

12.4 – Quadratic Equations with Complex Solutions

$$\text{If } ax^2 + bx + c = 0, \text{ then } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

The discriminant of a quadratic equation is represented by $b^2 - 4ac$.

The discriminant is used to find the number of solutions the quadratic equation has. If the value of the discriminant is 0, the equation has 1 solution. If the value of the discriminant is any other number, the equation has 2 solutions.

The discriminant is also used to tell us what type of solutions the quadratic equation has.

Value of the Discriminant	Number & Type of Solutions
$b^2 - 4ac > 0$ (Positive number, not 0.)	2 Real Solutions
$b^2 - 4ac = 0$ (Exactly 0.)	1 Real Solution
$b^2 - 4ac < 0$ (Negative number, not 0.)	2 Imaginary Solutions

Find the number and type of solutions for the following quadratic equations using the discriminant. Then, solve each equation using the quadratic formula.

1. $3x^2 - 5x - 2 = 0$

$a = \underline{\hspace{2cm}}$ $b = \underline{\hspace{2cm}}$ $c = \underline{\hspace{2cm}}$

Number & Type of Solutions: $\underline{\hspace{2cm}}$

Solution: $\underline{\hspace{4cm}}$

2. $x^2 - 6x + 9 = 0$

$a = \underline{\hspace{2cm}}$ $b = \underline{\hspace{2cm}}$ $c = \underline{\hspace{2cm}}$

Number & Type of Solutions: $\underline{\hspace{2cm}}$

Solution: $\underline{\hspace{4cm}}$

3. $x^2 - 2x + 5 = 0$

$a = \underline{\hspace{2cm}}$ $b = \underline{\hspace{2cm}}$ $c = \underline{\hspace{2cm}}$

Number & Type of Solutions: $\underline{\hspace{2cm}}$

Solution: $\underline{\hspace{4cm}}$