

Name: _____

Group #: _____

1. Find the derivative of the following using Leibniz Notation: $y = \frac{1}{\sqrt{1+x^2}}$

2. Find the derivative of the following using Prime Notation: $f(x) = \cos^{-1}(4x^2)$

3. Suppose $f(3) = 4$ and $f'(3) = 2$. 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 $y = \frac{f(x)}{g(x)}$, then $\frac{dy}{dx} = \frac{f'(x)g(x) - g'(x)f(x)}{[g(x)]^2}$.

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

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

(b) $f(x) = \log_7(xe^x)$

(c) $f(x) = \sqrt{x^2 - 1} \sec^{-1} x$

(d) $h(x) = \ln \left(\frac{x^2 - 1}{x^2 + 1} \right)$