Rate of Change Graphs

We will use the following terminology interchangeably:

- _____
- _____
- _____

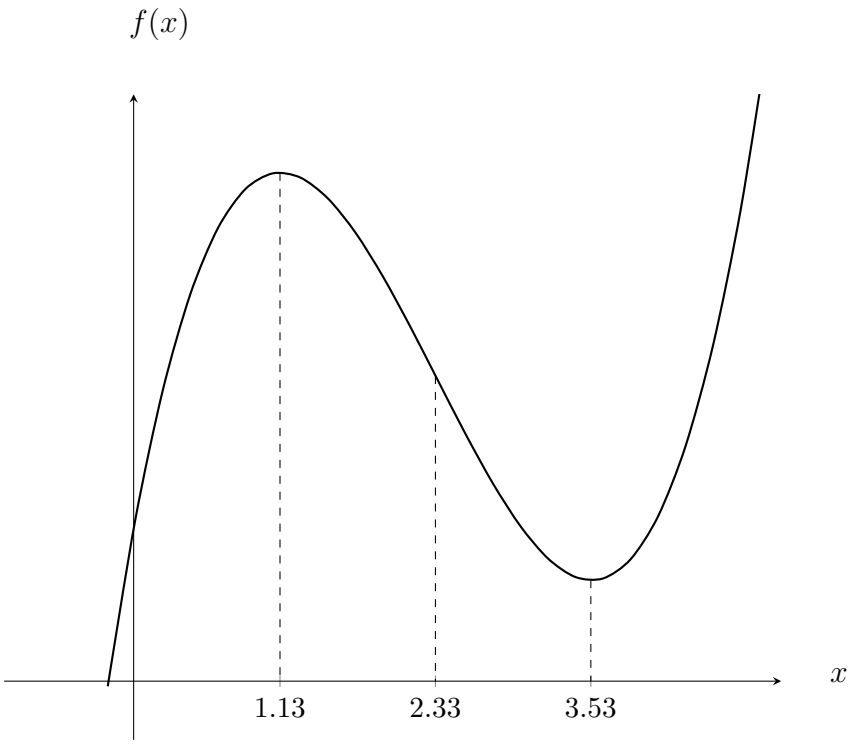
The following information will be useful when constructing slope graphs:

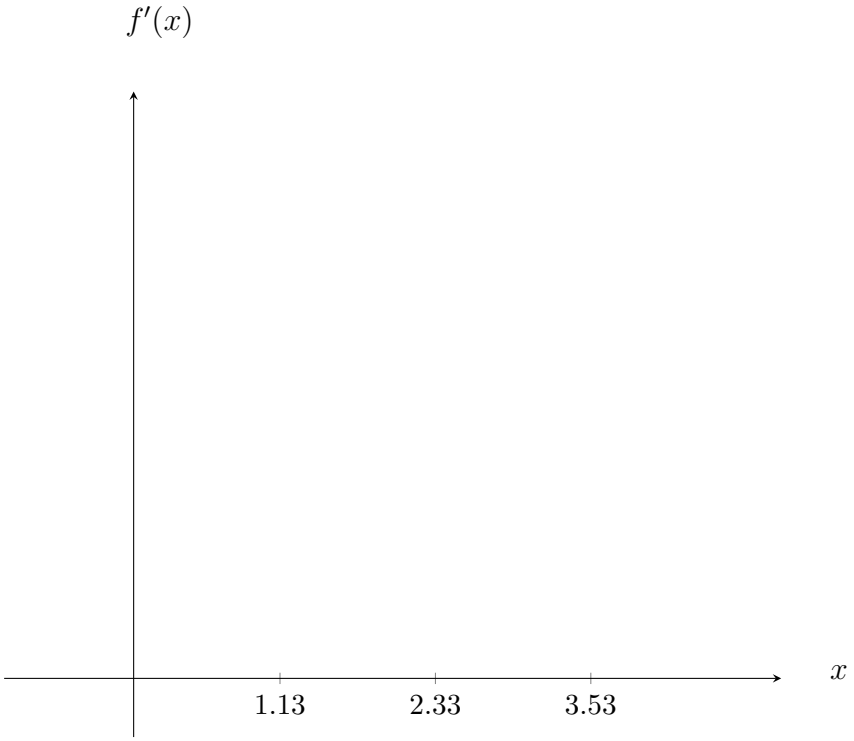
Derivative is:	**Function graph is**:	**Slope graph is**:
Positive		
Zero		
Negative		

Things to keep in mind when plotting the slope graph:

