Name: _____ Date: _____

QUIZ

Calculus: Derivative 1

Review Differentiation Concepts

Problem Solving

Directions:

You have 20 minutes to find the derivative, or to complete the formula. Use the "Derivative of a function" concept, its formal definition, rules of finding derivatives, and methods to differentiate.

When Trigonometry, differentiate, find derivatives, and/or sketch the graph of the function f (x). Analyze the Graph when appropriate.

Grade: _____

Teacher's Signature: _____

1. Apply the "Derivative of a Function" concept.

Use the definition of the derivative to find the derivative of

a.) $f(x) = x^2$

b.) $f(x) = \frac{1}{x}$

Hint: The derivative of a function $y = f(x)$ is a function $f'(x)$ defined as a limit:

$$f'(x) = \lim_{x \to 0} \frac{f(x + Dx) - f(x)}{Dx}$$

2. Apply the "Derivative of a Function" concept.

Use the definition of the derivative to find the derivative of

a.) $f(x) = x^3 - x$

b.) $f(x) = \sqrt{x}$

Hint: The derivative of a function $y = f(x)$ is a function $f'(x)$ defined as a limit:

$$f'(x) = \lim_{x \to 0} \frac{f(x + Dx) - f(x)}{Dx}$$

3. Complete the formula

a.) $\frac{d}{dx}\left(x^{n}\right) =$ ▮ for n a positive number

b.) $\frac{d}{dx}(kc) =$ ▮ where k and c are constants

c.) $\frac{d}{dz}\left(z^{n-2}\right) =$ ▮ for n a positive number

4. Differentiate y with respect to x

a.) $y = 3x^{12} + 2x^{9}$

b.) $y = \left(x^{7} + 3x^{6} + x^{2}\right) + x + 1$

c.) $y = 2\ln(6x + 2)$

5. Differentiate

a.) $\frac{d}{dx}\sin(x) =$ ▮

b.) $\frac{d}{dx}\cos(x) =$ ▮

c.) $\frac{d}{dx}\left(a^x\right) =$ ▮ for any number a>0

d.) $\frac{d}{dx}\left(e^x\right) =$ ▮

e.) $\frac{d}{dx}\left(3^x\right) =$ ▮

f.) $\frac{d}{dx}(\ln x) =$ ▮

g.) $\frac{d}{dx}\ln(10+2) =$ ▮

6. Differentiate

a.) $y = \sqrt{x}$

b.) $y = 4 \cdot \sqrt[3]{x^5}$

c.) Find the derivative of (Hint: Use the Chain Rule):

$$y = \sqrt{5x^2 + 3x - 1}$$

7. Find the derivatives of

a.) $\frac{d}{dx}(f(x) + g(x)) =$ ▮

b.) $\frac{d}{dx}(f(x) \cdot g(x)) =$ ▮

c.) $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) =$ ▮

8. a.) Find the sixth derivative of:

$$f(x) = 2x^5 - 4x^2 + 7x + 6$$

b.) Find the second derivative of (Hint: Use the Chain Rule):

$$y = \sin^3 x - 3\sin(x)$$

c.) Find the derivative of (Hint: Use the Chain Rule):

$$y = \sin^3\left(3x^2 - 1\right)$$