Math 205 JW Quiz 7
October 17, 2016

Name: ANSWERS

Instructions: No calculators! Answer all problems in the space provided! Do your rough work on scrap paper.

1. Define $f'(x) =$ $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ (using limits)

2. Complete the rule: $\frac{d}{dx}(x^n) =$ nx^{n-1}

3. Use limits to find the derivative of $f(x) = 2 - x - x^2$ by doing the following:
   (a) The expression you get, no simplifying, when you plug the function into the definition: $\lim_{h \to 0} \frac{2-(x+h)-(x+h)^2-(2-x-x^2)}{h}$

   (b) The expression, just before taking the limit as $h \to 0$: $\lim_{h \to 0} (-2x-1-h)$ (c) Final answer: $-2x-1$

4. For problem 3 above, find the equation of the tangent line at (0,2): $y-2=-(x-0)$

5. Complete the table:

Function (assume all are continuous everywhere)	The behavior it tells us about	How?
$f(x)$	**Points on the graph**	**Plug in x into f(x), find corresponding y-value to get (x,y)**
f'	f is decreasing. (f' also shows increasing)	$f'(x) < 0$
$f''(x)$	**The function is Concave down**	$f'' < 0$
f'	**The function is increasing**	$f' > 0$
f'	**There is a minimum point at x**	$f' < 0$ on the left of x, $f' > 0$ on the right of x, $f' = 0$ or und at x. *

Bonus:

1. Complete the following rules:
   (a) $\frac{d}{dx}(f(x) \cdot g(x)) =$ $f'g + fg'$ (b) $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) =$ $\frac{f'g - fg'}{g^2}$

   (c) $\frac{d}{dx}f(g(x)) =$ $f'(g(x)) \cdot g'(x)$ (d) $\frac{d}{dx}\ln x =$ $\frac{1}{x}$

* could also use the second derivative test.