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| **Quadratic Equations (8.1)** | **Math 098** |

As seen in Math 091 and earlier in Math 098, the graphs of quadratic equations are parabolic in shape.

When solving quadratic equations, there are three cases:

|  |  |  |
| --- | --- | --- |
|  |  |  |
| No *x*-intercepts  No real-valued roots/zeros | One *x*-intercept  One real-valued root/zero | Two *x*-intercepts  Two real-valued roots/zeros |

Solve 

Solve 

Intuitively, how might we solve the last example ?

Method: The principle of square roots

1. For any real number *k*, if , then  or .

Sometimes we write this using the notation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Solve

1. 
2. 
3. 

Let , find all values of *x* such that . Find algebraic and graphical solutions.

Solve   
  
  
  
  
  
  
  
Review:

1. 
2. 
3. 

This leads us to a slick way to solve quadratic equations via completing the square.

Solve   
  
  
  
  
  
  
  
  
What number should be used to “complete the square”?

1. 
2. 
3. 

Solve  by completing the square.

Method: To solve a quadratic equation in *x* by completing the square

1. Isolate the terms with variables on one side of the equation, and arrange them in descending order.
2. Divide both sides by the coefficient of  if that coefficient is not 1.
3. Complete the square by taking half of the coefficient of *x* and adding its square to both sides.
4. Express the trinomial as the square of a binomial (factor the trinomial) and simplify the other side.
5. Use the principle of square roots (find the square roots of both sides).
6. Solve for *x* by adding or subtracting on both sides.

Solve   
  
  
  
  
  
  
  
  
  
  
Find the *x*-intercepts of 

Formula: The compound interest formula

1. If any amount of money *P* is invested at interest rate *r*, compounded annually, then in *t* years, it will grow to the amount *A* given by  where *r* is written in decimal notation.

Find the interest rate if $6,250 is invested and grows to $7,290 in 2 years.

The formula  is used to approximate the distance *s* in feet, that an object falls freely from rest in *t* seconds. Ireland’s Cliffs of Moher are 702 ft tall. How long will it take a stone to fall from the top? Round to the nearest tenth of a second.