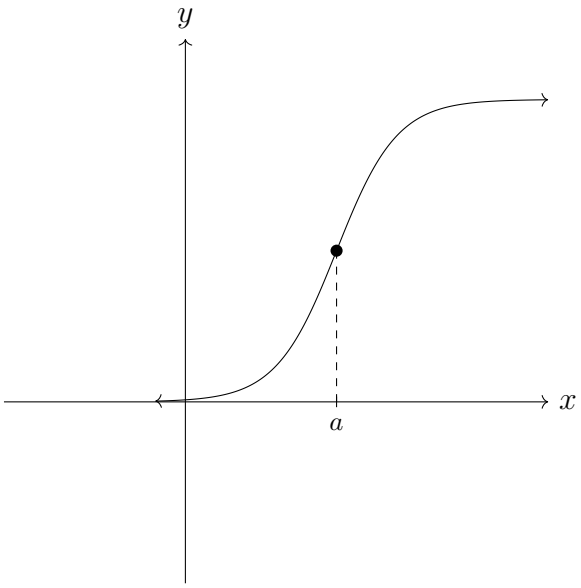
- _____ result in a max or min *on the derivative graph.*
- Derivatives may fail to exist at some points; there may be a _____ _____.
- The slope graph reports _____ of the original graph; a negative slope results in a _____, and a positive slope results in a _____.

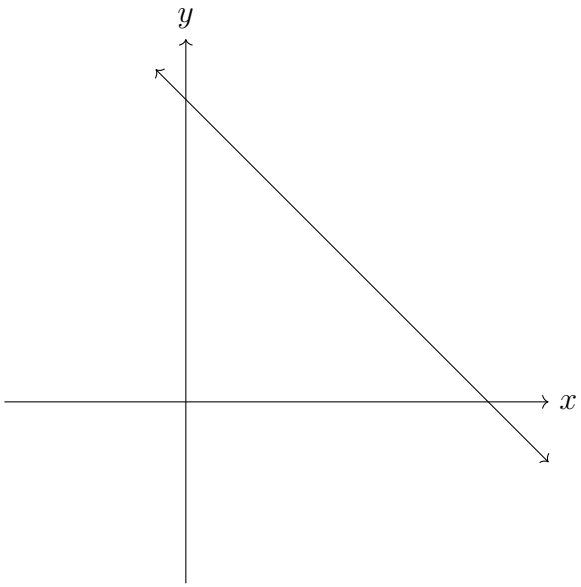
Example 2.6.1. Sketch the rate of change graph for the function



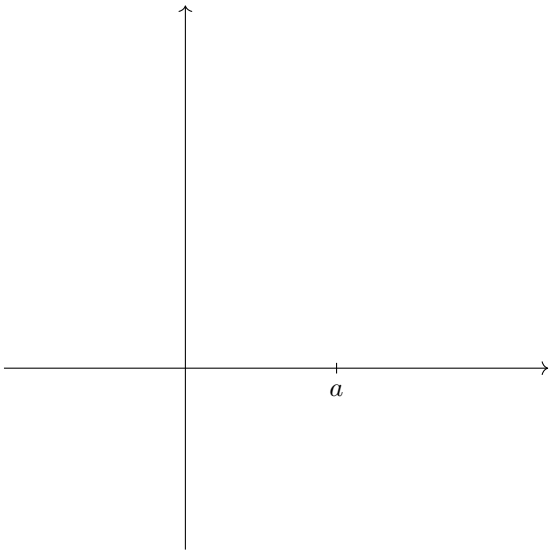


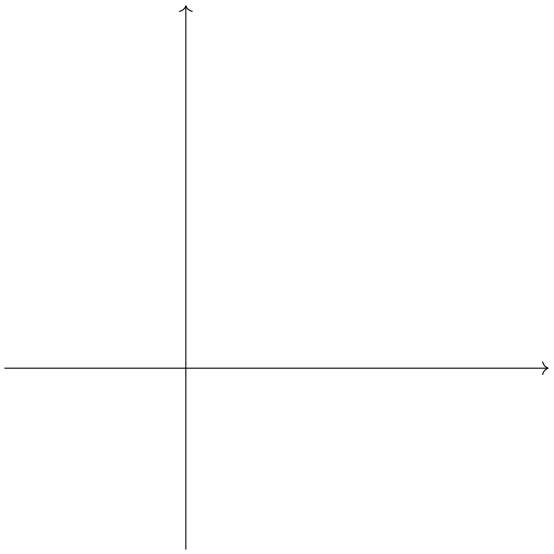
Example 2.6.2. Sketch (and label) the slope graphs of the following functions:

