

**CALCULUS JOURNAL**  
**Derivatives**

1. In terms of a graph, a derivative represents \_\_\_\_\_  
\_\_\_\_\_.
2. Explain what each of the following parts of the first definition of the derivative means in terms of a graph.  

$$\frac{f(x) - f(a)}{x - a}$$

$$\lim_{x \rightarrow a}$$
\_\_\_\_\_
3. a) Give 3 examples of notation for the 1<sup>st</sup> derivative. \_\_\_\_\_  
 b) Give two examples of notation for the 2<sup>nd</sup> derivative. \_\_\_\_\_
4. Given any function, how do you find the equation of the tangent line at  $x = 4$ ?  
 1) \_\_\_\_\_  
 2) \_\_\_\_\_  
 3) \_\_\_\_\_
5. (a) What is the difference in how you find the derivative of  $f(x) = \sec^6(7x^4 - 5)$  and  $f(x) = \sec(7x^4 - 5)^6$ ? \_\_\_\_\_  
 \_\_\_\_\_  
 (b) What is the difference in how you find the derivative of  $f(x) = \tan(\sin^8 3x)$  and  $f(x) = \tan x \sin^8 3x$ ? \_\_\_\_\_  
 \_\_\_\_\_
6. a) The differential  $dx$  represents \_\_\_\_\_.  
 b) Differentials are most commonly used to calculate \_\_\_\_\_
7. a) The graph of a differentiable function does NOT have any \_\_\_\_\_  
 \_\_\_\_\_.
8. Create a function for each of the following situations that would require the indicated rules in order to find its derivative. You do not have to find the derivative.  
 a) Requires a product rule within a chain rule \_\_\_\_\_  
 b) Requires a chain rule within a quotient rule \_\_\_\_\_  
 c) Requires a quotient rule and a chain rule within a product rule \_\_\_\_\_  
 d) Requires a chain rule with 4 segments in the chain \_\_\_\_\_

9. Important Rules, Formulas, Etc.

a) Both definitions of the derivative

b) Power Rule

c) Product Rule (in symbols and in words)

d) Quotient Rule (in symbols and in words)

e) Chain Rule

f) Derivatives of the six trig functions

g) Four steps for determining whether a function is differentiable