RD SHARMA

Solutions

Class 10 Maths

Chapter 3

Ex 3.3

Solve the following system of equations:

Question 1: 11x + 15y + 23 = 0 and 7x – 2y – 20 = 0

Soln:

The given system of equation is

11x+15y+23=0 ……. (i)

7x-2y-20=0 ……..(ii)

From (ii)

2y=7x-20

y= 7x−202 $\frac{7x-20}{2}$ …… (iii)

Substituting the value of y in equation (i) we get,

= 11x+15(7x−202)+23=0$11x + 15(\frac{7x-20}{2}) + 23 = 0$

= 11x+(105x−3002)+23=0$11x + (\frac{105x-300}{2}) + 23 = 0$

= (22+105x−300+462)=0$(\frac{22+105x-300+46}{2}) = 0$

= 127x = 254 = x=2

Putting the value of x in the equation (iii)

= y= 7(2)−202 $\frac{7(2)-20}{2}$

y= -3

The value of x and y are 2 and -3 respectively.

Question 2: 3x – 7y + 10 = 0, y – 2x – 3 = 0

Soln:

The given system of equation is

3x-7y+10=0 ……. (i)

y-2x-3=0 ……..(ii)

From (ii)

y-2x-3=0

y= 2x+3 …… (iii)

Substituting the value of y in equation (i) we get,

= 3x-7(2x+3)+10 =0

= 3x+14x-21+10=0

= -11x=11

= x=-1

Putting the value of x in the equation (iii)

= y= 2(-1)+3

y= 1

The value of x and y are -1 and 1 respectively.

Question 3: 0.4x + 0.3y = 1.7, 0.7x – 0.2y = 0.8

Soln:

The given system of equation is

0.4x+0.3y=1.7

0.7x-0.2y=0.8

Multiplying both sides by 10

4x+3y=17 …….. (i)

7x-2y=8 …… (ii)

From (ii)

7x-2y=8

x= 8+2y7 =0 $\frac{8+2y}{7} = 0$ …… (iii)

Substituting the value of y in equation (i) we get,

= 4(8+2y7 =0 $\frac{8+2y}{7} = 0$)+3y=17

= 32+29y=119

= 29y=87

= y=3

Putting the value of y in the equation (iii)

= x= 8+2(3)7 =0 $\frac{8+2(3)}{7} = 0$

=x= 147 =0 $\frac{14}{7} = 0$

= x= 2

The value of x and y are 2 and 3 respectively.

Question 4

x2 +y=0.8 $\frac{x}{2} + y = 0.8$

7x+y2 =10 $\frac{7}{x+\frac{y}{2}} = 10$

Soln:

The given system of equation is

x2 +y=0.8 $\frac{x}{2} + y = 0.8$ 7x+y2 =10 $\frac{7}{x+\frac{y}{2}} = 10$

Therefore x+2y=1.6

142x+y =10 $\frac{14}{2x+y} = 10$

x+2y=1.6

7=10x+5y

Multiplying both sides by 10

10x+20y=16 …….. (i)

10x+5y=7 …… (ii)

Subtracting two equations we get,

15y=9

y= 35 $\frac{3}{5}$

x=1.6−2(35)$1.6 - 2(\frac{3}{5})$

$= 1.6-(65)1.6-(\frac{6}{5})$

$= 25\frac{2}{5}$

The value of x and y are $25\frac{2}{5}$ and $35\frac{3}{5}$ respectively.

Question 5

7(y+3)-2(x+3) = 14

4(y-2)+3(x-3) = 2

Soln:

The given system of equation is

7(y+3)-2(x+3) = 14……. (i)

4(y-2)+3(x-3) = 2……..(ii)

From (i)

7y+21-2x-4=14

7y=14+4-21+2x

$=y=2x-35\frac{2x-3}{5}$

From (ii)

= 4y-8+3x-9=2

= 4y+3x-17-2=0

= 4y+3x-19=0 ……..(iii)

Substituting the value of y in equation (iii)

$=4(2x-35\frac{2x-3}{5})+3x-19=0$

= 8x-12+21x-133=0

= 29x=145

= x=5

Putting the value of x in the above equation

= y = 1

The value of x and y are 5 and 1 respectively.

Question 6

$\frac{x}{7} + \frac{y}{3} = 5$

$\frac{x}{2} - \frac{y}{9} = 6$

Soln:

The given system of equation is

$\frac{x}{7} + \frac{y}{3} = 5$ ..... (i)

$\frac{x}{2} - \frac{y}{9} = 6$ .....(ii)

From (i)

$\frac{x}{7} + \frac{y}{3} = 5$

$x = \frac{105-7y}{3}$

From (ii)

$\frac{x}{2} - \frac{y}{9} = 6$

$9x-2y=108$ .....(iii)

Substituting the value of x in equation (iii) we get,

$9\left(\frac{105-7y}{3}\right)-2y=108$

$945-63y-6y=324$

$945-324=69y$

$69y=621$

$y=9$

Putting the value of y in the above equation

$x = \frac{105-7(9)}{3}$

y= 14

The value of x and y are 5 and 14 respectively.

