 & -1 \end{vmatrix}}{\begin{vmatrix} -1 & -1 \end{vmatrix}} = \frac{-18}{-2} = 9 \tag{8}$$

(9)

$$y = \frac{\begin{vmatrix} \mathbf{a_1} & \mathbf{b} \end{vmatrix}}{\begin{vmatrix} \mathbf{a_1} & \mathbf{a_2} \end{vmatrix}} = \frac{\begin{vmatrix} 1 & 14 \\ 1 & 4 \end{vmatrix}}{\begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix}} = \frac{\begin{vmatrix} 4 & -14 \end{vmatrix}}{\begin{vmatrix} -1 & -1 \end{vmatrix}} = \frac{-10}{-2} = 5 \tag{10}$$

therefore x = 9 and y = 5