

# Solving Quadratic Equations

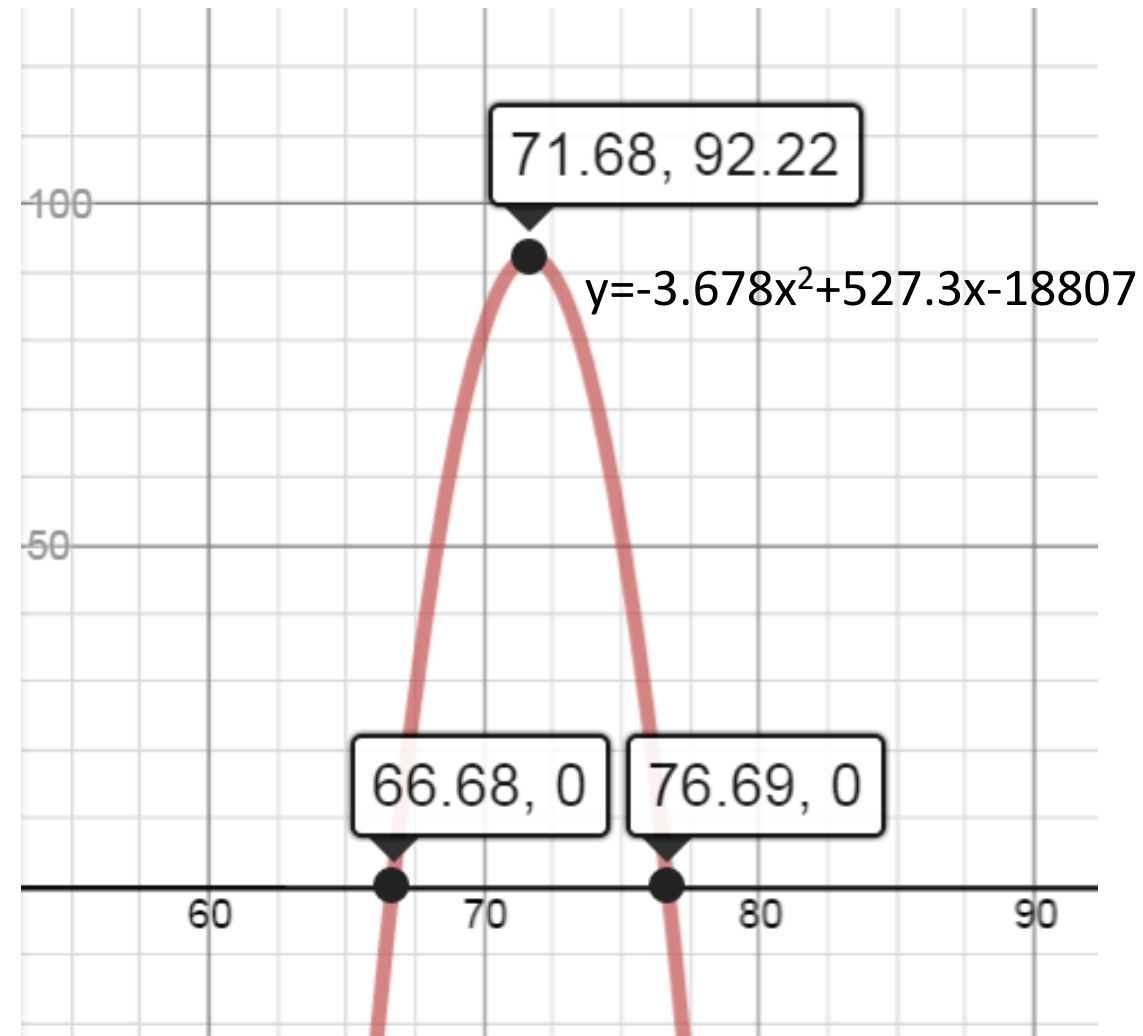
Section 3.1

# Ways to Solve Quadratic Equations

1. By graphing
  - Find the x-intercepts of the equation
2. Algebraically
  1. Using square roots
  2. By factoring

# Why is it so cold/hot in here?

- Researchers experimented to find out at what temperatures people felt comfortable.



