



Pair of Linear Equations in Two variables Ex 3.4 Q8

Answer :

GIVEN:

$$ax + by = a^2$$

$$bx + ay = b^2$$

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

Here we have the pair of simultaneous equation

$$ax + by - a^2 = 0$$

$$bx + ay - b^2 = 0$$

By cross multiplication method we get

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

$$\frac{x}{(b^3 - a^3)} = \frac{-y}{(-ab^2 + a^2b)} = \frac{1}{(a^2 - b^2)}$$

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

$$x = \frac{(b^3 - a^3)}{(a^2 - b^2)}$$

$$x = \frac{(a-b)(a^2 + ab + b^2)}{(a^2 - b^2)} \quad \left\{ \text{since } (a^3 - b^3) = (a-b)(a^2 + ab + b^2) \right\}$$

$$x = \frac{(a^2 + ab + b^2)}{(a+b)} \quad \left\{ \text{since } (a^2 - b^2) = (a+b)(a-b) \right\}$$

And

$$\frac{-y}{(-ab^2 + a^2b)} = \frac{1}{(a^2 - b^2)}$$

$$y = \frac{(-ab^2 + a^2b)}{(a^2 - b^2)}$$

$$y = \frac{(-ab(a-b))}{(a^2 - b^2)}$$

$$y = \frac{(-ab(a-b))}{(a-b)(a+b)} \left\{ \text{since } (a^2 - b^2) = (a+b)(a-b) \right\}$$

$$y = \frac{-ab}{(a+b)}$$

Hence we get the value of $x = \frac{(a^2 + ab + b^2)}{(a+b)}$ and $y = \frac{-ab}{(a+b)}$

Pair of Linear Equations in Two variables Ex 3.4 Q9

Answer :

GIVEN:

$$\frac{x}{a} + \frac{y}{b} = 2$$

$$ax - by = a^2 - b^2$$

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

Here we have the pair of simultaneous equation

$$\frac{x}{a} + \frac{y}{b} - 2 = 0$$

$$ax - by - (a^2 - b^2) = 0$$

By cross multiplication method we get

$$\begin{aligned} \frac{x}{\left(\left(\frac{1}{b} \times -(a^2 - b^2)\right) - ((-2) \times (-b))\right)} &= \frac{-y}{\left(\left(\frac{1}{a} \times -(a^2 - b^2)\right) - (-2 \times (a))\right)} = \frac{1}{\left(\frac{1}{a} \times (-b)\right) - \left(\frac{1}{b} \times (a)\right)} \\ \frac{x}{\frac{-(a^2 - b^2)}{b} - 2b} &= \frac{-y}{\left(\frac{-(a^2 - b^2)}{a}\right) + 2a} = \frac{1}{\left(\frac{(-b)}{a}\right) - \left(\frac{(a)}{b}\right)} \\ \frac{x}{\frac{-(a^2 - b^2) - 2b^2}{b}} &= \frac{-y}{\left(\frac{-(a^2 - b^2) + 2a^2}{a}\right)} = \frac{1}{\left(\frac{(-b^2) - (a^2)}{ab}\right)} \\ \frac{x}{\frac{-(a^2 - b^2) - 2b^2}{b}} &= \frac{-y}{\left(\frac{-(a^2 - b^2) + 2a^2}{a}\right)} = \frac{1}{\left(\frac{-(a^2 + b^2)}{ab}\right)} \end{aligned}$$

So for x we have

$$\begin{aligned} \frac{x}{\frac{-(a^2 - b^2) - 2b^2}{b}} &= \frac{1}{\left(\frac{-(a^2 + b^2)}{ab}\right)} \\ \frac{x}{\frac{-(a^2 + b^2)}{b}} &= \frac{1}{\left(\frac{-(a^2 + b^2)}{ab}\right)} \\ x &= a \end{aligned}$$

And

$$\begin{aligned} \frac{-y}{\left(\frac{-(a^2 - b^2) + 2a^2}{a}\right)} &= \frac{1}{\left(\frac{-(a^2 + b^2)}{ab}\right)} \\ \frac{-y}{\left(\frac{(a^2 + b^2)}{a}\right)} &= \frac{1}{\left(\frac{-(a^2 + b^2)}{ab}\right)} \\ y &= b \end{aligned}$$

Hence we get the value of $\boxed{x = a}$ and $\boxed{y = b}$

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