Closing Tuesday: 2.1
Closing Thursday: 2.2 and 2.3(part 1)
***Note*: 2.2 and 2.3 are big algebra homework assignments; start now!**
Read the book and my detailed review sheets before starting.

Today: Finish intro to quadratics.
Function Notation & algebra.
Next week: Applications.

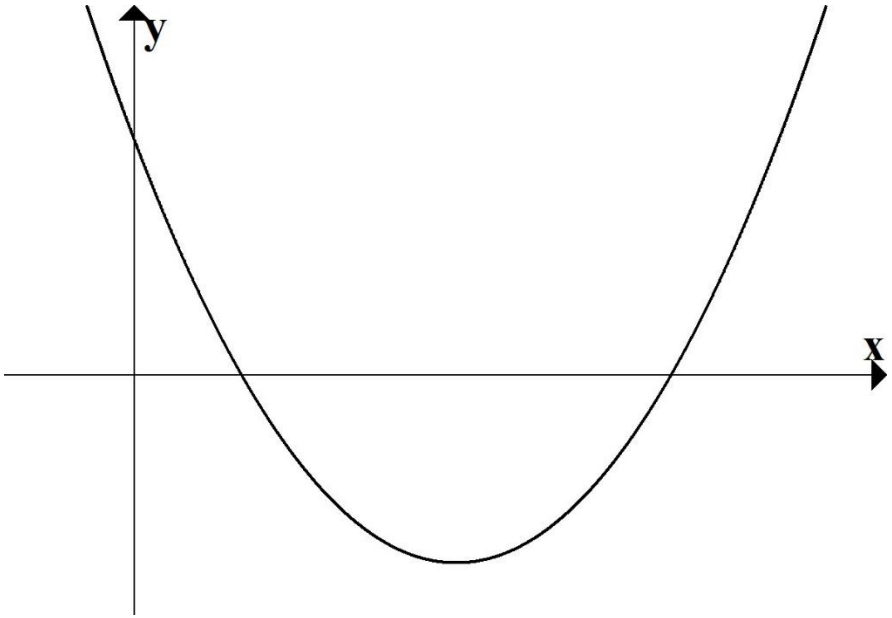
Recall
The solution(s) to $ax^2 + bx + c = 0$
are: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

The *x-coordinate of the vertex* of
$y = ax^2 + bx + c$
is: $x = -\frac{b}{2a}$

Example 1:
Consider the quadratic function
$f(x) = x^2 - 6x + 5$.

(a) Does it open upward or downward?
(b) What are the x-intercepts?
(c) What is the y-intercept?
(d) What are the x- and y-coordinates of the vertex?

Graph of $f(x) = x^2 - 6x + 5$.



Example 2: (A preview of next week)
Very similar to the first 6 questions in the 2.3 homework!

Total revenue (TR) and total cost (TC) are given by

$R(x) = 42x - x^2$ and $C(x) = 50 + 3x$

where x is in hundred items and R(x), C(x) are in hundred dollars.

(a) At what quantity is TR maximum?
(b) What is the maximum TR?
(c) Find the break-even points (*i.e.* quantities where profit is zero). *This is <u>not</u> the same as breakeven <u>price</u>!*
(d) What quantity maximizes profit?

2.2: Rates and Functional Notation

Recall: Given y = f(x)

$$\text{overall rate} = \frac{f(x)-f(0)}{x}$$

$$\text{diagonal slope} = \frac{f(x)}{x}$$

$$\text{incremental rate} = \frac{f(b)-f(a)}{b-a}$$

In particular:

$$ATS(t) = \frac{D(t)}{t}, AR(q) = \frac{TR(q)}{q}$$

$$AC(q) = \frac{TC(q)}{q}, AVC(q) = \frac{VC(q)}{q}$$

And:

$$AS(t) = \frac{D(t+h)-D(t)}{h},$$

$$MR(q) = \frac{TR(q+\text{"one item"})-TR(q)}{\text{"one item"}},$$

$$MC(q) = \frac{TC(q+\text{"one item"})-TC(q)}{\text{"one item"}}$$

Example 1: A object is launched in the air. Its distance, D(t), in miles above the ground at time t hours is given by

$$D(t) = 144t - 18t^2$$

WARM UP (*general graph questions*)

(a) How far does the car go the 1st hr?

(b) Give the largest interval over which the distance is increasing.

OVERALL RATES:

(a) Find ATS at t = 4.

(b) Find the formula for ATS(t).

(c) When will ATS be 100 mph?

Again, $D(t) = 144t - 18t^2$

INCREMENTAL RATES:

(a) Find the average speed over the 2 hour interval starting at $t = 2$.

(b) Find the average speed over the 0.1-hour interval starting at $t = 2$.

(c) Find the general formula for the average speed over the 0.1-hour interval starting at t.

(d) Find the general formula for the average speed over the h-hour interval starting at t.