Question 7

$\frac{x}{3}+\frac{y}{4}=11$

$\frac{5x}{6}-\frac{y}{3}=-7$

Soln:

The given system of equation is

$\frac{x}{3}+\frac{y}{4}=11$ ..... (i)

$\frac{5x}{6}-\frac{y}{3}=-7$ .....(ii)

From (i)

$\frac{4x+3y}{12}=11$

=4x+3y=132.....(iii)

From (ii)

$\frac{5x+2y}{6}=-7$

=5x-2y=-42 .....(iv)

Let us eliminate y from the given equations. The co efficient of y in the equation (iii) and (iv) are 3 and 2 respectively. The L.C.M of 3 and 2 is 6. So, we make the coefficient of y equal to 6 in the two equations.

Multiplying equation (iii)*2 and (iv)*3 we get

= 8x+6y=264 .....(v)

= 15x-6y=-126 .....(vi)

Adding equation (v) and (vi)

8x+15x=264-126

=23x=138

x=6

Putting the value of x in the equation (iii)

= 24+3y=132

=3y=108

y= 36

The value of x and y are 36 and 6 respectively.

Question 8

$4x+3y=8\frac{4}{x}+3y=8$

$6x-4y=-5\frac{6}{x}-4y=-5$

Soln:

taking $1x=u$taking $\frac{1}{x}=u$

The new equation becomes

4u+3y=8……(i)

6u-4y=-5……(ii)

From (i)

4u=8-3y

$=u=\ 8-3y4=u\frac{8-3y}{4}=u$

From (ii)

$=6(\ 8-3y4=u\frac{8-3y}{4}=u\ )$-4y=-5

$=\ 3(8-3y)2-4y=-5\frac{3(8-3y)}{2}-4y=-5$

$=\ 24-9y-8y2=-5\frac{24-9y-8y}{2}=-5$

= 24-17y=-10

= -17y=-34

= y=2

Putting y=2 in u = $\ 8-3y4=u\frac{8-3y}{4}=u$ we get ,

$=u=8-3(2)4\ \frac{8-3(2)}{4}$

$=u=8-64\ \frac{8-6}{4}$

$=u=24\ \frac{2}{4}$

=x=u=2

So the Solution of the given system of equation is x=2 and y =2

Question 9

x+ $\frac{y}{2} = 4$**=4**$x + \frac{y}{2} = 4$

2y+ $\frac{x}{3} = 5$**=5**$2y + \frac{x}{3} = 5$

Soln:

The given system of equation is:

x+ $\frac{y}{2} = 4$**=4**$x + \frac{y}{2} = 4$ .....(i)

2y+ $\frac{x}{3} = 5$**=5**$2y + \frac{x}{3} = 5$ .....(ii)

From (i) we get,

$\frac{2x+y}{2} = 4$**=4**$\frac{2x+y}{2} = 4$

= 2x+y=8

=y=8-2x

From (ii) we get,

x+6y=15 .....(iii)

Substituting y=8-2x in (iii) , we get

= x+6(8-2x)=15

= x+48-12x=15

= -11x=15-48

= -11x=-33

=x=3

Putting x=3 in y 8-2x, we get

y=8-(2*3)

=y=8-6=2

The Solution of the given system of equation are x=3 and y=2 respectively.

Question 10

x+2y= $32\frac{3}{2}$

2x+y= $32\frac{3}{2}$

Soln:

The given system of equation is

x+2y= $32\frac{3}{2}$ .....(i)

2x+y= $32\frac{3}{2}$.....(ii)

Let us eliminate y from the given equations. The coefficients of y in the given equations are 2 and 1 respectively. The L.C.M of 2 and 1 is 2. So, we make the coefficient of y equal to 2 in the two equations.

Multiplying equation (i)*1 and (ii)*2

x+2y= $32\frac{3}{2}$ .....(iii)

4x+2y=3 .....(iv)

Subtracting equation (iii) from (iv)

4x-x+2y-2y=3- x+2y= $32\frac{3}{2}$

= 3x= x+2y= $6-32\frac{6-3}{2}$

= 3x= $32\frac{3}{2}$

= x= $12\frac{1}{2}$

Putting x= $12\frac{1}{2}$ in equation (iv)

4($12\frac{1}{2}$)+2y=3

= 2+2y=3

= y= $12\frac{1}{2}$

The Solution of the system of equation is x= $12\frac{1}{2}$ and y= $12\frac{1}{2}$

Question 11

$\sqrt{2}x+\sqrt{3}y=0$ $\sqrt{2}x + \sqrt{3}y = 0$

$\sqrt{3}x-\sqrt{8}y=0\sqrt{3}x-\sqrt{8}y=0$

Soln:

$\sqrt{2}x+\sqrt{3}y=0\sqrt{2}x+\sqrt{3}y=0$ .....(i)

$\sqrt{3}x-\sqrt{8}y=0\sqrt{3}x-\sqrt{8}y=0$ .....(ii)

