

Linear equations in 2 variables

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Class 10th Maths - Chapter 3

This is Problem-2.3 from Exercise 3.2

1. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$, $\frac{c_1}{c_2}$, find out whether the lines representing the following pairs of linear equations intersect at a point, are parallel or coincident:

$$9x + 3y + 12 = 0 \quad (1)$$

$$18x + 6y + 24 = 0 \quad (2)$$

Solution:

Equations can be written as:

$$\begin{pmatrix} 9 & 3 \\ 18 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -12 \\ -24 \end{pmatrix} \quad (3)$$

$$x = \frac{\begin{vmatrix} \mathbf{B} & \mathbf{A}_2 \end{vmatrix}}{\begin{vmatrix} \mathbf{A}_1 & \mathbf{A}_2 \end{vmatrix}} = \frac{\begin{vmatrix} -12 & 3 \\ -24 & 6 \end{vmatrix}}{\begin{vmatrix} 9 & 3 \\ 18 & 6 \end{vmatrix}} = \frac{(-12)(6) - (-24)(3)}{(9)(6) - (18)(3)} = \frac{-72 + 72}{54 - 54} = 0 \quad (4)$$

$$y = \frac{\begin{vmatrix} \mathbf{A}_1 & \mathbf{B} \end{vmatrix}}{\begin{vmatrix} \mathbf{A}_1 & \mathbf{A}_2 \end{vmatrix}} = \frac{\begin{vmatrix} 9 & -12 \\ 18 & -24 \end{vmatrix}}{\begin{vmatrix} 9 & 3 \\ 18 & 6 \end{vmatrix}} = \frac{9(-24) - 18(-12)}{9(6) - 18(3)} = \frac{-216 + 216}{54 - 54} = 0 \quad (5)$$

Hence this equation has infinite number of solutions