

5.5 Solving Linear - Quadratic Systems

1. $\begin{cases} y - x^2 = -4 \\ y - 2x = -1 \end{cases}$

$$\begin{array}{r} y - 2x = -1 \\ + 2x \quad + 2x \\ \hline y = 2x - 1 \end{array}$$

$$\begin{array}{r} 2x - 1 - x^2 = -4 \\ +4 \quad +4 \\ \hline \end{array}$$

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

$$x^2 - 2x - 3 = 0 \quad \begin{array}{r} -3 \quad -2 \\ -3(1) \end{array}$$

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

$$\begin{array}{r} x - 3 = 0 \quad x + 1 = 0 \\ +3 \quad +3 \quad -1 \quad -1 \\ \hline x = 3 \quad x = -1 \end{array}$$

$$y - 2x = -1$$

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

$$\begin{array}{r} y - 6 = -1 \\ +6 \quad +6 \\ \hline \end{array}$$

$$y = 5$$

$$\boxed{(3, 5)}$$

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

$$\begin{array}{r} y + 2 = -1 \\ -2 \quad -2 \\ \hline \end{array}$$

$$y = -3$$

$$\boxed{(-1, -3)}$$

$$5. \quad \frac{3y}{4} = \frac{4x}{4} \rightarrow \left(\frac{3}{4}y\right)^2 = (x)^2 = \frac{9}{16}y^2$$
$$x^2 - y^2 = -63$$

$$\frac{9}{16}y^2 - y^2 = -63$$

$$\frac{9}{16}y^2 - \frac{16}{16}y^2 = -63$$

$$\left(-\frac{16}{16}\right) \frac{9}{16}y^2 = -63 \left(-\frac{16}{16}\right)$$

$$\sqrt{y^2} = 9(16) = \sqrt{144}$$

$$y = \pm 12$$

$$3y = 4x$$

$$3(12) = 4x$$

$$\frac{36}{4} = \frac{4x}{4}$$

$$9 = x$$

$$\boxed{(9, 12)}$$

$$3(-12) = 4x$$

$$\frac{-36}{4} = \frac{4x}{4}$$

$$-9 = x$$

$$\boxed{(-9, -12)}$$

$$\begin{array}{r}
 7. \quad x^2 + y^2 = 34 \\
 3x - 3y = 6 \\
 \quad + 3y \qquad \qquad + 3y \\
 \hline
 \end{array}$$

$$\frac{3x}{3} = \frac{6}{3} + \frac{3y}{3}$$

$$x = (2 + y)$$

$$\begin{aligned}
 x^2 &= (2 + y)^2 = (2 + y)(2 + y) \\
 &= 4 + 2y + 2y + y^2
 \end{aligned}$$

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

$$x^2 = (y^2 + 4y + 4)$$

$$y^2 + 4y + 4 + y^2 = 34$$

$$\begin{array}{r}
 2y^2 + 4y + 4 = 34 \\
 \quad \quad \quad -34 \quad \quad -34 \\
 \hline
 \end{array}$$

$$\frac{2y^2}{2} + \frac{4y}{2} - \frac{30}{2} = \frac{0}{2}$$

$$y^2 + 2y - 15 = 0$$

$$(y + 5)(y - 3) = 0$$

$$\begin{array}{r}
 y + 5 = 0 \\
 \quad -5 \quad -5 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 y - 3 = 0 \\
 \quad +3 \quad +3 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 -15 \mid 2 \\
 5(-3) \mid \\
 \hline
 \end{array}$$

$$y = -5$$

$$y = 3$$

$$3x - 3y = 6$$

$$3x - 3(-5) = 6$$

$$\begin{array}{r}
 3x + 15 = 6 \\
 \quad -15 \quad -15 \\
 \hline
 \end{array}$$

$$\frac{3x}{3} = \frac{-9}{3}$$

$$x = -3$$

$$\boxed{(-3, -5)}$$

$$3x - 3y = 6$$

$$3x - 3(3) = 6$$

$$\begin{array}{r}
 3x - 9 = 6 \\
 \quad +9 \quad +9 \\
 \hline
 \end{array}$$

$$\frac{3x}{3} = \frac{15}{3}$$

$$x = 5$$

$$\boxed{(5, 3)}$$

9.

$$h = (15t)$$

$$(h) = -16t^2 + 45t$$

$$15t = -16t^2 + 45t$$

$$16t^2 + 15t - 45t = 0$$

$$\frac{16t^2}{t} - \frac{30t}{t} = 0$$

$$t(16t - 30) = 0$$

$$t = 0$$

$$16t - 30 = 0$$

$$+ 30 \quad + 30$$

$$\frac{16t}{16} = \frac{30}{16}$$

$$t = 1.875 \text{ sec}$$

$$\begin{array}{r|l} 16(-45) & 15 \\ \hline 4 \cdot 4 \cdot 9 \cdot 5 & \end{array}$$