From equation (i)

$=x=-\sqrt{3}y\sqrt{2}\frac{-\sqrt{3}y}{\sqrt{2}}$ .....(iii)

Substituting this value in equation (ii) we obtain

$\sqrt{3}(-\sqrt{3}y\sqrt{2})-\sqrt{8}y=0\sqrt{3}(\frac{-\sqrt{3}y}{\sqrt{2}})-\sqrt{8}y=0$ $-3y\sqrt{2}-2\sqrt{2}y=0\frac{-3y}{\sqrt{2}}-2\sqrt{2}y=0$ $y(-3\sqrt{2}-2\sqrt{2})=0$ $y(\frac{-3}{\sqrt{2}}-2\sqrt{2})=0$

$=y=0$

Substituting the value of y in equation (iii) we obtain

$=x=0$

The value of x and y are 0 and 0 respectively.

Question 12

$3x-y+711+2=103x-\frac{y+7}{11}+2=10$ $2y-x+117=102y-\frac{x+11}{7}=10$

Soln:

The given system of equation is:

$3x-y+711+2=103x-\frac{y+7}{11}+2=10$ .....(i)

$2y-x+117=102y-\frac{x+11}{7}=10$ .....(ii)

From equation (i)

$33x-y-7+2211=10\frac{33x-y-7+22}{11}=10$

$=33x -y+15=110$

$=33x+15-110=y$

$= y= 33x-95$

From equation (ii)

14+x+117 =109 $\frac{14+x+11}{7} = 109$

= 14y+x+11=70

= 14y+x=70-11

= 14y+x=59 ……..(iii)

Substituting y = 33x-95 in (iii) we get,

14(33x-95)+x=59

= 462x-1330+x=59

= 463x=1389

= x=3

Putting x=3 in y=33x-95 we get,

=y=33(3)-95

= 99-95 = 4

The Solution of the given system of equation is 3 and 4 respectively.

Question 13

2x− 3y =9 $2x - \frac{3}{y} = 9$ 3x+ 7y =2 $3x + \frac{7}{y} = 2$

Soln:

2x− 3y =9 $2x - \frac{3}{y} = 9$ ……. (i)

3x+ 7y =2 $3x + \frac{7}{y} = 2$ …… (ii)

Taking 1y =u $\frac{1}{y} = u$ the given equation becomes,

2x-3u=9 ……..(iii)

3x+7u=2……..(iv)

From (iii)

2x=9+3u

=x= 9+3u2 $\frac{9+3u}{2}$

Substituting the value x= 9+3u2 $\frac{9+3u}{2}$ in equation (iv) we get,

3(9+3u2 $\frac{9+3u}{2}$)+7u=2

= 27+9u+14u2 =2 $\frac{27+9u+14u}{2} = 2$

=27+23u=4

= u= -1

=y= 1u $\frac{1}{u}$ = -1

Putting u=-1 in =x= 9+3u2 $\frac{9+3u}{2}$ we get,

=x= 9+3(−1)2 $\frac{9+3(-1)}{2}$

= x=3

The Solution of the given system of equation is 3 and -1 respectively.

Question 14

0.5x+0.7y=0.74

0.3x+0.5y=0.5

Soln:

The given system of equation is

0.5x+0.7y=0.74……(i)

0.3x-0.5y=0.5 ……..(ii)

Multiplying both sides by 100

50x+70y=74 …….. (iii)

30x+50y=50 …… (iv)

From (iii)

50x=74-70y

x= 74−70y50 =0 $\frac{74-70y}{50} = 0$ …… (iii)

Substituting the value of y in equation (iv) we get,

= 30(74−70y50 =0 $\frac{74-70y}{50} = 0$)+50y=50

= 222-210y+250y=250

= 40y=28

= y=0.7

Putting the value of y in the equation (iii)

= x= $74-70(0.7)50 = 0 \frac{74-70(0.7)}{50} = 0$

=x= $2550 = 0 \frac{25}{50} = 0$

= x= 0.5

The value of x and y are 0.5 and 0.7 respectively.

Question 15

$17x + 16y = 3 \frac{1}{7x} + \frac{1}{6y} = 3 \quad 12x - 13y = 5 \frac{1}{2x} - \frac{1}{3y} = 5$

Soln:

$17x + 16y = 3 \frac{1}{7x} + \frac{1}{6y} = 3$ ..... (i)

$12x - 13y = 5 \frac{1}{2x} - \frac{1}{3y} = 5$ ..... (ii)

Multiplying (ii) by $12 \frac{1}{2}$ we get,

$14x - 16y = 52 \frac{1}{4x} - \frac{1}{6y} = \frac{5}{2}$ ..... (iii)

Solving equation (i) and (iii)

$17x + 16y = 3 \frac{1}{7x} + \frac{1}{6y} = 3$ ..... (i)

$14x - 16y = 52 \frac{1}{4x} - \frac{1}{6y} = \frac{5}{2}$ ..... (iii)

Adding we get,

$17x + 16y = 3 + 52 \frac{1}{7x} + \frac{1}{6y} = 3 + \frac{5}{2}$

=x= $114 \frac{1}{14}$

When, x= $114 \frac{1}{14}$ we get,

Using equation (i)

$17(114) + 16y = 3 \frac{1}{7(\frac{1}{14})} + \frac{1}{6y} = 3$

= $2 + 16y = 32 + \frac{1}{6y} = 3$

= 16y $\frac{1}{6y}$=1

= y= 16 $\frac{1}{6}$

The Solution of the given system of equation is x= 114 $\frac{1}{14}$ and y= 16 $\frac{1}{6}$ respectively.