10,1  
2.5

$$(x-2)(x+5) = 0$$

$$x=2, x=-5$$

$$1^2 = 1 \\ 2^2 = 4 \\ 3^2 = 9$$

# Solve $x^2 + 3x - 10 = 0$ by Graphing

You are looking for the values of  $x$  where  $y = 0$ . Where does the parabola cross the  $x$ -axis?

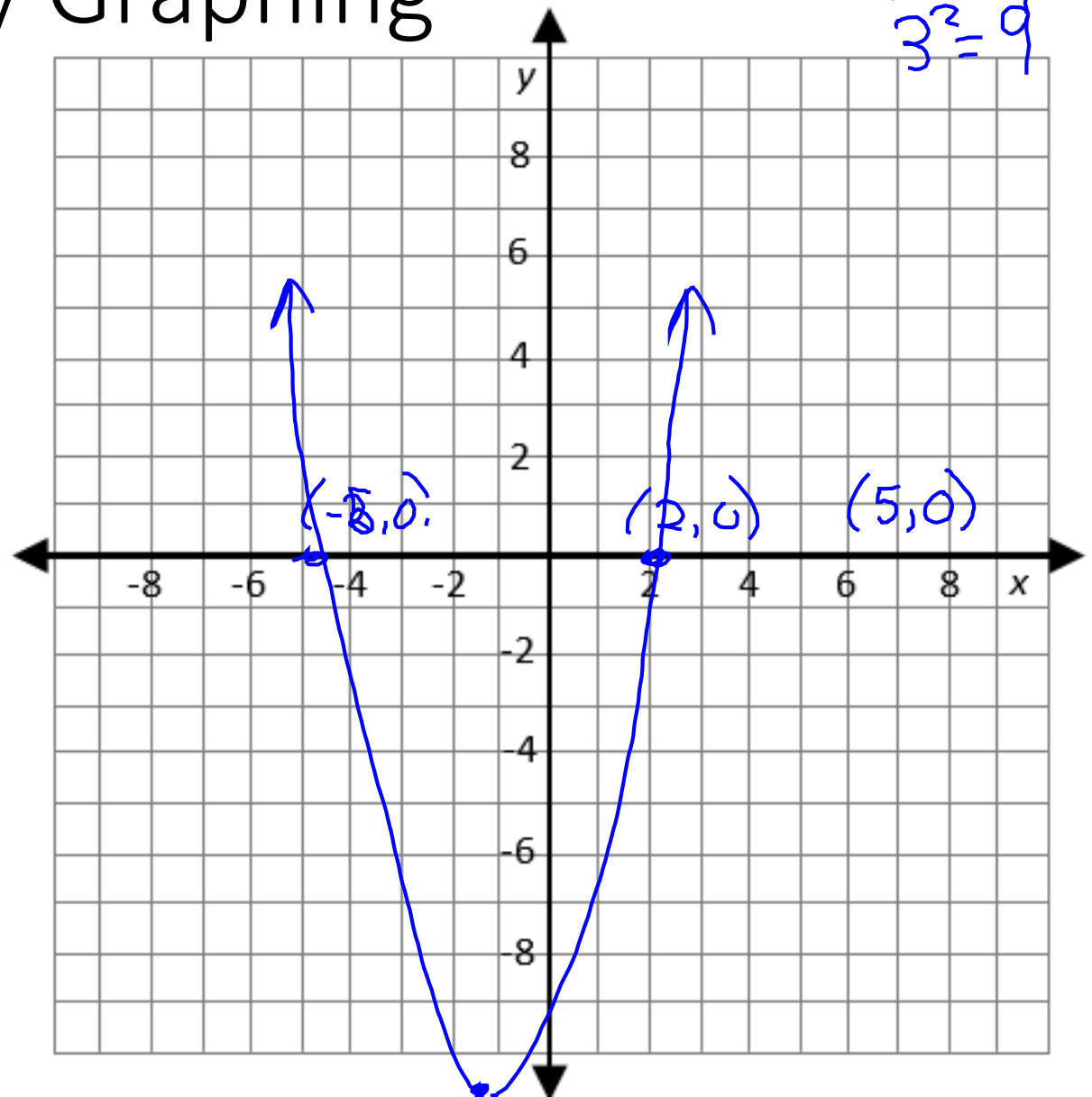
$$a=1 \quad b=3 \quad c=-10$$

$$h = -\frac{3}{2(1)} = -\frac{3}{2} = (-1\frac{1}{2})$$

$$k = f(-1\frac{1}{2}) = (-\frac{3}{2})^2 + 3(-\frac{3}{2}) - 10$$

$$k = \frac{9}{4} - \frac{9(2)}{2(2)} - 10$$

$$= \frac{9}{4} - \frac{18}{4} - 10 \quad (4) \\ = \frac{9}{4} - \frac{48}{4} = -\frac{39}{4}$$



$$2x^2 - 12x + 18 = 0$$

Solve  $2x^2 + 18 = 12x$  by Graphing

You are looking for the values of  $x$  where  $y = 0$ . Where does the parabola cross the  $x$ -axis?

