Linear Equation In Two Variables

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Class 10^{th} Maths - Chapter 3

This is Problem-1(ii) from Exercise 3.3

1. Solve x–$y = 3, 2x$–$3y = 36$
   Solution:
   Given Data: x–y=3 , 2x–3y=36
   This can also be written as:

$$\tag{1}$$

$$Where, \mathbf{A} = \begin{pmatrix} 1 & -1 \\ 2 & -3 \end{pmatrix} \tag{2}$$

$$\mathbf{X} = \begin{pmatrix} x \\ y \end{pmatrix} \tag{3}$$

$$\mathbf{B} = \begin{pmatrix} 3 \\ 36 \end{pmatrix} \tag{4}$$

$$\mathbf{A} = \mathbf{a1} + \mathbf{a2} \tag{5}$$

$$\mathbf{a1} = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \tag{6}$$

$$\mathbf{a2} = \begin{pmatrix} -1 \\ -3 \end{pmatrix} \tag{7}$$

(8)

$$x = \frac{\begin{vmatrix} \mathbf{b} & \mathbf{a2} \end{vmatrix}}{\begin{vmatrix} \mathbf{a1} & \mathbf{a2} \end{vmatrix}} = \frac{\begin{vmatrix} 3 & -1 \\ 36 & -3 \end{vmatrix}}{\begin{vmatrix} 1 & -1 \\ 2 & -3 \end{vmatrix}} = \frac{\begin{vmatrix} -9 & -(-36) \end{vmatrix}}{\begin{vmatrix} -3 & -(-2) \end{vmatrix}} = \frac{27}{-1} = -27 \tag{9}$$

(10)

$$y = \frac{\begin{vmatrix} \mathbf{a1} & \mathbf{b} \end{vmatrix}}{\begin{vmatrix} \mathbf{a1} & \mathbf{a2} \end{vmatrix}} = \frac{\begin{vmatrix} 1 & 3 \\ 2 & 36 \end{vmatrix}}{\begin{vmatrix} 1 & -1 \\ 2 & -3 \end{vmatrix}} = \frac{\begin{vmatrix} 36 & -6 \end{vmatrix}}{\begin{vmatrix} -3 & -(-2) \end{vmatrix}} = \frac{30}{-1} = -30 \tag{11}$$