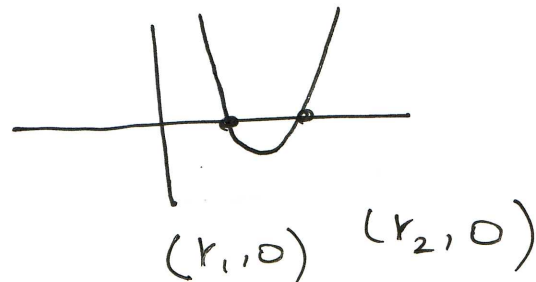


## 4.2 Quadratic Equations

Quadratic equations have a degree of 2 and as such have 2 roots. The solution of quadratic equations can be determined in four different ways.

First - By graphing



Second - By factoring

$$y = x^2 + 2x - 3$$

$$(x + 3)(x - 1) = 0 \quad x = -3, 1$$

Third - By completing the square  
change the equation into a statement that is a perfect square and then solve for the roots.

$$x^2 + 4x - 6 = 0 \rightarrow x^2 + 4x = 6$$

$$x^2 + 4x + 2^2 = 6 + 2^2 \rightarrow (x + 2)^2 = 10$$

$$x + 2 = \pm \sqrt{10} \rightarrow x = -2 \pm \sqrt{10}$$

Fourth - By use of the Quadratic Formula

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

$$x^2 + 4x - 6 = 0; \quad a = 1 \\ b = 4 \\ c = -6$$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(-6)}}{2(1)} = \frac{-4 \pm \sqrt{16 + 24}}{2} = \frac{-4 \pm \sqrt{40}}{2}$$

$$x = \frac{-4 \pm 2\sqrt{10}}{2}, \quad \boxed{x = -2 \pm \sqrt{10}}$$

