

Name: _____ Sep.4, 2015.

AP Calculus

W5_Quiz

PRODUCT RULE AND QUOTIENT RULE

Differentiate. Use proper notation and simplify your final answers. In some cases it might be advantageous to simplify/rewrite first. Do not use rules found in later sections.

1. $f(x) = (1 + \sqrt{x})(x^3)$

2. $g(t) = \left(\frac{2}{t} + t^5\right)(t^3 + 1)$

2. 3. $y = 2x \sin x + x^2 \cos x$

4. $f(\theta) = \frac{\sin \theta}{1 - \cos \theta}$

5. $y = \frac{\sqrt{x} - 1}{\sqrt{x} + 1}$

6. Find the tangent to *Newtons's serpentine*, $y = \frac{4x}{x^2 + 1}$ at the origin. Sketch the graph.

7. Find the tangent to the *witch of Agnesi* $y = \frac{8}{4 + x^2}$ at the point (2, 1). Sketch the graph.

8. Find the equation of the tangent and normal lines at the indicated x values.

$$f(x) = (x^3 - 4)(x^2 + \sqrt{x} - 6) \text{ at } x = 1$$

9. Let $f(x) = g(x)h(x)$, $g(10) = -4$, $h(10) = 560$, $g'(10) = 0$, and $h'(10) = 35$. Find $f'(10)$.

10. Let $y(x) = \frac{z(x)}{1+x^2}$, $z(-3) = 6$, and $z'(-3) = 15$. Find $y'(-3)$.

11. Suppose u and v are functions of x that are differentiable at $x = 2$ and that $u(2) = 3$, $u'(2) = -4$, $v(2) = 1$, and $v'(2) = 2$. Find the values of the following derivatives at $x = 2$.

(a) $(uv)'$

(b) $(u/v)'$

(c) $(v/u)'$

(d) $(3u - 2v + 2uv)'$