§2.1A: Alternate Definition of a Derivative
"I WILL…
…use the alternate definition of a derivative"

I. Definitions

A. Alternative Form Equation: _____

B. Same as the difference quotient

C. When investigating the relationship between differentiability and continuity

D. The existence of this limit requires that the one-sided limits exist & equal: $\lim_{x\to c^-}$_____ $= \lim_{x\to c^+}$_____

Review: Find the slope of the tangent line to the graph of the function $f(x) = 5 - x^2$, at the given point $(2,\ 1)$	Ex 1: Use the alternative form to find slope of the tangent line to the graph of the function $f(x) = 5 - x^2$, at the given point $(2,\ 1)$
Ex 2: Use the alternative form to find the derivative of $f(x) = \frac{1}{x}$ when $c = 4$	Ex 3: Use the alternative form to find the derivative of $f(x) = x^3 + 2x$ when $c = 0$
Your Turn: Use the alternative form to find the derivative of $f(x) = x^2 + 3$, when $c = -2$	

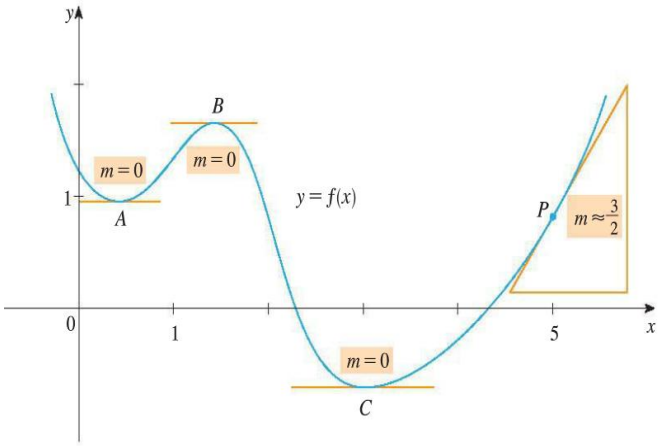
II. Graphing a Derivative's Graph

A. When looking at a graph, identify what type of slope that each point has
   1. If f has a positive slope, f' is _____
   2. If f has a negative slope, f' is _____

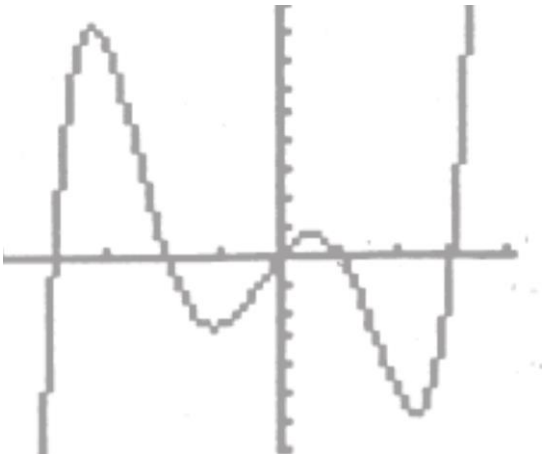
B. After establishing all the slopes, determine the derivative graph by its slope.

C. In other words, plot points of the derivative onto the graph

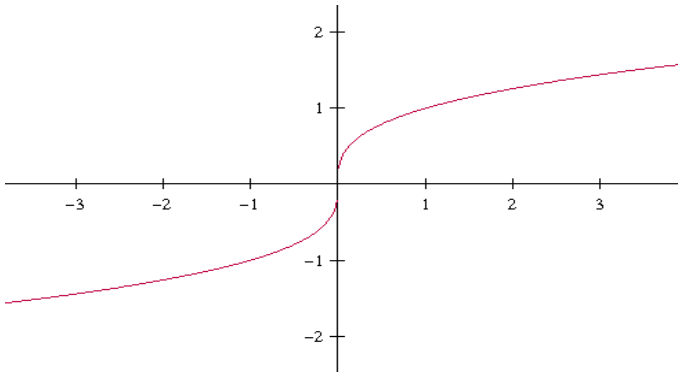
Ex 4: Sketch the derivative of the function given.



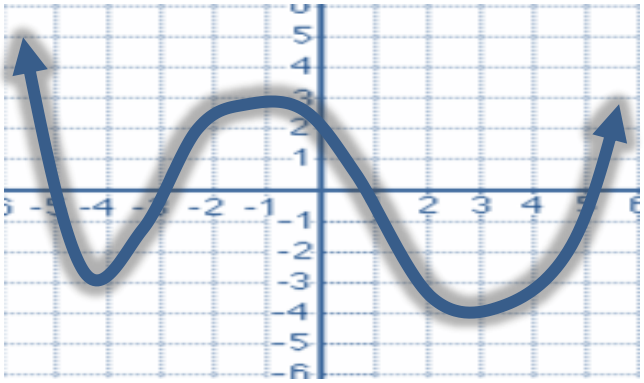
Ex 5: Sketch the derivative of the function given.



Ex 6: Sketch the derivative of the function given.



Your Turn: Sketch the derivative of the function given.



III. Direction of a Derivative

A. A graph which is differentiable is continuous

B. A graph which is continuous, is not always differentiable

C. A graph is neither continuous or differentiable is discontinuous

1. _____
2. _____
3. _____
4. _____

IV. Special Cases

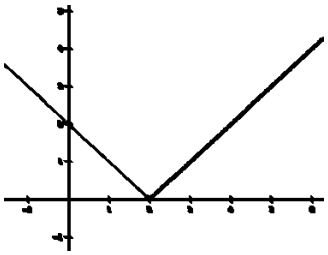
A. Differentiable functions are _____ but continuous functions are not always _____

B. Functions cannot be differentiable when:

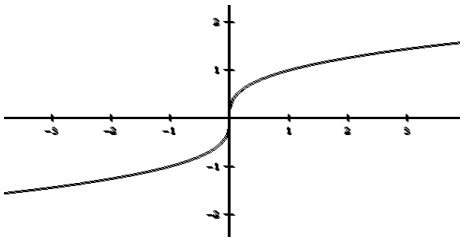
1. _____
2. _____
3. _____

C. A function f is said to be _____ at $x = c$ if the derivative of f exists at $x = c$. For the derivative to exist at $x = c$, the graph of f must have local linearity.

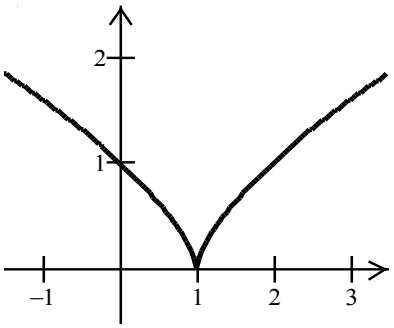
Ex 7: Use the graph to determine the derivative of $f(x) = |x - 2|$. If it does not exist, explain why.



Ex 8: Use the graph to determine the derivative of $f(x) = x^{1/3}$ at $x = 0$. If it does not exist, explain why.



Ex 9: Use the graph to determine the derivative of $f(x) = (x-1)^{2/3}$. If it does not exist, explain why.



AP 1) Let f be a function such that $\lim_{h\to 0} \frac{f(2+h)-f(2)}{h} = 5$. Which of the following must be true?

I. f is continuous at $x = 2$

II. f is differentiable at $x = 2$

III. The derivative of f is continuous at $x = 2$.

(A) I only (B) II only (C) I and II only (D) II and III only

Vocabulary	Connections and Process	Answer and Justifications

Assignment: Worksheet