Question 16

12x + 13y =2 $\frac{1}{2x} + \frac{1}{3y} = 2$

13x + 12y = 136 $\frac{1}{3x} + \frac{1}{2y} = \frac{13}{6}$

Soln:

Let 1x $\frac{1}{x}$ =u

Let 1y $\frac{1}{y}$ =v

u2 + v3 =2 $\frac{u}{2} + \frac{v}{3} = 2$ 3u+2v6 =2 $\frac{3u+2v}{6} = 2$

3u+2v=12 .....(i)

And, u3 + v2 = frac136 $\frac{u}{3} + \frac{v}{2} =$ frac136

=v=3

1u $\frac{1}{u}$ =x = 12 $\frac{1}{2}$

1v $\frac{1}{v}$ =y = 13 $\frac{1}{3}$

Question 17

15u + 2v =17 $\frac{15}{u} + \frac{2}{v} = 17$ 1u + 1v = 365 $\frac{1}{u} + \frac{1}{v} = \frac{36}{5}$

Soln:

Let 1x $\frac{1}{x}$ =u

Let 1y $\frac{1}{y}$ =v

15x+2y=17 .....(i)

x+y= 365 $\frac{36}{5}$.....(ii)

From equation (i) we get ,

2y=17-15x

=y= $17-15x2\frac{17-15x}{2}$

Substituting y= $17-15x2\frac{17-15x}{2}$ in equation (ii) we get,

= x+ $17-15x2\frac{17-15x}{2}$ = $365\frac{36}{5}$

= $-13x+17x2\frac{-13x+17x}{2}$ = $365\frac{36}{5}$

= 5(-13x+17)=72

= -65x=-13

= x= $15\frac{1}{5}$

Putting x= $15\frac{1}{5}$ in equation (ii) , we get

$15\frac{1}{5}$ +y= $365\frac{36}{5}$

= y=7

=v= $1y\frac{1}{y}$ = $17\frac{1}{7}$

The Solution of the given system of equation is 5 and $17\frac{1}{7}$ respectively.

Question 18

$3x-1y=-9\frac{3}{x}-\frac{1}{y}=-9$ $2x+1y=5\frac{2}{x}+\frac{1}{y}=5$

Soln:

Let $1x\frac{1}{x}$ =u

Let $1y\frac{1}{y}$ =v

3u-v=-9……..(i)

2u+3v=5 ……..(ii)

Multiplying equation (i) *3 and (ii) *1 we get,

9u-3v=-27 …….. (iii)

2u+3v=5 …… (iv)

Adding equation (i) and equation (iv) we get ,

9u+2u-3v+3v=-27+5

= u=-2

Putting u=-2 in equation (iv) we get,

2(-2)+3v=5

= 3v=9

= v=3

Hence x= $1u\frac{1}{u} = -12\frac{-1}{2}$

Hence y= $1v\frac{1}{v} = 13\frac{1}{3}$

Question 19

$2x - 3y = 9xy\frac{2}{x} - \frac{3}{y} = \frac{9}{xy}$ $2x + 1y = 9xy\frac{2}{x} + \frac{1}{y} = \frac{9}{xy}$

Soln:

$2x - 3y = 9xy\frac{2}{x} - \frac{3}{y} = \frac{9}{xy}$ ..... (i)

$2x + 1y = 9xy\frac{2}{x} + \frac{1}{y} = \frac{9}{xy}$ ..... (ii)

Multiplying equation (i) adding equation (ii) we get,

2y+3x=9.....(iii)

4y+9x=21 .....(iv)

From (iii) we get ,

3x= 9-2y

= x= $9-2y3\frac{9-2y}{3}$

Substituting x= $9-2y3\frac{9-2y}{3}$ in equation (iv) we get

4x+9($9-2y3\frac{9-2y}{3}$)=21

= 4y+3(9-2y) =21

= -2y=21-27

= y=3

Putting y=3 in x= $9-2y3\frac{9-2y}{3}$ we get,

=x= $9-2(3)3\ \frac{9-2(3)}{3}$

=x=1

Hence the Solutions of the system of equation are 1 and 3 respectively.

