Name _____ Date _____

Zeros of Quadratic Functions

A **zero of a function** f is an x-value for which $f(x) = 0$. If a real number k is a zero of the function $f(x) = ax^2 + bx + c$, then k is an x-intercept of the graph of the function.

Example 1 **Find the zeros of each function.**

a. $f(x) = 9x^2 - 1$

Set $f(x)$ equal to 0. Then use square roots to solve for x.

$$9x^2 - 36 = 0$$
$$9x^2 = 36$$
$$x^2 = 4$$
$$x = \pm\sqrt{4}$$
$$x = \pm 2$$

▶ The zeros of the function are $x = -2$ and $x = 2$.

b. $f(x) = x^2 - 2x - 8$

Set $f(x)$ equal to 0. Then use factoring to solve for x.

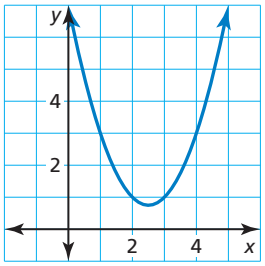
$$x^2 - 2x - 8 = 0$$
$$(x - 4)(x + 2) = 0$$
$$x - 4 = 0 \quad or \quad x + 2 = 0$$
$$x = 4 \quad or \quad x = -2$$

▶ The zeros of the function are $x = -2$ and $x = 4$.

Example 2 **Find the zeros of $f(x) = x^2 - 5x + 7$.**

Set $f(x)$ equal to 0. Then use the Quadratic Formula to solve for x.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(7)}}{2(1)}$$
$$= \frac{5 \pm \sqrt{-3}}{2}$$
$$= \frac{5 \pm i\sqrt{3}}{2}$$



▶ The zeros of the function are $x = \frac{5}{2} + \frac{\sqrt{3}}{2}i$ and $x = \frac{5}{2} - \frac{\sqrt{3}}{2}i$.

Notice that the graph of f does not intersect the x-axis.

Practice

Check your answers at BigIdeasMath.com.

Find the zero(s) of the function.

1. $f(x) = 8x^2 + 32$
2. $f(x) = -5x^2 + 40$
3. $f(x) = x^2 - 8x + 16$
4. $f(x) = 4x^2 + 12x + 9$
5. $f(x) = 4(x + 5)(x - 1)$
6. $f(x) = -\frac{1}{2}x(x + 3)$
7. $f(x) = 3x^2 + 12x + 15$
8. $f(x) = 2x^2 - x - 15$
9. $f(x) = -(x + 1)^2 + 18$
10. $f(x) = (x - 7)^2 + 9$