4.1 Graphical Solutions of Quadratic Equations

**Quadratic Equation:**
-a polynomial with degree two in the form

\[ ax^2 + bx + c = 0 \]  \( (a \neq 0) \)

**Root(s) of an Equation:**
-the solution(s) to an equation

Zero(s)/x-intercept of a function (when \( f(x) \) or \( y = 0 \))
-the values of \( x \) where a quadratic function, \( (x) = ax^2 + bx + c \), has a value of \( f(x) = 0 \)

For example:
Solving the equation \( 0 = 3x + 6 \) will determine the roots of an equation

⇒ The root of the equation is \( x = -2 \)

Finding the zero(s)/x-intercept of \( f(x) = 3x + 6 \)

⇒ The zero or x-intercept of \( f(x) \) is at \( x = -2 \)

**Solving quadratics / Finding zeros (or x-intercepts) with Graphing Calculator:**
To solve a quadratic, set one side of the equation equal to zero and plug the expression into the calculator.

Use 2nd trace => 2: zero and following the steps to find the zeros

**Example 1: Solve**

a.) \(-x^2 + 8x - 16 = 0\)
b.) \(x^2 + 10x = -12\)
c.) \(100 + 15x - x^2 = 0\)
d.) \(600 = 6x^2\)
e.) \(3x^2 - x = -2\)
f.) \(0.0025(x - 100)^2 - 12\)