MATH 205 – Calculus I **SQ 3.7**

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1. Fill in the following derivative rules:

$\frac{d}{dx}c = 0$ $\frac{d}{dx}x = 1$

$\frac{d}{dx}x^n = nx^{n-1}$ $\frac{d}{dx}\sqrt{x} = \frac{1}{2\sqrt{x}}$

$\frac{d}{dx}\frac{1}{x} = \frac{x(0)-1(1)}{x^2} = \frac{-1}{x^2}$ $\frac{d}{dx}e^x = e^x$

$\frac{d}{dx}\sin x = \cos x$ $\frac{d}{dx}\cos x = -\sin x$

$\frac{d}{dx}\tan x = \sec x^2$ $\frac{d}{dx}\cot x = -[\csc x]^2$

$\frac{d}{dx}\sec x = \sec x \tan x$ $\frac{d}{dx}\csc x = -\csc x \cot x$

Product Rule: $\frac{d}{dx}f(x)g(x) =$

$g'(x)f(x) + f'(x)g(x)$

Quotient Rule: $\frac{d}{dx}\frac{f(x)}{g(x)} =$

$$\frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$$

Chain Rule: $\frac{d}{dx}f(g(x)) =$

$f'[g(x)]\,g'(x)$

Instructions: Though calculators can be used for the entire daily question, all problems require you to show your work. Any answer without proper justification will receive ***ZERO*** credit. Only **EXACT** answers will receive full credit unless otherwise noted.

2. Determine $f'(x)$ for $f(x) = \sin^3(5x^9 - 7x + \sec x) = [\sin(5x^9 - 7x + \sec x)]^3$

$f(u) = u^3$

$u = \sin(\ldots)$

$f_2(u) = \sin(u)$

$u_2 = 5x^9 - 7x + \sec x$

$f'(u)(f'(u)(u'))$

$3[\sin(5x^9 - 7x + \sec x)]^2(\cos(5x^9 - 7x + \sec x)(45x^8 - 7 + \sec x \tan x))$

3. Determine $f'(x)$ for $f(x) = \tan\left(\frac{8x^3 - 10x^{\frac{5}{9}}}{\csc(e^{5x})}\right)$

$f(u) = \tan u$

$u = \frac{8x^3 - 10x^{5/9}}{\csc(e^{5x})}$

$f_2(u) = \csc u$

$u_2 = e^{5x}$

$f'(u)\left(\frac{lo \cdot dhi - hi \cdot dlo\,(f(u)(u'))}{(lo)^2}\right)$

$\left[\sec\left(\frac{8x^3 - 10x^{5/9}}{\csc(e^{5x})}\right)\right]^2\left[\frac{\csc(e^{5x})(24x^2 - \frac{50}{9}x^{-4/9}) - (8x^3 - 10x^{5/9})([-\csc(e^{5x})\cot(e^{5x})]5e^{5x})}{[\csc(e^{5x})]^2}\right]$