MATH 205 – Calculus I **SQ 3.10**

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1. Fill in the following derivative rules:

$\frac{d}{dx}\sqrt{x} = \frac{1}{2}(x)^{-1/2} = \frac{1}{2\sqrt{x}}$

$\frac{d}{dx}\csc x = -\csc(x)\tan(x)$

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

$\frac{d}{dx}\tan x = (\sec x)^2$

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

$\frac{d}{dx}b^x = e^{x\ln b} \rightarrow b^x(\ln b + x(0)) = b^x \ln b$

$\frac{d}{dx}\cot x = -(\csc x)^2$

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

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

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

$\frac{d}{dx}\sec x = \sec(x)\tan(x)$

$\frac{d}{dx}e^x = e^x$

$\frac{d}{dx}\log_b x = \frac{1}{x \cdot \ln b}$

$\frac{d}{dx}\ln x = \frac{1}{x}$

$\frac{d}{dx}\operatorname{arcsec} x = \frac{1}{|x|\sqrt{x^2-1}}$

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

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

$\frac{d}{dx}\arctan x = \frac{1}{1+x^2}$

$\frac{d}{dx}\operatorname{arccsc} x = \frac{-1}{|x|\sqrt{x^2-1}}$

$\frac{d}{dx}\operatorname{arccot} x = \frac{-1}{1+x^2}$

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 $f(x) = 3\sin^{-1}(4x^2 - 1)$

$3 \cdot \frac{1}{\sqrt{1-(4x^2-1)^2}}(8x) \rightarrow \frac{24x}{\sqrt{1-(4x^2-1)^2}}$

3. Determine $g''(x)$ for $g(x) = \arctan(7x^3)$

$g'(x) = \frac{21x^2}{1+49x^6}$

$\tan^{-1}x = \frac{1}{1+x^2}$

$\frac{1}{1+(7x^3)^2}(21x^2) = \frac{21x^2}{1+49x^6}$

$s\ 49\ 6\ 294$

$\frac{(1+49x^6)(42x) - 21x^2(294x^5)}{(1+49x^6)^2} = \frac{42x + 2058x^7 - 6174x^7}{(1+49x^6)^2} =$

$g''(x) = \frac{42x - 4116x^7}{(1+49x^6)^2}$