

MATH 220: CALCULUS I  
WORKSHEET 10  
FEBRUARY 19, 2013

List of some short-cut rules:

$$\begin{array}{l|l|l} \frac{d}{dx}(x) = 1 & \frac{d}{dx}(c) = 0 & \frac{d}{dx}(x^n) = nx^{n-1} \\ \frac{d}{dx}(a^x) = a^x \ln(a) & \frac{d}{dx}(\ln x) = \frac{1}{x} & \frac{d}{dx}(\sin x) = \cos x \\ \frac{d}{dx}(\tan(x)) = \sec^2(x) & \frac{d}{dx}(\sec(x)) = \sec(x) \tan(x) & \frac{d}{dx}(\tan^{-1}(x)) = \frac{1}{1+x^2} \\ \frac{d}{dx}(cf(x)) = cf'(x) & & \frac{d}{dx}(\sin^{-1}(x)) = \frac{1}{\sqrt{1-x^2}} \\ \frac{d}{dx}(f(x)g(x)) = f'(x)g(x) + f(x)g'(x) & & \frac{d}{dx}(f(x) + g(x)) = f'(x) + g'(x) \\ & & \frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2} \end{array}$$

Derivative = slope of the tangent line = instantaneous rate of change

**Homework:** In Section 3.1, do problems 3-30, 33, 35, 47, 51, 53

In Section 3.2, do the odd problems from 3-33

1. Find an equation of the tangent line to the curve  $y = \frac{x}{1+x^2}$  at the point  $\left(3, \frac{3}{10}\right)$ .

2. Use the quotient rule to find the derivatives of  $\cot(x)$  and  $\csc(x)$ .

3. Differentiate.

$$(a) f(x) = \frac{x^2 \cos(x)}{x - x^2}$$

$$(b) g(t) = \frac{t - t^2}{t^2 - 3t + 2}$$

$$(c) f(x) = \frac{e^x - e^{-x}}{2}$$

$$(d) h(w) = \frac{w^{2/3}}{e^w}$$