Question 20

$15x+16y=12\ \frac{1}{5x}+\frac{1}{6y}=12$ $15x+16y=8\ \frac{1}{5x}+\frac{1}{6y}=8$

Soln:

Let $1x\ \frac{1}{x}$ =u

Let $1y\ \frac{1}{y}$ =v

$u5+v6=12\ \frac{u}{5}+\frac{v}{6}=12$

$=6u+5v30=12\ \frac{6u+5v}{30}=12$

= 6u+5v=360 …….(i)

$u3+3v7\ \frac{u}{3}+\frac{3v}{7}$ =8

$=7u+9v21\ \frac{7u+9v}{21}$=8

= 7u-9v=168 …….(ii)

Let us eliminate v from the equation (i) and (ii) . multiplying equation (i) by 9 and (ii) by 5

54u+35u=3240+840

89u=4080

=u= $408089\ \frac{4080}{89}$

Putting u = $408089\ \frac{4080}{89}$ in equation (i) we get,

$6(408089\ \frac{4080}{89})$+5v=360

= $2448089\ \frac{24480}{89}$+5v=360

=5v= $32040-2448089\ \frac{32040-24480}{89}$

= v= $756089\ \frac{7560}{89}$

= v= $75605*89\ \frac{7560}{5*89}$

=v= $151289\frac{1512}{89}$

$1u\frac{1}{u}$ =x= $894080\frac{89}{4080}$

$1v\frac{1}{v}$ =y= $891512\frac{89}{1512}$

.

Question 27

$6x+y=7x-y+3\frac{6}{x+y}=\frac{7}{x-y}+3$ $12(x+y)=13(x-y)\frac{1}{2(x+y)}=\frac{1}{3(x-y)}$

Let $1(x+y)=u\frac{1}{(x+y)}=u$

Let $1(x-y)=v\frac{1}{(x-y)}=v$

Then, the given system of equation becomes,

6u=7v+3

6u-7v=3…….. (i)

And $u2=v3\frac{u}{2}=\frac{v}{3}$

3u=2v

3u-2v=0 …… (ii)

Multiplying equation (ii) by 2 and (i) 1

6u-7v=3

6u-4v=0

Subtracting v=-1 in equation (ii) ,we get

3u-2(-1)=0

3u+2=0

3u=-2

=u= $-23\frac{-2}{3}$

$1x+y\frac{1}{x+y}=-23\frac{-2}{3}$

x+y= $-32\frac{-3}{2}$ …….(v)

and v=-1

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

x-y=-1……(vi)

Adding equation (v) and equation (vi) we get,

$2x=-32\frac{-3}{2}$-1

$=x=-54\frac{-5}{4}$

Putting $x=-23\frac{-2}{3}$ in equation (vi)

$=-54\frac{-5}{4}$-y=-1

$=y=-14\frac{-1}{4}$

Question 28

$xyx+y=65\frac{xy}{x+y}=\frac{6}{5}$ $xyy-x=6\frac{xy}{y-x}=6$

Soln:

$xyx+y=65\frac{xy}{x+y}=\frac{6}{5}$

5xy= 6(x+y)

=5xy= 6x+6y ……(i)

And

$xyy-x=6\frac{xy}{y-x}=6$

xy=6(y-x)

=xy= 6y-6x ……(ii)

Adding equation (i) and equation (ii) we get,

6xy= 6y+6y

6xy=12y

x= 2

Putting x=2 in equation (i) we get,

10y=12+6y

10-6y=12

4y=12

y=3

The Solution of the given system of equation is 2 and 3 respectively.

Question 29

$22x+y + 15x-y = 5\frac{22}{x+y} + \frac{15}{x-y} = 5 \quad 55x+y + 45x-y = 14\frac{55}{x+y} + \frac{45}{x-y} = 14$

Let $1x+y \frac{1}{x+y}$=u

Let $1x-y \frac{1}{x-y}$=v

Soln:

Then the given system of equation becomes:

22u+45v=5 …….. (i)

55u+45v=14 ……(ii)

Multiplying equation (i)by 3 and (ii) by 1

66u+45v=15 …… (iii)

55u+45v=14 …… (iv)

Subtracting equation (iv) from equation (iii) , we get

66u-55u=15-14

= 11u=1

=u= $111 \frac{1}{11}$

Putting =u= $111 \frac{1}{11}$ in equation (i) we get,

=2+15v=5

=15v=3

=v= $15 \frac{1}{5}$

Now,

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

=x+y=11 ……..(v)

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

= x-y=5 ……..(vi)

Adding equation (v) and (vi) we get,

2x=16

=x=8

Putting the value of x in equation (v)

8+y=11

= y=3

The Solutions of the given system of equation are 8 and 3 respectively.

Question 30

$\frac{5}{x+y} - \frac{2}{x-y} = -1 \quad \frac{15}{x+y} + \frac{7}{x-y} = 10$

Let $\frac{1}{x+y}$=u

Let $\frac{1}{x-y}$=v

Soln:

Then the given system of equation becomes:

5u-2v=-1 …….. (i)

15u+7v=10 ……(ii)

Multiplying equation (i) by 7 and (ii) by 2

35u-14v=-7 …… (iii)

30u+14v=20 …… (iv)

Subtracting equation (iv) from equation (iii) , we get

-2v=-1-1

= -2v=-2

=v=1

Now,

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

=x+y=5 ……..(v)

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

= x-y=1 ……..(vi)

Adding equation (v) and (vi) we get,

2x=6

=x=3

Putting the value of x in equation (v)

3+y=5

= y=2

The Solutions of the given system of equation are 3 and 2 respectively.

