Section 1.4a   Quadratic Equations

In Section 1.1 we studied linear equations of the form $ax + b = c$, $a \neq 0$. These equations are also known as 1st order polynomial equations. In this section, we will learn how to solve 2nd order polynomial equations. Second order polynomial equations are called **quadratic equations**.

***Definition*:** A **Quadratic Equation in One Variable** is an equation that can be written in the form $ax^2 + bx + c = 0$, $a \neq 0$. Quadratic equations in this form are said to be in *standard form.*

Objective 1: Solving Quadratic Equations by Factoring and the Zero Product Property

Some quadratic equations can be easily **solved by factoring** and by using the following important property.

     The Zero Product Property: If $AB = 0$ then $A = 0$ or $B = 0$.

The Zero Product Property says that if two factors multiplied together are equal to zero, then at least one of the factors must be zero.

Objective 2: Solving Quadratic Equations using the Square Root Property

Any quadratic equation of the form $x^2 - c = 0$ where $c > 0$ can be solved by factoring the left side as $\left(x - \sqrt{c}\right)\left(x + \sqrt{c}\right) = 0$ thus the solutions are $x = \pm\sqrt{c}$. Quadratic equations of this form can be more readily solved by using the following **square root property**.

> **The Square Root Property:** The solution to the quadratic equation $x^2 - c = 0$, or equivalently $x^2 = c$, is $x = \pm\sqrt{c}$.