$$a = 2 \quad b = -12 \quad c = 18$$

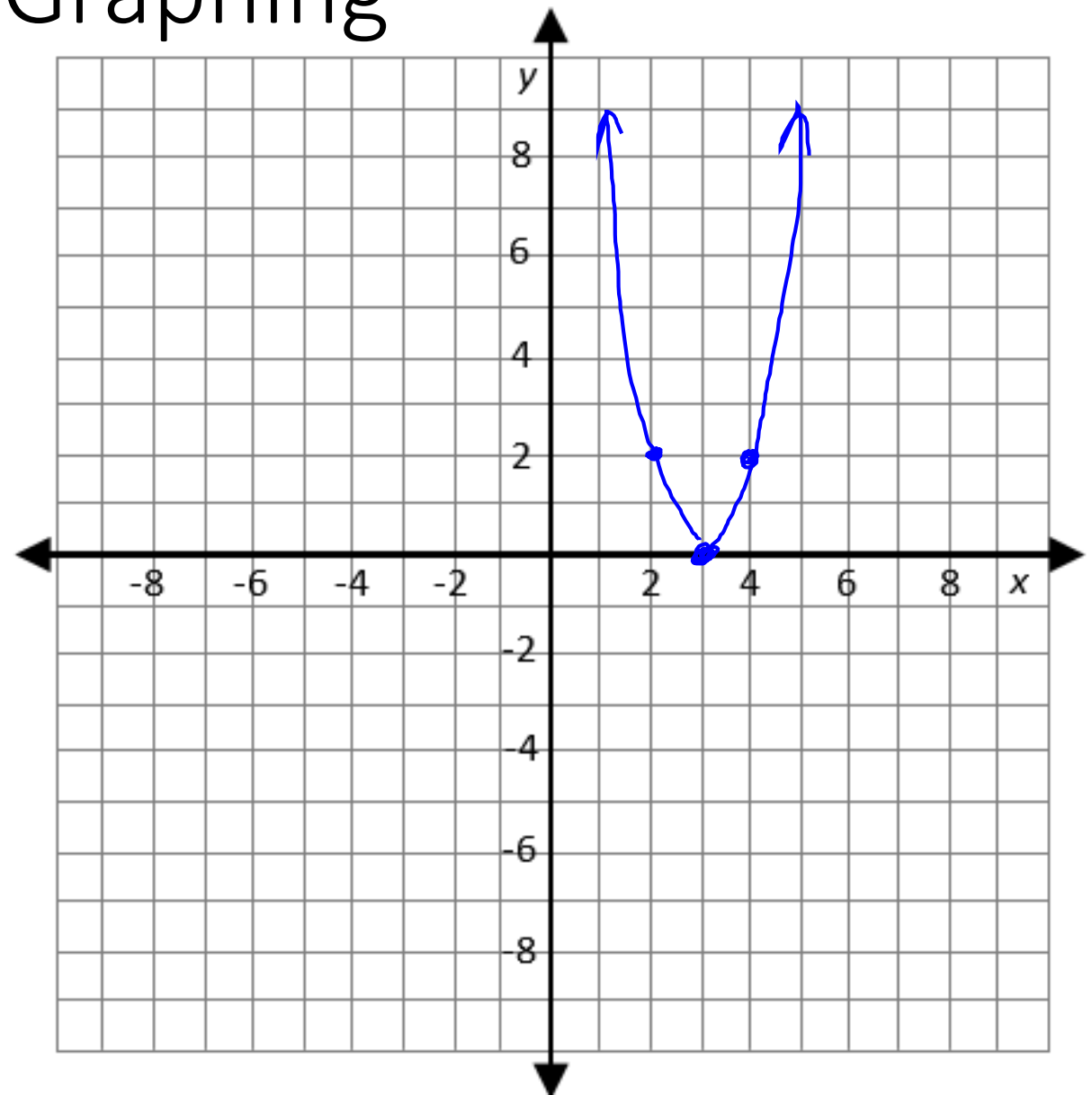
$$h = \frac{-b}{2a} = \frac{12}{4} = 3$$