Question 31

$3x+y+2x-y=2\frac{3}{x+y}+\frac{2}{x-y}=2 \quad 9x+y-4x-y=1\frac{9}{x+y}-\frac{4}{x-y}=1$

Let $1x+y\frac{1}{x+y}=u$

Let $1x-y\frac{1}{x-y}=v$

Soln:

Then the given system of equation becomes:

3u+2v=2 …….. (i)

9u+4v=1 ……(ii)

Multiplying equation (i) by 3 and (ii) by 1

6u+4v=4 …… (iii)

9u-4v=1 …… (iv)

Adding equation (iii) and (iv) we get,

45u=5

=u=3

Subtracting equation (iv) from equation (iii) , we get

2v=2-1

= 2v=1

= v= $12\frac{1}{2}$

Now,

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

=x+y=3 ……..(v)

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

= x-y=2 ……..(vi)

Adding equation (v) and (vi) we get,

2x=5

=x= $52\frac{5}{2}$

Putting the value of x in equation (v)

$52\frac{5}{2}$+y=11

= y= $12\frac{1}{2}$

The Solutions of the given system of equation are $52\frac{5}{2}$ and $12\frac{1}{2}$ respectively.

Question 32

$12(x+2y)+53(3x-2y)=-32\frac{1}{2(x+2y)}+\frac{5}{3(3x-2y)}=\frac{-3}{2}$ $54(x+2y)-35(3x-2y)=616\frac{5}{4(x+2y)}-\frac{3}{5(3x-2y)}=\frac{61}{6}$

Let $1x+y\frac{1}{x+y}$=u

Let $1x-y\frac{1}{x-y}$=v

Soln:

Then the given system of equation becomes:

$u2+5v3=-32\frac{u}{2}+\frac{5v}{3}=\frac{-3}{2}$ $3u+10v6=-32\frac{3u+10v}{6}=\frac{-3}{2}$

3u+10v=-9 ……..(i)

$5u4-3v5=6160\frac{5u}{4}-\frac{3v}{5}=\frac{61}{60}$

25u-12v= $613\frac{61}{3}$ ……..(ii)

Multiplying equation (i) by 12 and (ii) by 10

36u+120v=-108 …… (iii)

250u+120v= $6103\frac{610}{3}$ …… (iv)

Adding equation (iv) and equation (iii) , we get

36u+250u= $6103\frac{610}{3}$ -108

=286u= $2863\frac{286}{3}$

=u= $13\frac{1}{3}$

Putting u= $613\frac{61}{3}$ in equation (i)

3($13\frac{1}{3}$)+10v=-9

=v=-1

Now,

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

=x+2y=3 ……..(v)

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

= 3x-2y=-1 ……..(vi)

Putting x= $12\frac{1}{2}$ in equation (v) we get,

$12\frac{1}{2}$ +2y=3

=y= $54\frac{5}{4}$

The Solutions of the given system of equation are $12\frac{1}{2}$

And $54\frac{5}{4}$ respectively.

Question 34

x+y=5xy

3x+2y=13xy

Soln:

The given system of equations is:

x+y=5xy …….. (i)

3x+2y=13xy…… (ii)

Multiplying equation (i) by 2 and equation (ii) 1 we get,

2x++2y=10xy …… (iii)

3x+2y= 13xy ……. (iv)

Subtracting equation (iii) from equation (iv) we get,

3x-2x=13xy-10xy

= x=3xy

= x3x=y$\frac{x}{3x} = y$

= 13=y$\frac{1}{3} = y$

Putting y = 13=y$\frac{1}{3} = y$ in equation (i) we get,

=x+y=5(x)(13$\frac{1}{3}$)

= x+ x3x$\frac{x}{3x}$= 5x3$\frac{5x}{3}$

= 2x=1

= x= 12=y$\frac{1}{2} = y$

Hence Solution of the given system of equation is 12$\frac{1}{2}$ and 13$\frac{1}{3}$

Question 35

x+y=xy

x−yxy=6$\frac{x-y}{xy} = 6$

Soln:

x+y=xy …….. (i)

x−yxy=6$\frac{x-y}{xy} = 6$ …….. (ii)

Adding equation (i) and (ii) we get,

2x=2xy+6xy

=2x= 6xy

= y= x+y=xy

=y= $14\frac{1}{4}$

Putting =y= $14\frac{1}{4}$ in equation (i) , we get,

=x+ $14\frac{1}{4}$=2x($14\frac{1}{4}$)

= x= $-12\frac{-1}{2}$

Hence the Solution of the given system of equation is = x= $-12\frac{-1}{2}$

And y= $14\frac{1}{4}$ respectively.

