Name: _____   Group #: _____

1. Find the derivative of the following using Leibniz Notation: $y = \dfrac{1}{\sqrt{1 + x^5}}$

2. Find the derivative of the following using Prime Notation: $f(x) = \sin^{-1}(5x^3)$

3. Suppose $f(3) = 2$ and $f'(3) = 8$. Let $g(x) = x^2 f(3x)$. Find the equation of the line tangent to $g(x)$ at $x = 1$.

4. Use the chain and product rules to prove the quotient rule. In other words, show that if $y = \dfrac{f(x)}{g(x)}$, then $\dfrac{dy}{dx} = \dfrac{f'(x)g(x) - g'(x)f(x)}{[g(x)]^2}$.

5. Find the derivatives of the following functions. Simplify as much as possible by combining like terms and canceling common factors.

(a) $y = 2^{\sec(5x)}$

(b) $f(x) = \log_3(x^2 e^x)$

(c) $f(x) = \sqrt{x^2 + 1}\,\csc^{-1} x$

(d) $h(x) = \ln\left(\dfrac{x^2 - x}{x^2 + 2x}\right)$