

Ex 3.5 Question 1

$$\textcircled{i} \quad \begin{aligned} x - 3y - 3 &= 0 \\ 3x - 9y - 2 &= 0 \end{aligned}$$

$$\frac{a_1}{a_2} = \frac{1}{3} \quad \left| \quad \frac{b_1}{b_2} = \frac{-3}{-9} \right. \quad \left. \frac{c_1}{c_2} = \frac{-3}{-2} \right.$$

$$= \frac{1}{3} \quad \left| \quad = \frac{1}{3} \right. \quad \left. = \frac{3}{2} \right.$$

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

\therefore pair of equations has no solution

$$\textcircled{ii} \quad \begin{aligned} 2x + y &= 5 \\ 3x + 2y &= 8 \end{aligned}$$

$$\frac{a_1}{a_2} = \frac{2}{3} \quad \frac{b_1}{b_2} = \frac{1}{2} \quad \frac{c_1}{c_2} = \frac{5}{8}$$

$$\therefore \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

\therefore pair of equations has unique sol.

$$\begin{array}{cccc} 2 & 3 & 1 & 2 \\ 1 & 5 & 2 & 1 \\ 2 & 8 & 3 & 2 \end{array}$$

$$\frac{x}{1 \times 8 - 2 \times 5} = \frac{y}{5 \times 3 - 8 \times 2} = \frac{-1}{2 \times 2 - 1 \times 3}$$

$$\Rightarrow \frac{x}{8-10} = \frac{y}{15-16} = \frac{-1}{4-3}$$

$$\Rightarrow \frac{x}{-2} = \frac{y}{-1} = \frac{-1}{1}$$

$$\frac{x}{-2} = -1 \quad \left| \quad \frac{y}{-1} = -1 \right.$$

$$\Rightarrow x = 2 \quad \left| \quad \Rightarrow y = 1 \right.$$

$$\textcircled{iii} \quad \begin{aligned} 3x - 5y &= 20 \\ 6x - 10y &= 40 \end{aligned}$$

$$\frac{a_1}{a_2} = \frac{3}{6} \quad \left| \quad \frac{b_1}{b_2} = \frac{-5}{-10} \right. \quad \left. \frac{c_1}{c_2} = \frac{20}{40} \right.$$

$$= \frac{1}{2} \quad \left| \quad = \frac{1}{2} \right. \quad \left. = \frac{1}{2} \right.$$

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

\therefore pair of equations has inf. many sols

$$\textcircled{iv} \quad \begin{aligned} x - 3y - 7 &= 0 \\ 3x - 3y - 15 &= 0 \end{aligned}$$

$$\frac{a_1}{a_2} = \frac{1}{3} \quad \left| \quad \frac{b_1}{b_2} = \frac{-3}{-3} \right. \quad \left. \frac{c_1}{c_2} = \frac{-7}{-15} \right.$$

$$= 1 \quad \left| \quad = \frac{7}{15} \right.$$

$$\therefore \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

\therefore pair of eqns has one sol.

$$\begin{array}{cccc} 2 & 3 & 1 & 2 \\ -3 & -7 & 1 & -3 \\ -3 & -15 & 3 & -3 \end{array}$$

$$\frac{x}{45-21} = \frac{y}{-21+15} = \frac{1}{-3+9}$$

$$\Rightarrow \frac{x}{24} = \frac{y}{-6} = \frac{1}{6}$$

$$\Rightarrow \frac{x}{24} = \frac{1}{6} \quad \left| \quad \frac{y}{-6} = \frac{1}{6} \right.$$

$$\Rightarrow x = \frac{24}{6} \quad \left| \quad y = \frac{-6}{6} \right.$$

$$\Rightarrow x = 4 \quad \left| \quad y = -1 \right.$$