Pair of Linear Equations in Two varibles Ex 3.5 Q34

Answer :

GIVEN:
$$2x - 3y = 7$$
$$(a+b)x - (a+b-3)y = 4a+b$$

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
$$\frac{2}{(a+b)} = \frac{3}{(a+b-3)} = \frac{7}{4a+b}$$

Consider the following
$$\frac{3}{(a+b-3)} = \frac{7}{4a+b}$$
$$12a + 3b = 7(a+b-3)$$
$$12a + 3b = 7a + 7b - 21$$
$$5a - 4b + 21 = 0 \ldots\ldots(1)$$

Again
$$\frac{2}{(a+b)} = \frac{3}{(a+b-3)}$$
$$2(a+b-3) = 3(a+b)$$
$$2a + 2b - 6 = 3a + 3b$$
$$a + b + 6 = 0 \ldots\ldots(2)$$

Multiplying eq. (2) by 4 and adding eq. (1)
$$9a + 45 = 0$$
$$a = -5$$

Putting the value of a in eq. (2)
$$-5 + b + 6 = 0$$
$$b = -1$$

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

Pair of Linear Equations in Two varibles Ex 3.5 Q35

Answer :

GIVEN:
$$2x + 3y = 9$$
$$(p+q)x + (2p-q)y = 3(p+q+1)$$

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

We know that the system of equations
$$a_1 x + b_1 y = c_1$$
$$a_2 x + b_2 y = c_2$$

For infinitely many solution
$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

Here
$$\frac{2}{(p+q)} = \frac{3}{(2p-q)} = \frac{3}{(p+q+1)}$$

$$\frac{3}{(2p-q)} = \frac{3}{(p+q+1)}$$

$$3(p+q+1) = 3(2p-q)$$
$$3p + 3q + 3 = 6p - 3q$$
$$3p - 6q - 3 = 0 \ \dots\dots \ (1)$$

Again consider
$$\frac{2}{(p+q)} = \frac{3}{(2p-q)}$$

$$3(p+q) = 2(2p-q)$$
$$3p + 3q = 4p - 2q$$
$$p - 5q = 0 \ \dots\dots \ (2)$$

Multiplying eq. (2) by 3 and subtracting from eq. (1)
$$3p - 6q - 3 - 3p + 15q = 0$$
$$9q = 3$$
$$q = \frac{1}{3}$$

Putting the value of q in eq. (2)

$$p - \frac{5}{3} = 0$$

$$p = \frac{5}{3}$$

Hence for $\boxed{p = \dfrac{5}{3}}$ and $\boxed{q = \dfrac{1}{3}}$ the system of equation has infinitely many solution.

********** END *********