Math 166 - Section A
January 18, 2008

Name: Key - Yellow

Quiz #1c: Review of Calculus I
Show all work in a neat and logical manner in order to get full credit.
No Calculators are allowed.

6 pts. 1. Find the indicated limit or show that it does not exist.

(a) $\lim_{x\to 1} \dfrac{x^2+x-2}{x^2-1} = \lim_{x\to 1} \dfrac{(x+2)(x-1)}{(x+1)(x-1)} = \lim_{x\to 1} \dfrac{x+2}{x+1} = \boxed{\dfrac{3}{2}}$

(b) $\lim_{x\to\infty} \dfrac{x^2}{x^2+3x+6} = \lim_{x\to\infty} \dfrac{\frac{x^2}{x^2}}{\frac{x^2}{x^2}+\frac{3}{x}+\frac{6}{x^2}} = \dfrac{1}{1} = \boxed{1}$

Remember: $\lim_{x\to\infty} \dfrac{1}{x} = 0$

12 pts. 2. Find the derivative of the following functions. Simplify your answers, if possible.

(a) $f(x) = (x^3+3)(x^2+2)$

$f'(x) = 3x^2(x^2+2) + (x^3+3)(2x)$

$3x^4 + 6x^2 + 2x^4 + 6x$

$\boxed{5x^4 + 6x^2 + 6x}$

(b) $g(x) = \dfrac{x^2+3}{x}$

$g'(x) = \dfrac{2x(x) - (x^2+3)(1)}{x^2}$

$= \dfrac{2x^2 - x^2 - 3}{x^2}$

$= \boxed{\dfrac{x^2-3}{x^2}}$

Don't forget the back! ⇒

(c) $h(x) = \sin^3(6x^3)$

Let $u = \sin(6x^3)$ Let $v = 6x^3$

$h(x) = u^3$ $u = \sin(v)$ $dv = 18x$

$h'(x) = 3u^2\,du$ $du = \cos(v)\,dv$

$h'(x) = 3(\sin(6x^3))^2 18x\cos(6x^3)$ $du = 18x\cos(6x^3)$

$\boxed{h'(x) = 54x\sin^2(6x^3)\cos(6x^3)}$

12 pts. 3. Find the indefinite integral

(a) $\int \sqrt{5x+2}\,dx$ $u = 5x+2$

$du = 5\,dx$

$\int u^{1/2}\,\frac{du}{5}$

$\frac{1}{5}\left(\frac{2}{3}u^{3/2}\right) + C = \boxed{\frac{2}{15}(5x+2)^{3/2} + C}$

(b) $\int \frac{2}{x^3} - x^4\,dx = \int 2x^{-3} - x^4\,dx$

$= \frac{2x^{-2}}{-2} - \frac{x^5}{5} + C$

$= \boxed{\frac{-1}{x^2} - \frac{x^5}{5} + C}$

(c) $\int \sqrt[5]{w}\,dw = \int w^{1/5}\,dw$

$\boxed{\frac{5w^{6/5}}{6} + C}$

Points earned: _____ **out of a possible 30 points**