Solve the following simultaneous equations.

Q.1 $x+y=5$

$x^2-2y-14=0$

Solution: $x+y=5$ .....(i)

$x^2-2y-14=0$ .....(ii)

From eq. (i)

$x+y=5$

$x=5-y$

Put it in eq. (ii)

$(5-y)^2-2y-14=0$

$25+y^2-10y-2y-14=0$

$y^2-12y+11=0$

$y^2-11y-y+11=0$

$y(y-11)-1(y-11)=0$

$(y-1)(y-11)=0$

$y-1=0$ or $y-11=0$

$y=1$ or $y=11$

Putting the values of y in eq. (i)

$y=1$	$y=11$
$x+y=5$	$x+y=5$
$x+1=5$	$x+11=5$
$x=5-1$	$x=5-11$
$\boxed{x=4}$	$\boxed{x=-6}$

Solution set is $\{(-6,11),(4,1)\}$

Q.2 $3x-2y=1$

$x^2+xy-y^2=1$

Solution: $3x-2y=1$ .....(i)

$x^2+xy-y^2=1$ .....(ii)

From eq. (i)

$3x=1+2y$

$x=\dfrac{1+2y}{3}$ .....(iii)

Put it in eq. (ii)

$\left(\dfrac{1+2y}{3}\right)^2+\left(\dfrac{1+2y}{3}\right)y-y^2=1$

$\dfrac{1+4y^2+4y}{9}+\dfrac{y+2y^2}{3}-y^2=1$

Multiplying by '9' on both sides

$\dfrac{9(1+4y^2+4y)}{9}+\dfrac{9(y+2y^2)}{3}-9(y^2)=1\times 9$

$1+4y^2+4y+3y+6y^2-9y^2=9$

$y^2+7y-8=0$

$y^2+8y-y-8=0$

$y(y+8)-1(y+8)=0$

$(y+8)(y-1)=0$

$y+8=0$ or $y-1=0$

$y=-8$ or $y=1$

Putting these values in eq. (iii)

$y=-8$ $\quad$ $y=1$

$y=-8$ $\quad y=1$

$x=\dfrac{1+2y}{3}$ $\quad x=\dfrac{1+2y}{3}$

$x=\dfrac{1+2(-8)}{3}$ $\quad x=\dfrac{1+2(1)}{3}$

$x=\dfrac{1-16}{3}$ $\quad x=\dfrac{1+2}{3}$

$x=\dfrac{-15}{3}=\boxed{-5}$ $\quad x=\dfrac{3}{3}=\boxed{1}$

Solution set is $\{(-5,-8),(1,1)\}$

Q.3 $x-y=7$

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

Solution: $x-y=7$ .....(i)

$$\frac{2}{x}-\frac{5}{y}=2 \quad .....(ii)$$

Multiply eq. (ii) by “xy”

$$2y-5x=2xy \quad .....(iii)$$

From eq. (i)

$$x=7+y$$

Put it in eq. (iii)

$$2y-5(7+y)=2(7+y)y$$
$$2y-35-5y=14y+2y^2$$
$$y^2+17y+35=0$$
$$2y^2+10y+7y+35=0$$
$$2y(y+5)+7(y+5)=0$$
$$(y+5)(2y+7)=0$$
$$y+5=0 \quad \text{or} \quad 2y+7=0$$
$$y=-5 \quad \text{or} \quad 2y=-7$$
$$y=-5 \quad \text{or} \quad y=\frac{-7}{2}$$

Now putting values of y in eq. (i)

$y=-5$ $\quad y=\dfrac{-7}{2}$

$x=7+y$ $\quad x=7+y$

$x=7+(-5)$ $\quad x=7+\left(\dfrac{-7}{2}\right)$

$x=7-5$ $\quad x=7-\dfrac{7}{2}$

$x=2$ $\quad x=\dfrac{14-7}{2}$

$\boxed{x=2}$ $\quad \boxed{x=\dfrac{7}{2}}$

Solution set is $\left\{(2,-5)\left(\dfrac{7}{2},\dfrac{-7}{2}\right)\right\}$

Q.4 $x+y=a-b$

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

Solution: $x+y=a-b$ .....(i)

$$\frac{a}{x}-\frac{b}{y}=2 \quad .....(ii)$$

Multiplying eq. (ii) by “xy”

$$ay-bx=2xy \quad .....(iii)$$

From equation (i)

$$x=a-b-y.........(iii)$$

Put it in equation (ii)

$$ay-bx=2xy$$

$$ay-b(a-b-y)=2(a-b-y)y$$
$$ay-ba+b^2+by=2a-2by-2y^2$$
$$2y^2+2ay+ay+2by+by+b^2-ab=0$$
$$2y^2-ay+3by+b^2-ab=0$$
$$2y^2-y(a-3b)+(b^2-ab)=0$$

