Pair of Linear Equations in Two varibles 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

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

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

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

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

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

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

And

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

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

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

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

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

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

Pair of Linear Equations in Two varibles 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

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

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

By cross multiplication method we get

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

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

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

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

So for x we have

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

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

$$x=a$$

And

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

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

$$y=b$$

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

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