Question 36

2(3u-v)=5uv

2(u+3v)=5uv

Solution

2(3u-v)=5uv

= 6u-2v=5uv ……. (i)

2(u+3v)=5uv

2u+6v=5uv ……. (ii)

Multiplying equation (i) by 3 and equation (ii) by 1 we get,

18u-6v=15uv ……. (iii)

2u+6v=5uv ……. (iv)

Adding equation (iii) and equation (iv) we get,

18u+2u=15uv+5uv

= v=1

Putting v=1 in equation (i) we get,

6u-2=5u

=u=2

Hence the Solution of the given system of Solution of equation is 2 and 1 respectively.

Question 37

$23x+2y + 33x-2y = 175$ $\frac{2}{3x+2y} + \frac{3}{3x-2y} = \frac{17}{5}$ $13x+2y - 13x-2y = 2$ $\frac{1}{3x+2y} - \frac{1}{3x-2y} = 2$

Let $13x+2y \frac{1}{3x+2y} = u$

Let $13x-2y \frac{1}{3x-2y} = v$

Soln:

Then the given system of equation becomes:

$2u+3v = -175 \frac{-17}{5}$ .....(i)

5u-v=2 ..... (ii)

Multiplying equation (ii) by 3

Adding equation (iv) and equation (iii) , we get

$15u-2u = -175 \frac{-17}{5} + 5$

$=13u = 135 \frac{13}{5}$

$=u = 15 \frac{1}{5}$

Putting $u = 15 \frac{1}{5}$ in equation (i)

$5(15 \frac{1}{5}) + v = -2$

=v=1

Now,

$13x+2y \frac{1}{3x+2y} = u$

=3x+2y=5 .....(iv)

$13x-2y \frac{1}{3x-2y} = v$

= 3x-2y=1 .....(v)

Adding equation (iv) and (v) we get,

6x=6

=x=1

Putting the value of x in equation (v) we get,

3+2y=5

= y=1

The Solutions of the given system of equation are 1 and 1 respectively.

Question 38

$44x+y + 36x-y = 4\frac{44}{x+y} + \frac{36}{x-y} = 4 \quad 55x+y - 40x-y = 13\frac{55}{x+y} - \frac{40}{x-y} = 13$

Let $1x+y \frac{1}{x+y}$=u

Let $1x-y \frac{1}{x-y}$=v

Soln:

Then the given system of equation becomes:

44u+30v=10 …….. (i)

55u+40v=13 ……(ii)

Multiplying equation (i) by 4 and (ii) by 3

176u+120v=40 …… (iii)

165u+120v=39 …… (iv)

Subtracting equation (iv) from (iii) we get,

176-165u=40-39

=u= $111 \frac{1}{11}$

Putting the value of u in equation (i)

44($111 \frac{1}{11}$)+30v=10

= 4+30v=10

=30v=6

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

=x+y=11……..(v)

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

= x-y=5 ……..(vi)

Adding equation (v) and (vi) we get,

2x=16

=x=8

Putting the value of x in equation (v)

8+y=11

= y=3

The Solutions of the given system of equation are 8 and 3 respectively.

Question 40

$\frac{10}{x+y} + \frac{2}{x-y} = 4 \quad \frac{15}{x+y} - \frac{5}{x-y} = -2$

Let $\frac{1}{x+y}$=p

Let $\frac{1}{x-y}$=q

Soln:

Then the given system of equation becomes:

10p+2q=4 …….. (i)

15p-5q=-2 ……(ii)

Multiplying equation (i) by 4 and (ii) by 3

176u+120v=40 …… (iii)

165u+120v=39 …… (iv)

Using cross multiplication method we get,

$\frac{p}{4-20} = \frac{q}{-60-20} = \frac{1}{-50-30} \quad p-16 = 1-80 \quad \frac{p}{-16} = \frac{1}{-80} \quad q-80 = 1-80 \quad \frac{q}{-80} = \frac{1}{-80}$

p= $15\frac{1}{5}$ and q=1

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

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

x+y=5…….. 3

x-y=1 ……..4

Adding equation 3 and 4 we get,

x=3

Substituting the value of x in equation 3 we get,

y=2

The Solution of the given system of Solution is 3 and 2 respectively.

Question 41

$13x+y + 13x-y = 34 = \frac{1}{3x+y} + \frac{1}{3x-y} = \frac{3}{4} = \quad 12(3x+y) - 12(3x-y) = -18 \frac{1}{2(3x+y)} - \frac{1}{2(3x-y)} = \frac{-1}{8}$

Let $1x-1 \frac{1}{x-1}$ =p

Let $1y-2 \frac{1}{y-2}$ =q

Soln:

Then the given system of equation becomes:

$5x-1 + 1y-2 = 2 \frac{5}{x-1} + \frac{1}{y-2} = 2$ 1

$6x-1 - 3y-2 = 1 \frac{6}{x-1} - \frac{3}{y-2} = 1$ 2

Can be written as 5p+q=2 3

6p-3q=1 4

Equation 3 and 4 from a pair of linear equation in the general form. Now, we can use any method to solve these equations.