By using quadratic formula

$a=2,\ b=-(a-3b),\ c=(b^2-ab)$

$$y=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$y=\frac{-[-(a-3b)]\pm\sqrt{[-(a-3b)]^2-4(2)(b^2-ab)}}{2(2)}$$

$$y=\frac{(a-3b)\pm\sqrt{a^2+9b^2-6ab-8b^2+8ab}}{4}$$

$$y=\frac{(a-3b)\pm\sqrt{a^2+b^2+2ab}}{4}$$

$$y=\frac{(a-3b)\pm\sqrt{(a+b)^2}}{4}$$

$$y=\frac{(a-3b)\pm(a+b)}{4}$$

$$y=\frac{a-3b-a-b}{4} \quad \text{or} \quad y=\frac{a-3b+a+b}{4}$$

$$y=\frac{-4b}{4} \quad \text{or} \quad y=\frac{2a-2b}{4}$$

$$y=-b \quad \text{or} \quad y=\frac{2(a-b)}{4}$$

$$y=-b \quad \text{or} \quad y=\frac{a-b}{2}$$

Putting the values of y in eq. (iii)

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

Solution set is $\left\{(a,-b),\left(\frac{a-b}{2},\frac{a-b}{2}\right)\right\}$

Q.5 $x^2+(y-1)^2=10$

$x^2+y^2+4x=1$

Solution: $x^2+(y-1)^2=10$ .....(i)

$x^2+y^2+4x=1$ .....(ii)

Subtracting eq. (ii) from (i)

$$\begin{array}{r} x^2+y^2+1-2y \qquad =10 \\ \pm x^2 \pm y^2 \qquad \pm 4x=1 \\ \hline 1-2y-4x=9 \end{array}$$

$$-4x-2y=9-1$$

$$-4x-2y=8$$

$$-2(2x+y)=8$$

$$2x+y=\frac{8}{-2}$$

$$2x+y=-4$$

$y=-4-2x$ .....(iii)

Put in eq. (ii)

$$x^2+(-4-2x)^2+4x=1$$

$$x^2+[-(4+2x)]^2+4x=1$$

$$x^2+[16+4x^2+16x]+4x=1$$

$$5x^2+20x+16-1=0$$

$$5x^2+20x+15=0$$

$$5(x^2+4x+3)=0$$

$$x^2+4x+3=0 \qquad (\because 5\neq 0)$$

$$x^2+3x+x+3=0$$

$$x(x+3)+1(x+3)=0$$

$$(x+3)(x+1)=0$$

$$x+3=0 \quad \text{or} \quad x+1=0$$

$$x=-3 \quad \text{or} \quad x=-1$$

Putting the values of x in eq. (iii)

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

$y=-4+6$ $\qquad$ $y=-4+2$

$\boxed{y=2}$ $\qquad$ $\boxed{y=-2}$

Solution set is $\{(-3,2),(-1,-2)\}$

Q.6 $(x+1)^2+(y+1)^2=5$

$(x+2)^2+y^2=5$

Solution: $(x+1)^2+(y+1)^2=5$ .....(i)

$(x+2)^2+y^2=5$ .....(ii)

From eq. (i)

$x^2+1+2x+y^2+1+2y=5$

$x^2+y^2+2x+2y+2=5$

$x^2+y^2+2x+2y=5-2$

$x^2+y^2+2x+2y=3$ .....(iii)

From eq. (ii)

$(x+2)^2+y^2=5$

$x^2+4+4x+y^2=5$

$x^2+y^2+4x=5-4$

$x^2+y^2+4x=1$ .....(iv)

Subtracting eq. (iv) from (iii)

$$\begin{aligned}x^2+y^2+2x+2y&=3\\ \pm x^2\pm y^2\pm 4x\quad&=\pm 1\\ \hline -2x+2y&=2\end{aligned}$$

