



Pair of Linear Equations in Two variables Ex 3.4 Q21

Answer :

GIVEN:

$$a^2x + b^2y = c^2$$

$$b^2x + a^2y = d^2$$

To find: The solution of the systems of equation by the method of cross-multiplication:

Here we have the pair of simultaneous equation

$$a^2x + b^2y - c^2 = 0$$

$$b^2x + a^2y - d^2 = 0$$

By cross multiplication method we get

$$\frac{x}{(-d^2b^2) - (-c^2a^2)} = \frac{-y}{(-d^2a^2) - (-c^2b^2)} = \frac{1}{a^4 - b^4}$$

$$\frac{x}{(c^2a^2 - d^2b^2)} = \frac{y}{(d^2a^2 - c^2b^2)} = \frac{1}{a^4 - b^4}$$

Consider the following for x

$$\frac{x}{(c^2a^2 - d^2b^2)} = \frac{1}{a^4 - b^4}$$

$$x = \frac{a^2c^2 - b^2d^2}{a^4 - b^4}$$

Now consider the following for y

$$\frac{-y}{(-d^2a^2) - (-c^2b^2)} = \frac{1}{a^4 - b^4}$$

$$\frac{y}{(d^2a^2 - c^2b^2)} = \frac{1}{a^4 - b^4}$$

$$y = \frac{a^2d^2 - b^2c^2}{a^4 - b^4}$$

Hence we get the value of $x = \frac{a^2c^2 - b^2d^2}{a^4 - b^4}$ and $y = \frac{a^2d^2 - b^2c^2}{a^4 - b^4}$

Pair of Linear Equations in Two variables Ex 3.4 Q22

Answer :

GIVEN:

$$\frac{57}{x+y} + \frac{6}{x-y} = 5$$

$$\frac{38}{x+y} + \frac{21}{x-y} = 9$$

To find: The solution of the systems of equation by the method of cross-multiplication:

Here we have the pair of simultaneous equation

$$\frac{57}{x+y} + \frac{6}{x-y} - 5 = 0$$

$$\frac{38}{x+y} + \frac{21}{x-y} - 9 = 0$$

$$\text{let } \frac{1}{x+y} = u \text{ and } \frac{1}{x-y} = v$$

Now rewriting the given equation as

$$57u + 6v - 5 = 0 \quad \dots\dots(1)$$

$$38u + 21v - 9 = 0 \quad \dots\dots(2)$$

By cross multiplication method we get

$$\frac{u}{(-9 \times 6) - (-5 \times 21)} = \frac{-v}{(-9 \times 57) - (-5 \times 38)} = \frac{1}{(21 \times 57) - (38 \times 6)}$$

$$\frac{u}{(-54) - (-105)} = \frac{-v}{(-513) - (-190)} = \frac{1}{(1197) - (228)}$$

$$\frac{u}{51} = \frac{-v}{-323} = \frac{1}{969}$$

$$\frac{u}{51} = \frac{v}{323} = \frac{1}{969}$$

Consider the following for u

$$\frac{u}{51} = \frac{1}{969}$$

$$\Rightarrow u = \frac{1}{19}$$

Consider the following for v

$$\frac{v}{323} = \frac{1}{969}$$

$$v = \frac{1}{3}$$

We know that

$$\frac{1}{x+y} = u \text{ and } \frac{1}{x-y} = v$$

$$\frac{1}{x+y} = \frac{1}{19}$$

$$x+y=19 \quad \dots\dots(3)$$

$$\frac{1}{x-y} = \frac{1}{3}$$

$$x-y=3 \quad \dots\dots(4)$$

Now adding eq. (3) and (4) we get $x=11$

And after substituting the value of x in eq. (4) we get $y=8$

Hence we get the value of $\boxed{x=11}$ and $\boxed{y=8}$

***** END *****