

1. Let $w(x) = \frac{1}{4}x^2 - 3x - 8$ and $m(x) = x + 12$. Use GeoGebra to determine the following.

a. The points of intersection.

$$(-4, 8) \text{ and } (20, 32)$$

c. Solve $w(x) < m(x)$

The solution set is

$$\{x \mid -4 < x < 20\} = (-4, 20)$$

b. Solve $w(x) = m(x)$

The solution set is

$$\{-4, 20\}$$

d. Solve $w(x) \geq m(x)$

The solution set is

$$\{x \mid x \leq -4 \text{ or } x \geq 20\} = (-\infty, -4] \cup [20, \infty)$$

2. Let $p(x) = 6x^2 - 3x + 4$ and $k(x) = 7$. Use GeoGebra to determine the following.

a. The points of intersection.

$$(-0.5, 7) \text{ and } (1, 7)$$

c. Solve $p(x) > k(x)$

The solution set is

$$\{x \mid x < -0.5 \text{ or } x > 1\} = (-\infty, -0.5) \cup (1, \infty)$$

b. Solve $p(x) = k(x)$

The solution set is

$$\{-0.5, 1\}$$

d. Solve $p(x) \leq k(x)$

The solution set is

$$\{x \mid -0.5 \leq x \leq 1\} = [-0.5, 1]$$

3. Solve the following inequalities graphically.

a. $\left| \frac{2}{3}x + 2 \right| > 4$

$$f(x) = \left| \frac{2}{3}x + 2 \right|$$

$$g(x) = 4$$

The solution set is

$$\{x \mid x < -9 \text{ or } x > 3\}$$

$$= (-\infty, -9) \cup (3, \infty)$$

b. $x^2 - 3 \leq 1$

$$f(x) = x^2 - 3 \quad g(x) = 1$$

The solution set is

$$\{x \mid -2 \leq x \leq 2\} = [-2, 2]$$

$$c. x^2 - x - 3 > x$$

$$f(x) = x^2 - x - 3 \quad g(x) = x$$

The solution set is

$$\{x \mid x < -1 \text{ or } x > 3\}$$

$$= (-\infty, -1) \cup (3, \infty)$$

$$d. x^3 + x \leq \frac{1}{6}x^2$$

$$f(x) = x^3 + x \quad g(x) = \frac{1}{6}x^2$$

The solution set is

$$\{x \mid x \leq 0\} = (-\infty, 0]$$

$$e. \sqrt{4-x} > -2-x$$

$$f(x) = \sqrt{4-x} \quad g(x) = -2-x$$

The solution set is

$$\{x \mid -5 < x \leq 0\} = (-5, 0]$$

$$f. 10x^2 - 11x + 7 \leq 7$$

$$f(x) = 10x^2 - 11x + 7 \quad g(x) = 7$$

The solution set is

$$\{x \mid 0 \leq x \leq 1.1\} = [0, 1.1]$$

$$g. -10x + 4 < 20x^2 - 34x + 6$$

$$f(x) = -10x + 4 \quad g(x) = 20x^2 - 34x + 6$$

The solution set is

$$\{x \mid x < 0.090098 \text{ or } x > 1.1099019\}$$

$$= (-\infty, 0.090098) \cup (1.1099019, \infty)$$

$$h. -15x^2 - 2 \geq 10x - 4$$

$$f(x) = -15x^2 - 2 \quad g(x) = 10x - 4$$

The solution set is

$$\{x \mid -0.82775 \leq x \leq 0.1610799\}$$

$$= [-0.82775, 0.1610799]$$