We get p= $13 \frac{1}{3}$

q= $13 \frac{1}{3}$

Substituting the $1x-1 \frac{1}{x-1}$ for p , we have

$1x-1 \frac{1}{x-1} = 13 \frac{1}{3}$

x-1 = 3

x= 4

$1y-2 \frac{1}{y-2} = 13 \frac{1}{3}$

y-2 =3

y=5

The Solution of the required pair of equation is 4 and 5 respectively.

Question 42

$7x-2yxy=5\frac{7x-2y}{xy}=5$ $8x+7yxy=15\frac{8x+7y}{xy}=15$

Soln:

$7y-2x=5\frac{7}{y}-\frac{2}{x}=5$ ……..1

$8y+7x=15\frac{8}{y}+\frac{7}{x}=15$ ……2

Let $1x\frac{1}{x}=p$

Let $1y\frac{1}{y}=q$

The given equation s reduce to:

-2p+7q=5

= -2p+7q-5=0 …….. 3

7p+8q=15

= 7p+8q-15=0 …… 4

Using cross multiplication method we get,

$p-105-(-40)=q-30-35=1-16-49\frac{p}{-105-(-40)}=\frac{q}{-30-35}=\frac{1}{-16-49}$ $p-65=1-65\frac{p}{-65}=\frac{1}{-65}$ $q-65=1-65\frac{q}{-65}=\frac{1}{-65}$

p=1 and q=1

$p=1x\frac{1}{x}$

$q=1y\frac{1}{y}$

x=1 and y=1

Question 43

152x-378y=-74

-378x+152y=-604

Soln:

152x-378y=-74 ……. 1

-378x+152y=-604 ……. 2

Adding the equations 1 and 2 , we obtain

-226x-226y=-678

=x+y=3 ……. 3

Subtracting the equation 2 from equation 1, we obtain

530x+530y=530

x-y=1 …….4

Adding equations 3 and 4 we obtain,

2x=4

= x=2

Substituting the value of x in equation 3 we obtain y=1

Question 44

99x+101y=409

101x+99y=501

Soln:

The given system of equation are :

99x+101y=409 …….1

101x+99y=501……. 2

Adding equation 1 and 2 we get ,

99x+101x+101y+99y= 49+501

= 200(x+y) = 1000

=x+y=5 ……. 3

Subtracting equation 1 from 2

101x-99x+99y-101y = 501-499

= 2(x-y)=2

= x-y = 1 ……. 4

Adding equation 3 and 4 we get,

2x=6

= x= 3

Putting x=3 in equation 3 we get,

3+y =5

=y=2

The Solution of the given system of equation is 3 and 2 respectively.

Question 45

23x-29y=98

29x-23y=110

Soln:

23x-29y=98 ……1

29x-23y=110 …… 2

Adding equation 1 and 2 we get,

= 6(x+y)=12

= x+y = 2 ……3

Subtracting equation 1 from 2 we get,

52(x-y) = 208

=x-y = 4 ……. 4

Adding equation 3 and 4 we get,

2x= 6

= x= 3

Putting the value of x in equation 4

3+y=2

=y= -1

The Solution of the given system of equation is 3 and -1 respectively.

Question 46

x-y+z=4

x-2y-2z=9

2x+y+3z=1

Soln:

x-y+z=4 ……..1

x-2y-2z=9……..2

2x+y+3z=1……3

From equation 1

z=4-x+y

z= -x+y+4

Subtracting the value of the z in equation 2 we get,

x-2y-2(-x+y+4) =9

= x-2y+2x-2y-8=8

= 3x-4y= 17 …….. 4

Subtracting the value of z in equation 3, we get,

2x+y+3(-x+y+4) =1

= 2x+y +3x+3y+12 =1

= -x+4y=-11

Adding equation 4 and 5 we get,

3x-x-4y+4y=17-11

= 2x=6

= x= 3

Putting x=3 in equation 4, we get,

9-4y=17

= -4y= 17-9

= y = -2

Putting x= 3 and y=-2 in z= -x+y+4 , we get,

Z= -3-2+4

= -1

The Solution of the given system of equation are 3 , -2 and -1 respectively.

Question 47

x-y+z=4

x+y+z=2

2x+y-3z =0

Soln:

x-y+z=4 ……..1

x+y+z=2……..2

2x+y-3z =0……3

From equation 1

=z= -x+y+4

Substituting z= -x+y+4 in equation 2 , we get ,

=x+y+(-x+y+4) = 2

= x+y-x+y+4 = 2

= 2y =2

= y= 1

Substituting the value of z in equation 3

2x+y-3(-x+y+4) =0

= 2x+y+3x-3y-12 =0

= 5x-2y = 12 ……. 4

Putting the y= -1 in equation 4

5x-2(-1) = 12

5x =10

=x=2

Putting x=2 and y = -1 in z =-x+y+4

Z= -2-1+4

= 1

The Solution of the given system of equations are 2 , -1 and 1 respectively.