$-2(x-y)=2$

$x-y=\dfrac{2}{-2}$

$x-y=-1$

$x=y-1$ .....(v)

Put it in eq. (iv)

$(y-1)^2+y^2+4(y-1)=1$

$y^2+1-2y+y^2+4y-4=1$

$2y^2+2y-4+1-1=0$

$2y^2+2y-4=0$

$2(y^2+y-2)=0$

$y^2+y-2=0$ $\qquad$ $(\because 2\neq 0)$

$y^2+y-2=0$

$y^2+2y-y-2=0$

$y(y+2)-1(y+2)=0$

$(y+2)(y-1)=0$

$y+2=0$ or $y-1=0$

$y=-2$ or $y=1$

Putting the values of y in eq. (v)

$y=-2$ $\qquad$ $y=1$

$x=y-1$ $\qquad$ $x=y-1$

$x=-2-1$ $\qquad$ $x=1-1$

$\boxed{x=-3}$ $\qquad$ $\boxed{x=0}$

Solution set is $\{(-3,-2),(0,1)\}$

Q.7 $x^2+2y^2=22$

$5x^2+y^2=29$

Solution: $x^2+2y^2=22$ .....(i)

$5x^2+y^2=29$ .....(ii)

Multiplying eq. (ii) by '2'

$10x^2+2y^2=58$ .....(iii)

Subtracting eq. (i) from eq. (iii)

$$\begin{aligned}10x^2+2y^2&=58\\ \pm\ \ x^2+2y^2&=22\\ \hline 9x^2\qquad&=36\end{aligned}$$

$x^2 = \frac{36}{9}$

$x^2 = 4$

Taking square root on both sides

$\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$

$\Rightarrow x = -2 \quad \text{or} \quad x = 2$

Putting the values of x in eq. (i)

$x=-2$	$x=2$
$x^2 + 2y^2 = 22$	$x^2 + 2y^2 = 22$
$(-2)^2 + 2y^2 = 22$	$(2)^2 + 2y^2 = 22$
$4 + 2y^2 = 22$	$4 + 2y^2 = 22$
$2y^2 = 18$	$2y^2 = 18$
$y^2 = \frac{18}{2}$	$y^2 = \frac{18}{2}$
$y^2 = 9$	$y^2 = 9$
$\boxed{y = \pm 3}$	$\boxed{y = \pm 3}$

Solution set is $\{(\pm 2, \pm 3)\}$

Q.8 $4x^2 - 5y^2 = 6$

$3x^2 + y^2 = 14$

Solution: $4x^2 - 5y^2 = 6 \quad .....(i)$

$3x^2 + y^2 = 14 \quad .....(ii)$

Multiplying eq. (ii) by '5'

$15x^2 + 5y^2 = 70 \quad .....(iii)$

Adding equation (i) and (iii)

$$\begin{aligned} 4x^2 - 5y^2 &= 6 \\ 15x^2 + 5y^2 &= 70 \\ \hline 19x^2 \quad\quad &= 76 \end{aligned}$$

$x^2 = \frac{76}{19}$

$x^2 = 4$

Taking square root on both sides

$\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$

$\Rightarrow x = -2 \quad \text{or} \quad x = 2$

Putting the values of x in eq. (ii)

$x=-2$	$x=2$
$3x^2 + y^2 = 14$	$3x^2 + y^2 = 14$
$3(-2)^2 + y^2 = 14$	$3(2)^2 + y^2 = 14$
$3(4) + y^2 = 14$	$3(4) + y^2 = 14$
$12 + y^2 = 14$	$12 + y^2 = 14$
$y^2 = 14 - 12$	$y^2 = 14 - 12$
$y^2 = 2$	$y^2 = 2$
$\boxed{y = \pm\sqrt{2}}$	$\boxed{y = \pm\sqrt{2}}$

Solution set is $\{(\pm 2, \pm\sqrt{2})\}$

Q.9 $7x^2 - 3y^2 = 4$

$2x^2 + 5y^2 = 7$

Solution: $7x^2 - 3y^2 = 4 \quad .....(i)$

$2x^2 + 5y^2 = 7 \quad .....(ii)$

Multiply eq. (i) by 5

$35x^2 - 15y^2 = 20 \quad .....(iii)$

Adding equation (ii) and (iii)

$$\begin{aligned} 35x^2 - 15y^2 &= 20 \\ 6x^2 + 15y^2 &= 21 \\ \hline 41x^2 \quad\quad &= 41 \end{aligned}$$

