

Unit: Differentiation

Date: \_\_\_\_\_

Topic: More Practice with the Power, Product, and Quotient Rules

Objective: *SWBAT find the formula for the derivative of a function by using the power, product, and quotient rules.*

## More Practice with Power, Product, and Quotient Rules

Directions:

- Read each problem carefully.
- Show **ALL** work.
- This will be handed in tomorrow as a quiz grade.

For Exercises 1-10, find and simplify  $\frac{dy}{dx}$  for each of the following:

**\*\*HINT: Simplify expressions as much as possible first BEFORE you try to take the derivative.\*\***

1)  $y = 5x^{-4} - \frac{7}{8}x^{-2} + 3x^2 - 6$

2)  $y = (-3 + x^{-3})(-4x^3 + 3)$

3)  $y = \frac{3}{4x^3} + \frac{7}{2x^9} + \sqrt[5]{x^2} - \sqrt[3]{8x}$

4)  $y = \frac{4x^3 - 2x + 7}{x}$

$$5) y = -7x^5(2\sqrt{x} - 1)$$

$$6) y = \frac{2x - \sqrt{x}}{-x}$$

$$7) y = 3x^2(5x^{1/3} - x^{1/2})$$

$$8) y = \left(\frac{1}{x^2} - \frac{3}{x^4}\right)(x + 5x^3)$$

$$9) y = \frac{2x^3}{3} - \frac{7}{2x^2} + 6x - 4$$

$$10) y = \frac{2x^{11/3} + 4x^{5/4} - 3x^{7/2}}{4x^{2/3}}$$

*Exercises 11-20*

11) Find the equation of the tangent line to the curve  $g(x) = \frac{x^4}{2} + 3x$  at  $x = 0$ .

12) Find the equation of the line perpendicular to the tangent line to the curve  $y = \frac{x}{x-1}$  at  $(2,2)$ .

13) Determine the points, if any, at which  $f(x) = \frac{x^2}{x-1}$  has a horizontal tangent line.

14) Find  $f'(2)$  given that  $f(x) = g(x)h(x)$ ,  $g(2) = 3$ ,  $g'(2) = -2$ ,  $h(2) = -1$ ,  
and  $h'(2) = 4$ .

15) Find the instantaneous rate of change of the curve  $y = \frac{x+1}{x}$  at  $x = -4$ .

16) Find the tangents to the curve  $y = \frac{2}{3}x^3 - 13x$  at the points where the slope is -5.

