MATH 220: CALCULUS I
WORKSHEET 11
FEBRUARY 21, 2013

List of some short-cut rules:

$\frac{d}{dx}(x) = 1$	$\frac{d}{dx}(c) = 0$	$\frac{d}{dx}(x^n) = nx^{n-1}$	$\frac{d}{dx}(e^x) = e^x$
$\frac{d}{dx}(a^x) = a^x \ln(a)$	$\frac{d}{dx}(\ln x) = \frac{1}{x}$	$\frac{d}{dx}(\sin x) = \cos x$	$\frac{d}{dx}(\cos x) = -\sin x$
$\frac{d}{dx}(\tan(x)) = \sec^2(x)$	$\frac{d}{dx}(\sec(x)) = \sec(x)\tan(x)$	$\frac{d}{dx}(\tan^{-1}(x)) = \frac{1}{1+x^2}$	$\frac{d}{dx}\left(\sin^{-1}(x)\right) = \frac{1}{\sqrt{1-x^2}}$

$\frac{d}{dx}(cf(x)) = cf'(x)$ $\qquad$ $\frac{d}{dx}(f(x)+g(x)) = f'(x)+g'(x)$

$\frac{d}{dx}(f(x)g(x)) = f'(x)g(x) + f(x)g'(x)$ $\qquad$ $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{f'(x)g(x)-f(x)g'(x)}{(g(x))^2}$

$\frac{d}{dx}(\ f(g(x))\ ) = f'(\ g(x)\ ) \cdot g'(x)$

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

Homework: 3.1: 3-30, 33, 35, 47, 51, 53
3.2: 3-33 (odd only)
3.3: 1-23 (odd only)
3.4: 7-55 (odd only)
Total of $28 + 5 + 16 + 12 + 25 = 86$ exercises.

1. Differentiate.

   (a) $y = e^{3\ln(e^{\sin x})}$

   (b) $f(t) = \tan(e^{2t})$

(c) $g(x) = \left(\dfrac{\sin(x)}{e^x + e^1} \right)^2$

(d) $x = \dfrac{e^y + e^{-y}}{2}$

2. If $F(x) = f(xf(xf(x)))$, where $f(1) = 2, f(2) = 3, f'(1) = 4, f'(2) = 5$, and $f'(3) = 6$, find $F'(1)$.