

Pair of linear equation in two variables

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Class 10th Maths - Chapter 3

1. On comparing $\frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$ Find out whether the following pair of linear equation are consistent, or inconsistent.

$$5x - 3y = 11; \quad (1)$$

$$-10x + 6y = 22 \quad (2)$$

Solution:

equations can be written as:

$$\begin{pmatrix} 5 & -3 \\ -10 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 11 \\ 22 \end{pmatrix} \quad (3)$$

$$(4)$$

The values of x and y are:

$$x = \frac{\begin{vmatrix} b & a_2 \\ a_1 & a_2 \end{vmatrix}}{\begin{vmatrix} a_1 & a_2 \end{vmatrix}} = \frac{\begin{vmatrix} 11 & 22 \\ -3 & 6 \end{vmatrix}}{\begin{vmatrix} 5 & -10 \\ -3 & 6 \end{vmatrix}} = \frac{|11 \times -3| - |22 \times 6|}{|5 \times 6| - |-10 \times -3|} = \frac{66 - 66}{30 - 30} = \frac{0}{0} \quad (5)$$

$$y = \frac{\begin{vmatrix} a_1 & b \end{vmatrix}}{\begin{vmatrix} a_1 & a_2 \end{vmatrix}} = \frac{\begin{vmatrix} 5 & -10 \\ 11 & 22 \end{vmatrix}}{\begin{vmatrix} 5 & -10 \\ -3 & 6 \end{vmatrix}} = \frac{\begin{vmatrix} 5 \times 22 & -10 \times 11 \end{vmatrix}}{\begin{vmatrix} 6 \times 5 & -10 \times -3 \end{vmatrix}} = \frac{-10 + 10}{30 - 30} = \frac{0}{0}$$

(6)

The solution derived has infinite solutions as x and y values are zero.