Worksheet 7

Fall 2016

MATH 221, Week 7

Name: _____

1 A few more derivatives!

Differentiate the following using the definition of the derivative:

(a) $f(x) = \sqrt{x+3}$

(b) $f(x) = 4 - \sqrt{x+3}$

(c) $f(x) = \sqrt[3]{x}$ (this should look familiar)

(d) $f(x) = x^{2/3}$

2 Solving for an Unknown

Solve for y' in the following equations:

(a) $x(x-y)^3 + 2x(x-y^2)(1-y') = 2x - 3y'$

(b) $1 + y'\cos(y) = y + x\sin(y^2)y'$

3 Chain Rule!

Differentiate the following functions:

(a) $f(x) = (x+1)^2$

(b) $f(x) = \cos(\sin(x))$

(c) $f(x) = \tan(2x^2 - 4)$

(d) $f(x) = ((2x^2)^5 + 4)^3$

(e) $f(x) = \tan^3(\sqrt{\cot(7x)})$

(f) $f(x) = h(g(k(x)))$ Where h, g, k are all functions.

4 Continuity/Differentiability of Functions

Find a family of numbers a and b so that the following function is continuous. So this answer will be like an equation that a and b have to satisfy.

$$f(x) = \begin{cases} ax + b & x \leq 0 \\ bx^2 + a & x > 0 \end{cases}$$

Are there any numbers a and b so that this function is continuous AND differentiable? If so, what are they? If not, why not?

5 To think about a little more (from last week)

Draw some curves that have maxima and minima. Draw their tangent lines at those points. Look at the geometry there. What is true at these points? Look at your answers to parts 1 and 3. What are some potential maxima and minima of these functions. Can you find any? How could you use this in an applied setting?