Pair of Linear Equations in Two varibles Ex 3.4 Q19

Answer :

GIVEN:

$$bx+cy=a+b$$

$$ax\left(\frac{1}{(a-b)}-\frac{1}{(a+b)}\right)+cy\left(\frac{1}{(b-a)}-\frac{1}{(b+a)}\right)=\frac{2a}{(a+b)}$$

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

Here we have the pair of simultaneous equation

$$bx+cy-(a+b)=0$$

$$ax\left(\frac{1}{(a-b)}-\frac{1}{(a+b)}\right)+cy\left(\frac{1}{(b-a)}-\frac{1}{(b+a)}\right)-\frac{2a}{(a+b)}=0$$

By cross multiplication method we get

$$\frac{x}{\left(-\frac{2ac}{(a+b)}\right)-\left(-(a+b)\times\left(\frac{c}{(b-a)}-\frac{c}{(b+a)}\right)\right)}=\frac{-y}{\left(-\frac{2ab}{(a+b)}\right)-\left(-(a+b)\times\left(\frac{a}{(a-b)}-\frac{a}{(a+b)}\right)\right)}$$

$$=\frac{1}{\left(\frac{bc}{(b-a)}-\frac{bc}{(b+a)}\right)-\left(\frac{ac}{(a-b)}-\frac{ac}{(a+b)}\right)}$$

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

$$=\frac{1}{\left(\frac{bc(b+a)-bc(b-a)}{(b-a)(b+a)}\right)-\left(\frac{ac(a+b)-ac(a-b)}{(a-b)(a+b)}\right)}$$

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

$$=\frac{1}{\left(\frac{bc(b+a)-bc(b-a)}{(b-a)(b+a)}\right)-\left(\frac{ac(a+b)-ac(a-b)}{(a-b)(a+b)}\right)}$$

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

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

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

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

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

$$\frac{x}{\left(\frac{4a^2c}{(a+b)(b-a)}\right)}=\frac{y}{\left(\frac{-4ab^2}{(a+b)(a-b)}\right)}=\frac{1}{\left(\frac{-4abc}{(a^2-b^2)}\right)}$$

$$\frac{x}{-4a^2c}=\frac{y}{-4ab^2}=\frac{1}{-4abc}$$

Consider the following for x

$$\frac{x}{-4a^2c}=\frac{1}{-4abc}$$

$$\Rightarrow x=\frac{a}{b}$$

Now for y

$$\frac{y}{-4ab^2}=\frac{1}{-4abc}$$

$$\Rightarrow y=\frac{b}{c}$$

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

Pair of Linear Equations in Two varibles Ex 3.4 Q20

Answer :

GIVEN:

$$(a-b)x+(a+b)y=2a^2-2b^2$$
$$(a+b)(x+y)=4ab$$

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

Here we have the pair of simultaneous equation

$$(a-b)x+(a+b)y-2a^2+2b^2=0$$
$$(a+b)x+(a+b)y-4ab=0$$

By cross multiplication method we get

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

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

Consider the following for x

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

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

$$x=\frac{4ab+2a^2-2b^2}{2b}$$

$$x=\frac{2ab+a^2-b^2}{b}$$

Now consider the following for y

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

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

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

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

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

$$\frac{y}{(4ab)(a-b)+(a+b)(-2)(a-b)(a+b)}=\frac{1}{(a+b)(-2b)}$$

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

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

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

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