



Pair of Linear Equations in Two variables Ex 3.5 Q36

Answer :

(i) GIVEN:

$$(2a-1)x-3y=5$$

$$3x+(b-2)y=3$$

To find: To determine for what value of k the system of equation has infinitely many solutions

We know that the system of equations

$$a_1x+b_1y=c_1$$

$$a_2x+b_2y=c_2$$

For infinitely many solution

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

Here

$$\frac{2a-1}{3} = \frac{3}{-(b-2)} = \frac{5}{3}$$

Consider

$$\frac{3}{-(b-2)} = \frac{5}{3}$$

$$-5b+10=9$$

$$-5b=-1$$

$$b=\frac{1}{5}$$

Again consider

$$\frac{2a-1}{3} = \frac{5}{3}$$

$$2a-1=5$$

$$2a=6$$

$$a=3$$

Hence for $\boxed{a=3}$ and $\boxed{b=\frac{1}{5}}$ the system of equation has infinitely many solution.

(ii) GIVEN:

$$2x-(2a+5)y=5$$

$$(2b+1)x-9y=15$$

To find: To determine for what value of k the system of equation has infinitely many solutions

We know that the system of equations

$$a_1x+b_1y=c_1$$

$$a_2x+b_2y=c_2$$

For infinitely many solution

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

Here

$$\frac{2}{2b+1} = \frac{2a+5}{9} = \frac{5}{15}$$

Consider the following

$$\begin{aligned}\frac{2a+5}{9} &= \frac{5}{15} \\ 30a+75 &= 45 \\ 30a &= -30 \\ a &= -1 \\ \text{Again consider} \\ \frac{2}{2b+1} &= \frac{5}{15} \\ 10b+5 &= 30 \\ 10b &= 25 \\ b &= \frac{5}{2}\end{aligned}$$

Hence for $a = -1$ and $b = \frac{5}{2}$ the system of equation has infinitely many solution.

(iii) GIVEN:

$$\begin{aligned}(a-1)x + 3y &= 2 \\ 6x + (1-2b)y &= 6\end{aligned}$$

To find: To determine for what value of k the system of equation has infinitely many solutions

We know that the system of equations

$$\begin{aligned}a_1x + b_1y &= c_1 \\ a_2x + b_2y &= c_2\end{aligned}$$

For infinitely many solution

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

Here

$$\frac{(a-1)}{6} = \frac{3}{(1-2b)} = \frac{2}{6}$$

Consider the following

$$\begin{aligned}\frac{3}{(1-2b)} &= \frac{2}{6} \\ 2-4b &= 18 \\ -4b &= 16 \\ b &= -4\end{aligned}$$

Again consider

$$\begin{aligned}\frac{(a-1)}{6} &= \frac{2}{6} \\ 6a-6 &= 12 \\ 6a &= 18 \\ a &= 3\end{aligned}$$

Hence for $a = 3$ and $b = -4$ the system of equation has infinitely many solution.

(iv) GIVEN:

$$\begin{aligned}3x + 4y &= 12 \\ (a+b)x + 2(a-b)y &= 5a-1\end{aligned}$$

To find: To determine for what value of k the system of equation has infinitely many solutions

We know that the system of equations

$$\begin{aligned}a_1x + b_1y &= c_1 \\ a_2x + b_2y &= c_2\end{aligned}$$

For infinitely many solution

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

Here

$$\frac{3}{(a+b)} = \frac{4}{2(a-b)} = \frac{12}{5a-1}$$

Consider the following

$$\begin{aligned}\frac{4}{2(a-b)} &= \frac{12}{5a-1} \\ 24a-24b &= 20a-4 \\ 4a-24b &= -4 \dots\dots (1)\end{aligned}$$

Again consider

$$\begin{aligned}\frac{3}{(a+b)} &= \frac{12}{5a-1} \\ 12a+12b &= 15a-3 \\ 3a-12b &= 3 \dots\dots (2)\end{aligned}$$

***** END *****

