

Name: _____

Group #: _____

1. Prove the derivative of $f(x) = \tan x$ by using derivative rules.

Use derivative rules to find the derivatives of the following functions. Simplify by combining like terms and canceling common factors.

2. $f(t) = (5 + t^5) \left(\frac{5}{\sqrt[5]{t}} + 5t \right)$

3. $r(\theta) = \frac{\sec \theta}{1 + \sec \theta}$

4. Find an equation of the line tangent to the function $g(x) = 2x \cos x$ at $x = \frac{3\pi}{2}$.

5. Suppose there exists a function, $f(x)$, such that $f(1) = 4$ and $f'(1) = 5$.
Let $h(x) = \frac{f(x)}{x+1}$. Find the equation of the tangent line to $h(x)$ at $x = 1$.

6. Find the third derivative of $f(t) = 3t^3 - \frac{2}{t^2}$

7. Find the 42nd and 55th derivative of $f(x) = \sin x$.

8. Use this table to find the following:

x	2	3	4	5
$f(x)$	2	3	4	3
$g(x)$	7	3	-1	2
$f'(x)$	5	7	-1	-2
$g'(x)$	3	-2	1	8

(a) $\left. \frac{d}{dx} \left[-2f(x) \right] \right|_{x=4}$

(b) $\left. \frac{d}{dx} \left[x^2 f(x) \right] \right|_{x=5}$

(c) Find the equation of the tangent line to $y = \frac{g(x)}{f(x)}$ at $x = 3$.