$x^2=\frac{41}{41}$

$x^2=1$

$x=\pm\sqrt{1}$
$x=\pm1$
$x=1 \quad \text{or} \quad x=-1$

Putting the values of x in eq. (i)

$x=1$	$x=-1$
$7x^2-3y^2=4$	$7x^2-3y^2=4$
$7(1)^2-3y^2=4$	$7(-1)^2-3y^2=4$
$7(1)-3y^2=4$	$7(1)-3y^2=4$
$7-3y^2=4$	$7-3y^2=4$
$-3y^2=4-7$	$-3y^2=4-7$
$-3y^2=-3$	$-3y^2=-3$
$y^2=\frac{-3}{-3}$	$y^2=\frac{-3}{-3}$
$y^2=1$	$y^2=1$
$y=\pm\sqrt{1}$	$y=\pm\sqrt{1}$
$\boxed{y=\pm1}$	$\boxed{y=\pm1}$

Solution set is $\{(\pm1,\pm1)\}$

Q.10 $x^2+2y^2=3$

$x^2+4xy-5y^2=0$

Solution: $x^2+2y^2=3$ .....(i)

$x^2+4xy-5y^2=0$ .....(ii)

Factorizing eq. (ii)

$x^2+4xy-5y^2=0$
$x^2+5xy-xy-5y^2=0$
$x(x+5y)-y(x+5y)=0$
$(x+5y)(x-y)=0$

$x+5y=0$	$x-y=0$
$x=-5y$ .....(iii)	$x=y$ .....(iv)

Putting value of x in eq. (i)

$x=-5y$	$x=y$
$(-5y)^2+2y^2=3$	$(y)^2+2y^2=3$
$25y^2+2y^2=3$	$y^2+2y^2=3$
$27y^2=3$	$3y^2=3$
$y^2=\frac{3}{27}$	$y^2=\frac{3}{3}$
$y^2=\frac{1}{9}$	$y^2=1$
$y=\pm\sqrt{\frac{1}{9}}$	$y=\pm1$
$y=\pm\frac{1}{3}$	$y=1 \quad \text{or} \quad y=-1$
$y=\frac{1}{3} \quad \text{or} \quad y=\frac{-1}{3}$	

Putting values of $y=\pm\frac{1}{3}$ in eq. (iii)

$y=\frac{1}{3}$	$y=\frac{-1}{3}$
$x=-5y$	$x=-5y$
$x=-5\left(\frac{1}{3}\right)$	$x=-5\left(\frac{-1}{3}\right)$
$\boxed{x=\frac{-5}{3}}$	$\boxed{x=\frac{5}{3}}$

Now putting values of $y=\pm1$ in eq. (iv)

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

Solution set is

$\left\{(-1,-1),(1,1),\left(\frac{5}{3},\frac{-1}{3}\right),\left(\frac{-5}{3},\frac{1}{3}\right)\right\}$

Q.11 $3x^2 - y^2 = 26$

$3x^2 - 5xy - 12y^2 = 0$

Solution: $3x^2 - y^2 = 26$ .....(i)

$3x^2 - 5xy - 12y^2 = 0$ .....(ii)

Factorizing equation (ii)

$3x^2 - 5xy - 12y^2 = 0$

$3x^2 - 9xy + 4xy - 12y^2 = 0$

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

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

$x - 3y = 0$ $3x + 4y = 0$

$x = 0 + 3y$ $3x = -4y$

$x = 3y$ .....(iii) $x = \frac{-4y}{3}$ .....(iv)

Putting value of x in eq. (i) from eq. (iii)

$3(3y)^2 - y^2 = 26$

$3(9y)^2 - y^2 = 26$

$27y^2 - y^2 = 26$

$26y^2 = 26$

$y^2 = \frac{26}{26}$

$y^2 = 1$

$y = \pm 1$

$y = 1$ or $y = -1$

Putting the value of y in eq. (iii)

$y = 1$ $y = -1$

$x = 3y$ $x = 3y$

$x = 3(1)$ $x = 3(-1)$

$x = 3$ $x = -3$

$(x, y) = (3, 1)$ $(x, y) = (-3, -1)$

Putting the value of x in eq. (iv) from eq. (i)

