

### 3.3 Product and Quotient Rule Quiz

Name: Key

1. Complete the following derivative rules from memory:

a) Constant all by its lonesome rule  $(c)' = 0$

b) Constant multiple rule  $[cf(x)]' = cf'(x)$

c) Sum rule  $[f(x) + g(x)]' = f'(x) + g'(x)$

d) Product rule  $[f(x)g(x)]' = f'(x)g(x) + f(x)g'(x)$

e) Quotient rule  $\left[\frac{f(x)}{g(x)}\right]' = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$

f) Power rule  $(x^n)' = nx^{n-1}$

g) Natural exponential function  $(e^x)' = e^x$

h) Ugly exponential function  $(b^x)' = b^x \ln b$

2. At a particular gas station near BSC,  $N(p)$  represents the number of gallons of gasoline sold when the price is  $p$  dollars per gallon.

a) Explain what  $N(3) = 2000$  means, including units.

When gas costs \$3/gal, 2000 gal are sold.

b) Explain what  $N'(3) = -100$  means, including units.

When gas costs \$3/gal, if the price goes up by \$1/gal, approximately 100 fewer gal are sold.

3. For  $f(x) = \frac{1}{x^2 - 1}$

a) Find  $f'(x)$ .

$$f'(x) = \frac{(x^2 - 1)(0) - (1)(2x)}{(x^2 - 1)^2}$$

b) Simplify  $f'(x)$ .

$$f'(x) = \frac{-2x}{(x^2 - 1)^2}$$

c) Find  $f(0)$ .

$$f(0) = -1$$

d) Find where  $f(x) = 0$ .

$$\frac{1}{x^2 - 1} = 0 \Rightarrow 1 = 0 \text{ No solution}$$

e) Find  $f'(0)$ .

$$f'(0) = 0$$

f) Find where  $f'(x) = 0$ .

$$\frac{-2x}{(x^2 - 1)^2} = 0 \Rightarrow -2x = 0 \Rightarrow x = 0$$