MATH 160 Fall 2015 Exam II SCORE (on next page)
Date_____ Name_____

Math 160 APPLIED CALCULUS EXAM II

Show all work. Do not begin until told to do so.

1

I. Product Rule:

$$\frac{d}{dx}[f(x) \cdot g(x)] = \frac{d}{dx}[f(x)] \cdot g(x) + \frac{d}{dx}[g(x)] \cdot f(x)$$
$$= f' \cdot g + g' \cdot f$$

II. Quotient Rule:

$$\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{\frac{d}{dx} [f(x)] \cdot g(x) - \frac{d}{dx} [g(x)] \cdot f(x)}{[g(x)]^2}$$
$$= \frac{f' \cdot g - g' \cdot f}{g^2}$$

III. Chain Rule:

$$\frac{d}{dx}\left[f(g(x))\right] = f'(g(x)) \cdot g'(x)$$

	SCORE	
1. Find the slope of the tangent line to $f(x) = x^3 + 2x + 1$ at x	= 1.	
		[8 points]

2. Let $f(x) = -2x^2 - 3$:

(a) Find the average rate of change over the interval [1, 3].

[6 points]

(b) Find the instantaneous rate of change at x = 3.

[6 points]

3. Using the limit definition, find the derivative of $f(x) = 4x^2$.

[7 points]

4. Find the equation of the tangent line to $f(x) = 5x^2 - 4x - 12$ at the point (-2, f(-2)). (Remember the slope of the tangent line at x = a is f'(a)).

[8 points]

5. Given
$$f(x) = \frac{5}{x} + 8x^2 + 4\sqrt{x}$$
, find $f'(1)$.

[8 points]

6. Find the derivative of $f(x) = \pi^3$.

[6 points]

7. Find the derivative of $f(x) = 7x^{-3} + 3x^{5/3}$.

[6 points]

8. Find the derivative of $f(x) = 5x^6 + 3x^2 - \frac{2}{x}$.

[6 points]

9. Find the derivative of the function $f(x) = \frac{2x^8}{6x^2}$ in two ways:

(a) Using Quotient rule.

[6 points]

(b) Simplifying the function and using the Power rule.

[6 points]

10. Find functions f and g such that the given function is f(g(x)).

$$\sqrt{3x^4 - 7x^2 + 5}$$
 [6 points]

11. Find $x(x^2-1)^4$ using product rule (*Hint: Remember you must use chain rule as well*).

[7 points]

12. Calculate the derivative of $f(x) = \frac{x^2 - 2x + 3}{x + 1}$.

[7 points]

13. Find the derivative of the function in question #10.

[7 points]