

## The Discriminant

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

*Within the quadratic formula lies the discriminant. The discriminant,  $b^2 - 4ac$ , tells you about your solutions.*

*If  $b^2 - 4ac > 0$  you will have two real solutions*

*If  $b^2 - 4ac = 0$  you will have one real solution*

*If  $b^2 - 4ac < 0$  you will have no real solutions*

*Think about what this means in terms of the graph of the function. The quadratic formula allows you to find roots of a quadratic equation. If the quadratic is given to you as a function, then you are finding the zeros of the function. The only difference is an equation versus a function. In other words, one of them has  $f_{(x)}$  in front of it. In either case, whether you are being asked to find the roots of the equation, or the zeros of the function, you are solving for  $x$ . So, finding the roots of an equation involve the same procedures as finding the zeros of a function. As we have discussed in class, the zeros of a function are the  $x$  intercepts of the graph of that function.*

*Therefore, as an extension, you can conclude the following.*

*If  $b^2 - 4ac > 0$  you will have two  $x$  intercepts*

*If  $b^2 - 4ac = 0$  you will have one  $x$  intercept*

*If  $b^2 - 4ac < 0$  you will have no  $x$  intercepts*