



### Exercise 3D

Question 3:

$$3x - 5y - 7 = 0$$

$$6x - 10y - 3 = 0$$

$$a_1 = 3, b_1 = -5, c_1 = -7$$

$$a_2 = 6, b_2 = -10, c_2 = -3$$

$$\therefore \frac{a_1}{a_2} = \frac{3}{6} = \frac{1}{2}, \frac{b_1}{b_2} = \frac{-5}{-10} = \frac{1}{2}, \frac{c_1}{c_2} = \frac{-7}{-3} = \frac{7}{3}$$

$$\text{Thus, } \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

Hence the given system of equations is inconsistent.

Question 4:

$$2x - 3y - 5 = 0, 6x - 9y - 15 = 0$$

These equations are of the form

$$a_1x + b_1y + c_1 = 0, a_2x + b_2y + c_2 = 0$$

$$\text{where, } a_1 = 2, b_1 = -3, c_1 = -5,$$

$$a_2 = 6, b_2 = -9, c_2 = -15$$

$$\therefore \frac{a_1}{a_2} = \frac{2}{6} = \frac{1}{3}, \frac{b_1}{b_2} = \frac{-3}{-9} = \frac{1}{3} \text{ and } \frac{c_1}{c_2} = \frac{-5}{-15} = \frac{1}{3}$$

$$\text{Thus, } \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

Hence the given system of equations has infinitely many solutions.

Question 5:

$$kx + 2y - 5 = 0$$

$$3x - 4y - 10 = 0$$

These equations are of the form

$$a_1x + b_1y + c_1 = 0, \quad a_2x + b_2y + c_2 = 0$$

$$\text{where } a_1 = k, b_1 = 2, c_1 = -5$$

$$a_2 = 3, b_2 = -4, c_2 = -10$$

for a unique solution, we must have

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \text{ or } \frac{k}{3} \neq \frac{2}{-4} \Rightarrow k \neq \frac{-3}{2}$$

This happens when

$$k \neq \frac{-3}{2}$$

Thus, for all real value of k other than , the given system equations will have a unique solution

(ii) For no solution we must have

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\text{Now, } \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\frac{k}{3} = \frac{2}{-4} \neq \frac{-5}{-10}$$

$$\Rightarrow \frac{k}{3} = \frac{2}{-4} \text{ and } \frac{k}{3} \neq \frac{1}{2}$$

$$k = \frac{-3}{2}, k \neq \frac{3}{2}$$

Hence, the given system of equations has no solution if  $k = -3/2$ .

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