Monday, Sept 10, 2012 (Day 6)

Section 3-4 The Derivative

Today: Rates of Change

Series of examples involving the function

$$f(x) = \underbrace{-x^2 + 6x - 5}_{} = \underbrace{-(x-1)(x-5)}_{\text{factored form}}$$

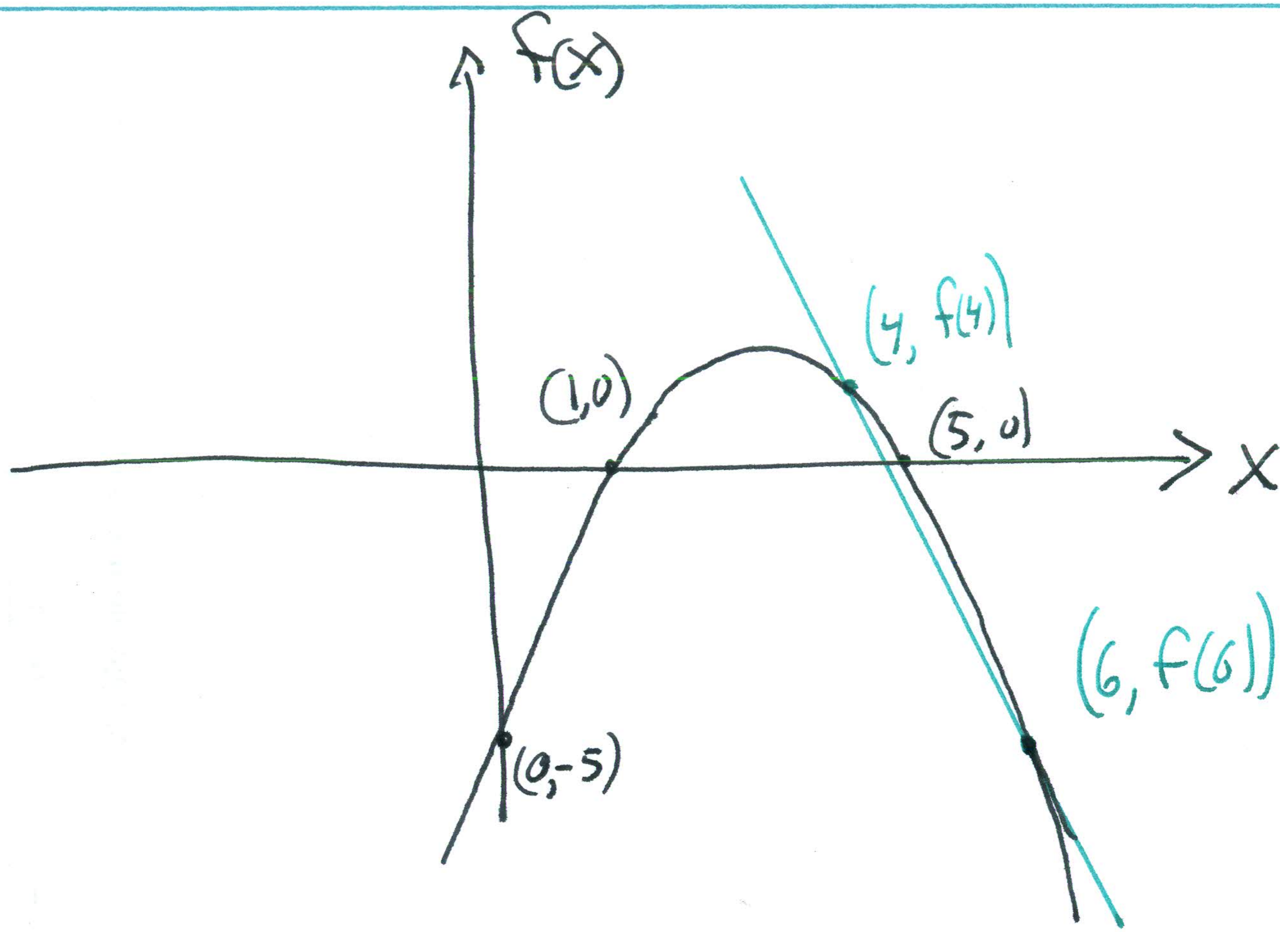
(A) Draw graph of f

Standard form of function tells us

- graph is a parabola (because x^2 term)
- upside down (negative leading coefficient $-x^2$)
- y-intercept at $(x,y) = (0,-5)$

Factored form of the equation tells us

- x-intercepts at $(x,y) = (1,0)$ and $(5,0)$



(B) Draw secant line through the point $(x,y) = (4, f(4))$ and $(x,y) = (6, f(6))$ Solution: green line

(C) Find secant line slope.

Solution $m = \dfrac{\Delta y}{\Delta x} = \dfrac{f(6) - f(4)}{6 - 4}$

~~Ex~~ We need the y-values

$$f(6) = -(6-1)(6-5) = -(5)(1) = -5$$

↑ substitute x=6 into f(x)

$$f(4) = -(4-1)(4-5) = -(3)(-1) = +3$$

↑ substitute $x=4$ into f(x)

Use these to find slope m

$$m = \frac{f(6)-f(4)}{6-4} = \frac{(-5)-(3)}{6-4} = \frac{-8}{2} = -4$$

Slope $m = -4$

Introduce Average Rate of change

See Reference 7 in Course Packet

We see that what we just did was to compute the "Average rate of Change of f from $x=4$ to $x=6$."

The result was $m=-4$