$3\left(\frac{-4y}{3}\right)^2 - y^2 = 26$

$3 \times \frac{16y^2}{9} - y^2 = 26$

$\frac{48y^2 - 9y^2}{9} = 26$

$39y^2 = 26 \times 9$

$y^2 = \frac{234}{39}$

$y^2 = 6$

$y = \pm\sqrt{6}$

$y = \sqrt{6}$ or $y = -\sqrt{6}$

Putting the value of y in eq. (iv)

$y = \sqrt{6}$ $y = -\sqrt{6}$

$x = \frac{-4y}{3}$ $x = \frac{-4y}{3}$

$x = \frac{-4\sqrt{6}}{3}$ $x = \frac{-4(-\sqrt{6})}{3}$

$(x, y) = \left(\frac{-4\sqrt{6}}{3}, \sqrt{6}\right)$ $x = \frac{4\sqrt{6}}{3}$

$(x, y) = \left(\frac{-4\sqrt{6}}{3}, \sqrt{6}\right)$ $(x, y) = \left(\frac{4\sqrt{6}}{3}, -\sqrt{6}\right)$

Solution set is

$$\left\{(3,1), (-3,-1), \left(\frac{-4\sqrt{6}}{3}, \sqrt{6}\right), \left(\frac{4\sqrt{6}}{3}, -\sqrt{6}\right)\right\}$$

Q.12 $x^2 + xy = 5$

$y^2 + xy = 3$

Solution: $x^2 + xy = 5$ .....(i)

$y^2 + xy = 3$ .....(ii)

Multiply eq. (i) by '3' and eq. (ii) by '5'

$$3x^2+3xy=15 \quad .....(iii)$$

$$5y^2+5xy=15 \quad .....(iv)$$

Subtracting eq. (iv) from eq. (iii)

$$\begin{array}{l} 3x^2+3xy \quad\quad =15 \\ \underline{\quad \pm 5xy \pm 5y^2 = -15} \\ 3x^2-2xy-5y^2=0 \end{array}$$

$$3x^2-5xy+3xy-5y^2=0$$
$$x(3x-5y)+y(3x-5y)=0$$
$$(3x-5y)(x+y)=0$$
$$3x-5y=0 \quad\quad x+y=0$$
$$3x=5y \quad\quad x=-y \quad .....(vi)$$
$$x=\frac{5y}{3} \quad .....(v)$$

From eq. (vi) put y=-x in eq. (i)

$$x^2+xy=5$$
$$(-y)^2+(-y)y=5$$
$$y^2-y^2=5$$
$$0\neq 5 \quad\quad \text{impossible}$$

Now from eq. (v) put $x=\frac{5y}{3}$ in eq. (i)

$$\left(x=\frac{5y}{3}\right)^2+\frac{5y}{3}\times y=5$$
$$\frac{25y^2}{9}+\frac{5y^2}{3}=5$$

Multiplying both sides by 9

$$9\times\frac{25y^2}{9}+9\times\frac{5y^2}{3}=9\times 5$$
$$25y^2+15y^2=45$$
$$40y^2=45$$

$$y^2=\frac{45}{40} \quad\quad \Rightarrow y^2=\frac{9}{8}$$
$$y=\pm\sqrt{\frac{9}{8}} \quad\quad \Rightarrow y=\sqrt{\frac{3^2}{4\times 2}}$$
$$y=\pm\frac{3}{2\sqrt{2}}$$
$$y=\frac{3}{2\sqrt{2}} \quad \text{or} \quad y=\frac{-3}{2\sqrt{2}}$$

Now putting the value of y in eq. (v)

$$x=\frac{5y}{3} \quad\quad\quad x=\frac{5y}{3}$$
$$y=\frac{3}{2\sqrt{2}} \quad\quad\quad y=\frac{-3}{2\sqrt{2}}$$
$$x=\frac{5}{3}\times\frac{3}{2\sqrt{2}} \quad\quad\quad x=\frac{5}{3}\times\left(\frac{-3}{2\sqrt{2}}\right)$$
$$x=\frac{5}{2\sqrt{2}} \quad\quad\quad x=\frac{-5}{2\sqrt{2}}$$
$$\boxed{x=\left(\frac{5}{2\sqrt{2}},\frac{3}{2\sqrt{2}}\right)} \quad\quad \boxed{x=\left(\frac{-5}{2\sqrt{2}},\frac{-3}{2\sqrt{2}}\right)}$$

