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Day 9 is Monday, February 4, 2013

Today: Start Section 3-5

## Basic Differentiation Properties

In section 3-4, we learned about the Definition of the derivative.

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

We computed  $f'(x)$  by using this definition.

(We organized our solutions using "4-step method")

Step 1 find  $f(x+h)$

Step 2 find  $f(x+h) - f(x)$

Step 3 find  $\frac{f(x+h) - f(x)}{h}$

Step 4 find  $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

Starting Now, in section 3-5, we will learn Rules for Taking Derivatives. We won't use the 4-step method.

## Notation for the Derivative

Notation without variables:

function:  $f$

the derivative:  $f'$

Notation using variables:

function:  $f(x)$

the derivative:  $f'(x)$  or  $\frac{df}{dx}$  or  $\frac{df(x)}{dx}$

Syntax:

$\frac{d}{dx} f(x)$   
 this tells us to take the derivative  
 the function

the whole symbol  $\frac{df(x)}{dx}$  stands for the result, the derivative.

## Our First Derivative Rule:

### The Constant function Rule

- If  $f(x)$  is a constant function, then  $f'(x)$  is zero.
  - If  $f(x) = c$  then  $f'(x) = 0$
  - $\frac{dc}{dx} = 0$
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Example

If  $f(x) = 5$  then  $f'(x) = 0$

Equivalently:  $\frac{d5}{dx} = 0$