Vertex  $(3, 0)$   
 $(4, )$

$$2(3)^2 - 12(3) + 18$$
$$18 - 36 + 18$$

$$2(4)^2 - 12(4) + 18$$
$$32 - 48 + 18$$
$$2$$

$(3, 0)$   
 $x = 3$



# Solve by Using Square Roots

3.  $2x^2 + 14 = 70$

$-14 \quad -14$

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$$\frac{2x^2}{2} = \frac{56}{2}$$

$$\sqrt{x^2} = \sqrt{28}$$

$$x = 2\sqrt{7} \\ -2\sqrt{7}$$

4.  $4x^2 + 20 = 16$

$-20 \quad -20$

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$$\frac{4x^2}{4} = \frac{-4}{4}$$

$$\sqrt{x^2} = \sqrt{-1}$$

$$x = \pm \emptyset$$

$$5 \frac{2}{3} (x+1)^2 = 10 \frac{3}{2}$$

$$\sqrt{(x+1)^2} = \sqrt{15}$$

$$x+1 = \pm \sqrt{15}$$

$$x = -1 \pm \sqrt{15}$$

# Solve by Factoring

0.1  
0.5  
0.3

Example 6 – Solve  $x^2 - 6x - 7 = 0$  by factoring.

$$\begin{array}{l} x+1=0 \\ \underline{-1-1} \\ x=-1 \end{array} \quad \begin{array}{l} x-7=0 \\ \underline{+7+7} \\ x=7 \end{array} \quad (x+1)(x-7) = 0$$

$x = -1, 7$

$\begin{array}{r} | \\ \hline 1, 7 \end{array}$

Example 7 - Solve  $x^2 + 2x = 48$  by factoring.

$$\begin{array}{l} x^2 + 2x - 48 = 0 \\ (x+8)(x-6) = 0 \\ x+8=0 \quad x-6=0 \\ x=-8 \quad x=6 \end{array}$$

$$\begin{array}{r} 48 \\ \hline 1 \end{array}$$

Find the zeros of  $f(x) = x^2 + 8x + 12$

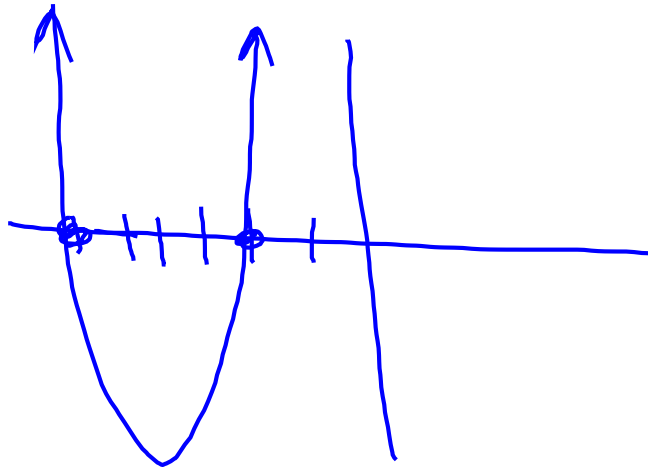
$$0 = x^2 + 8x + 12$$

Find the values of  $x$  that make the function zero.

$$0 = (x+6)(x+2)$$

$$0 = x+6 \text{ or } x+2=0$$

$$-6 = x \text{ or } x = -2$$





Section 3.1 p. 99 #s 3-19 odd, 27-31 odd, 47-53 odd

- A monthly skateboard magazine has 50,000 subscribers when it charges \$12 per annual subscription. For each \$1 increase in price, the magazine loses about 2500 subscribers. How much should it charge to maximize annual revenue? What is the maximum annual revenue?

$$\begin{array}{c} \text{Annual Revenue} \\ \text{(dollars)} \end{array} = \begin{array}{c} \text{Number of} \\ \text{Subscribers} \end{array} \cdot \begin{array}{c} \text{Subscription Price} \\ \text{(dollars/person)} \end{array}$$