Solution set is

$$\left\{\left(\frac{5}{2\sqrt{2}},\frac{3}{2\sqrt{2}}\right),\left(\frac{-5}{2\sqrt{2}},\frac{-3}{2\sqrt{2}}\right)\right\}$$

Q.13 $x^2-2xy=7$

$$xy+3y^2=2$$

Solution: $x^2-2xy=7 \quad .....(i)$

$$xy+3y^2=2 \quad .....(ii)$$

Multiplying eq. (i) by 2 and eq. (ii) by 7

$$2x^2-4xy=14 \quad .....(iii)$$

$$7xy+21y^2=14 \quad .....(iv)$$

Subtract eq. (iv) from eq. (iii)

$$2x^2 - 4xy \quad = 14$$
$$\pm 7xy \pm 21y^2 = -14$$
$$2x^2 - 11xy - 21y^2 = 0$$

$$2x^2 - 14xy + 3xy - 21y^2 = 0$$
$$2x(x-7y) + 3y(x-7y) = 0$$
$$(x-7y)(2x+3y) = 0$$
$$x - 7y = 0 \qquad 2x + 3y = 0$$
$$x = 7y \qquad 2x = -3y$$
$$x = 7y \quad \ldots(v) \qquad x = \frac{-3y}{2} \quad \ldots(vi)$$

Put x=7y in eq. (i)

$$(7y)^2 - 2(7y)y = 7$$
$$49y^2 - 14y^2 = 7$$
$$35y^2 = 7 \qquad \Rightarrow y^2 = \frac{7}{35}$$
$$y^2 = \frac{1}{5} \qquad \Rightarrow y = \pm\frac{1}{\sqrt{5}}$$
$$y = \frac{1}{\sqrt{5}} \qquad y = -\frac{1}{\sqrt{5}}$$

Putting values of y in eq. (v)

$$x = 7y \qquad x = 7y$$
$$y = \frac{1}{\sqrt{5}} \qquad y = -\frac{1}{\sqrt{5}}$$
$$x = 7\left(\frac{1}{\sqrt{5}}\right) \qquad x = 7\left(-\frac{1}{\sqrt{5}}\right)$$
$$x = \frac{7}{\sqrt{5}} \qquad x = \frac{-7}{\sqrt{5}}$$
$$(x,y) = \left(\frac{7}{\sqrt{5}}, \frac{1}{\sqrt{5}}\right) \qquad (x,y) = \left(\frac{-7}{\sqrt{5}}, \frac{-1}{\sqrt{5}}\right)$$

From eq. (vi) put value of x in eq. (i)

$$\left(\frac{-3}{2}y\right)^2 - 2\left(\frac{-3}{2}y\right)y = 7$$

$$\frac{9}{4}y^2 + 3y^2 = 7$$
$$9y^2 + 12y^2 = 28$$
$$21y^2 = 28$$
$$y^2 = \frac{28}{21} \qquad y^2 = \frac{4}{3}$$
$$\sqrt{y^2} = \sqrt{\frac{4}{3}} \qquad y = \pm\frac{2}{\sqrt{3}}$$
$$y = \frac{2}{\sqrt{3}} \qquad y = -\frac{2}{\sqrt{3}}$$

Putting values of y in eq. (vi)

$$y = \frac{2}{\sqrt{3}} \qquad y = -\frac{2}{\sqrt{3}}$$
$$x = \frac{-3}{2}\left(\frac{2}{\sqrt{3}}\right) \qquad x = \frac{-3}{2}\left(\frac{-2}{\sqrt{3}}\right)$$
$$x = -\sqrt{3} \qquad x = \sqrt{3}$$
$$\boxed{(x,y) = \left(-\sqrt{3}, \frac{2}{\sqrt{3}}\right)} \qquad \boxed{(x,y) = \left(\sqrt{3}, \frac{-2}{\sqrt{3}}\right)}$$

Solution set is

$$\left\{\left(\frac{7}{\sqrt{5}}, \frac{1}{\sqrt{5}}\right), \left(\frac{-7}{\sqrt{5}}, \frac{-1}{\sqrt{5}}\right), \left(-\sqrt{3}, \frac{2}{\sqrt{3}}\right), \left(\sqrt{3}, \frac{-2}{\sqrt{3}}\right)\right\}$$

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