NAME: MATH1210-002

Quiz 3: §1.5, 2.1 & 2.2

June 22, 2016

Instructions: Please show all of your work as partial credit will be given where appropriate, *and* there may be no credit given for problems where there is no work shown. All answers should be boxed and completely simplified, unless otherwise stated. No electronics are allowed.

1. **[8 points]** Evaluate the limit $\lim_{x\to\infty} \dfrac{3x^2 + 5\sqrt{x^7} - 1000}{-\sqrt{16x^7} + 2x^3}$

2. **[10 points]** Use the definition of the instantaneous slope, namely slope $= \lim_{h\to 0} \dfrac{f(x+h) - f(x)}{h}$, to find the slope formula for $f(x) = \frac{3}{1-x}$.

3. **[6 points]** Find the equation of the line tangent to $f(x) = \frac{3}{1-x}$ at $x = 2$. (*Note: This is the same function used in the previous question.*

4. **[10 points]** Use the definition of the derivative, namely $f'(x) = \lim_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$, to find $f'(x)$ for $f(x) = \sqrt{4x+1}$

5. **[3 points each]** The given limit is a derivative, but of what function and at what x-value?

(a) $\lim_{h \to 0} \dfrac{\sqrt[3]{125+h} - 5}{h}$ Function:_____ x-value:_____

(b) $\lim_{w \to 2} \dfrac{w^3 + w^2 - 12}{(w-2)}$ Function:_____ x-value:_____