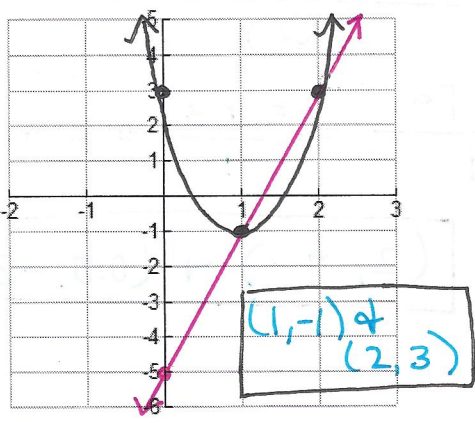
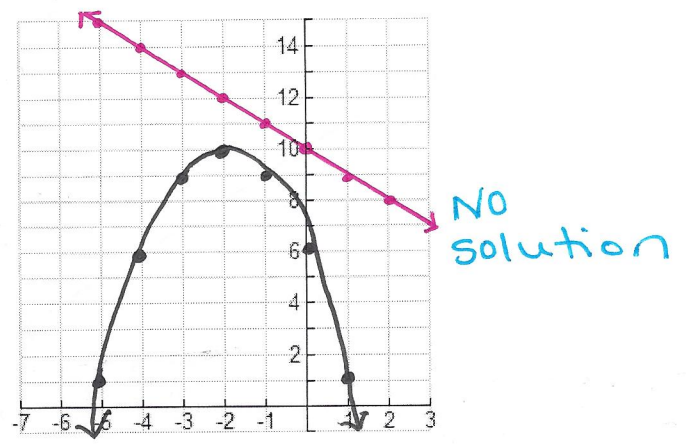


Solve each system by graphing. Check your answers.

1.  $\begin{cases} y = 4x^2 - 8x + 3 \\ y = 4x - 5 \end{cases} \rightarrow x = \frac{-b}{2a} = \frac{-(-8)}{2(4)} = 1$   
 $\sqrt{(1, -1)}$



2.  $\begin{cases} y = -x^2 - 4x + 6 \\ x + y = 10 \end{cases} \rightarrow x = \frac{-b}{2a} = \frac{-(-4)}{2(-1)} = -2$   
 $y = -x + 10$   
 $\sqrt{(-2, 10)}$



Solve each system by substitution. Check your answers.

3.  $\begin{cases} y = -2x^2 + x + 4 \\ 5x + y = 8 \end{cases}$   
 $5x - 2x^2 + x + 4 = 8$   
 $-2x^2 + 6x + 4 = 8$   
 $0 = 2x^2 - 6x + 4$   
 $0 = 2(x^2 - 3x + 2)$   
 $0 = 2(x^2 - x - 2x + 2)$   
 $0 = 2(x(x-1) - 2(x-1))$   
 $0 = 2(x-1)(x-2)$   
 $x = 1 \quad x = 2$   
 $(1, 3) \text{ and } (2, -2)$

4.  $\begin{cases} y = -2x^2 - 3x + 2 \\ y = -x + 6 \end{cases}$   
 $-x + 6 = -2x^2 - 3x + 2$   
 $0 = -2x^2 - 2x - 4$   
 $0 = -2(x^2 + x + 2)$   
 $x = \frac{-(-1) \pm \sqrt{1 - 4(1)(2)}}{2(1)} = \frac{-1 \pm \sqrt{-7}}{2}$   
 $x = \frac{-1 \pm i\sqrt{7}}{2}$

No Real Solution

Solve each system by elimination. Check your answers.

5.  $\begin{cases} y = x^2 - 1 \\ x + 2y = 8 \end{cases} \rightarrow \begin{matrix} -x^2 + 0x + y = -1 \\ 0x^2 + x + 2y = 8 \end{matrix} \begin{matrix} -2 \\ + \end{matrix}$   
 $2x^2 + 0x - 2y = 2$   
 $2x^2 + x - 10 = 0$   
 $x = \frac{-1 \pm \sqrt{1 - 4(2)(-10)}}{2(2)} = \frac{-1 \pm \sqrt{81}}{4}$   
 $x = 2 \text{ and } -2.5$   
 $(2, 3) \text{ and } (-2.5, 5.25)$

6.  $\begin{cases} y = x^2 + 3x + 2 \\ 2x + y = -4 \end{cases} \rightarrow \begin{matrix} -x^2 - 3x + y = 2 \\ 0x^2 + 2x + y = -4 \end{matrix} \begin{matrix} -1 \\ + \end{matrix}$   
 $x^2 + 3x - y = -2$   
 $x^2 + 5x = -6$   
 $x^2 + 5x + 6 = 0$   
 $x^2 + 2x + 3x + 6 = 0$   
 $x(x+2) + 3(x+2) = 0$   
 $(x+2)(x+3) = 0$   
 $x = -2 \quad x = -3$   
 $(-2, 0) \text{ and } (-3, 2)$

Solve each system by any method. Check your answers.

7. 
$$\begin{cases} y = 2x^2 - x + 3 \\ 2x - y = -3 \end{cases}$$

$$\begin{aligned} 2x - (2x^2 - x + 3) &= -3 \\ 2x - 2x^2 + x - 3 &= -3 \\ 0 &= 2x^2 - 3x \\ 0 &= x(2x - 3) \\ \downarrow \quad \downarrow \\ x &= 0 \quad x = \frac{3}{2} \text{ or } 1.5 \end{aligned}$$

$$\boxed{(0, 3) + (1.5, 6)}$$

8. 
$$\begin{cases} y = 2x^2 + 3x - 5 \\ y = 8x - 7 \end{cases}$$

$$\begin{aligned} 8x - 7 &= 2x^2 + 3x - 5 \\ 0 &= 2x^2 - 5x + 2 \\ x &= \frac{-(-5) \pm \sqrt{25 - 4(2)(2)}}{2(2)} \\ x &= \frac{5 \pm \sqrt{9}}{4} = \frac{5 \pm 3}{4} = 2 \text{ or } \frac{1}{2} \end{aligned}$$

$$\boxed{(2, 9) + (0.5, -3)}$$

9. A bird is flying upwards such that its height in meters after  $t$  seconds is given by  $h = 0.75t$ . As the bird takes off, a ball is thrown upwards from the ground with an initial velocity of 20 meters per second. The height in meters of the ball after  $t$  seconds is given by  $h = -4.9t^2 + 20t$ .

a. Find the time it takes the ball and the bird to reach the same height.

$$\begin{aligned} \begin{cases} h = 0.75t \\ h = -4.9t^2 + 20t \end{cases} &\rightarrow 0.75t = -4.9t^2 + 20t \\ &4.9t^2 - 19.25t = 0 \\ x &= \frac{19.25 \pm \sqrt{(-19.25)^2 - 4(4.9)(0)}}{2(4.9)} = \frac{19.25 \pm 19.25}{9.8} = 3.93 + \cancel{0} \leftarrow \text{has to take longer} \\ &\quad \uparrow \\ &\quad \boxed{3.93 \text{ seconds}} \end{aligned}$$

b. Find the maximum height of the ball.

$$h = -4.9t^2 + 20t$$

$$x = \frac{-b}{2a} = \frac{-20}{2(-4.9)} = \frac{100}{49}$$

$$y \left( \frac{100}{49}, \frac{1000}{49} \right)$$

$$\text{max} = 20.41 \text{ m}$$