MSLC Workshop Series

Math 1151 - Workshop

Derivative “Short-Cut” Rules

There are certain functions that you should know how to take the derivative of.

**Make sure you have these memorized! We won’t go over them together, but try to fill out this page on your own!**

A constant: **** [[1]](#footnote-2)

Examples:   

x to a constant power:  [[2]](#footnote-3)

Examples:   

The trig derivatives:

 

 

 

Derivatives of exponential functions:

  

 

Derivatives of inverse trig functions:

**IMPORTANT:** These rules ONLY work when for these exact functions with a single variable (i.e. *x* ) plugged in to them!

What do we do if we can see that we have more than one of these basic functions to differentiate in the same problem? Well, that depends entirely on how the functions are combined.

Here are the ways the basic functions can be combined and what to do about it:

**The functions are combined by:**

**The constant multiple rule**:

 [[3]](#footnote-4)

Example: If , then

**The sum/difference rule**:



Example: If , then 

**The product rule**:



Example: If , then 

**The quotient rule**:



Example: Find  if .

**The functions are combined by:**

**The Chain Rule:**

****

Alternate Notation #1**: **

Alternate Notation #2: , where  and 

Examples of the Chain Rule:







If ,

then 

The best thing you can do now is practice finding lots of derivatives using all the rules until they become familiar. Find  for the following. To start, try to find the outermost operation (addition, division, composition, etc.). Do not simplify the results. **Treat and as constants, and and as differentiable functions.**

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

1. *c* is a constant (no *x*’s allowed!) [↑](#footnote-ref-2)
2. *n* is a constant (no *x*’s allowed!) [↑](#footnote-ref-3)
3. *c* is a constant (no *x*’s allowed!) [↑](#footnote-ref-4)