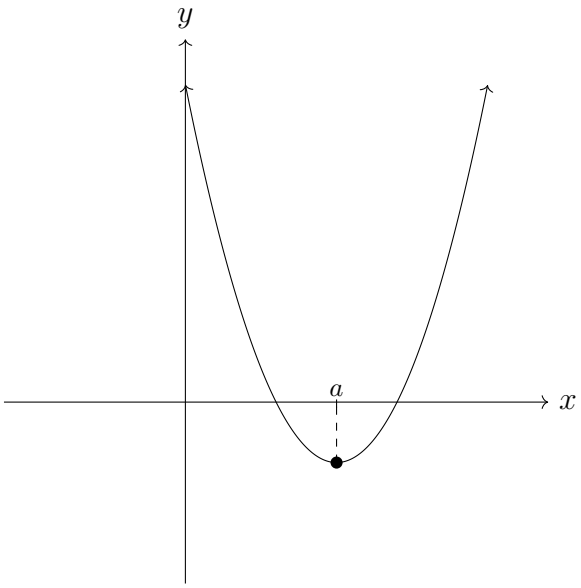


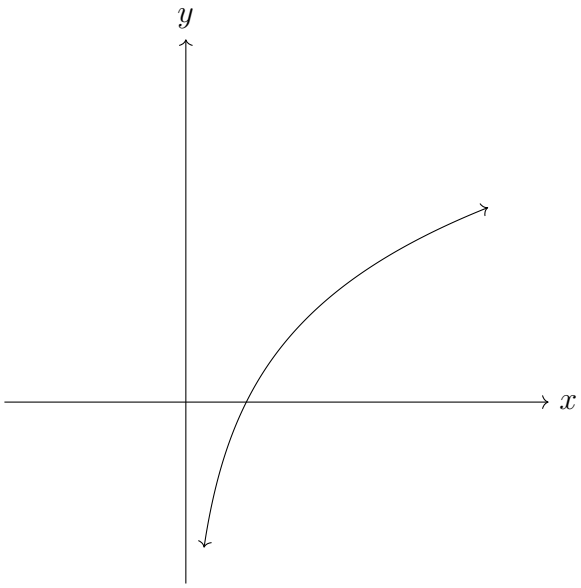


(a)

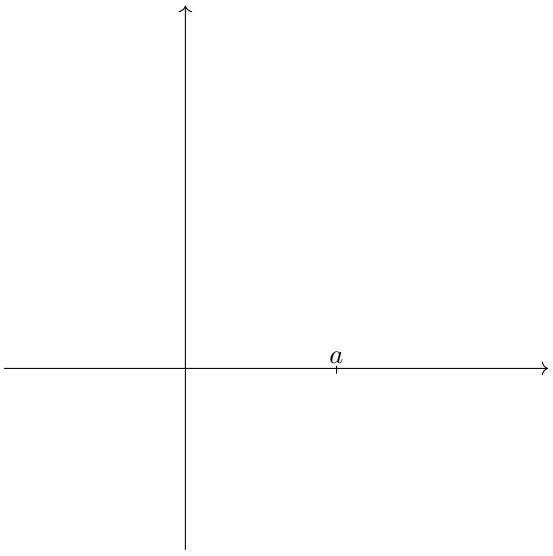


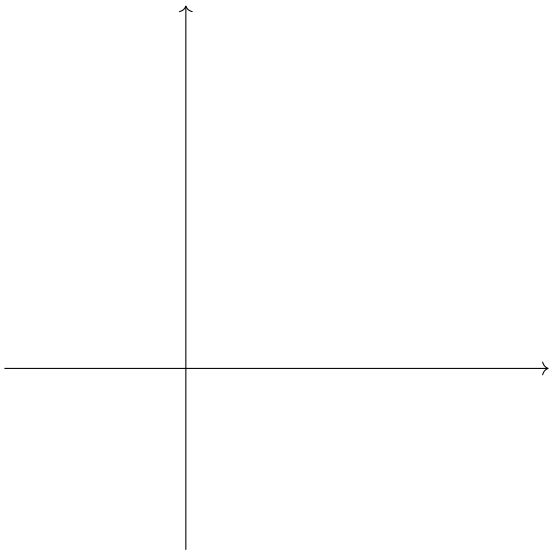


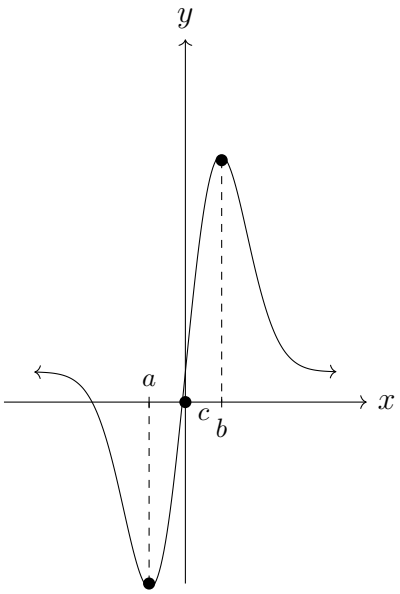


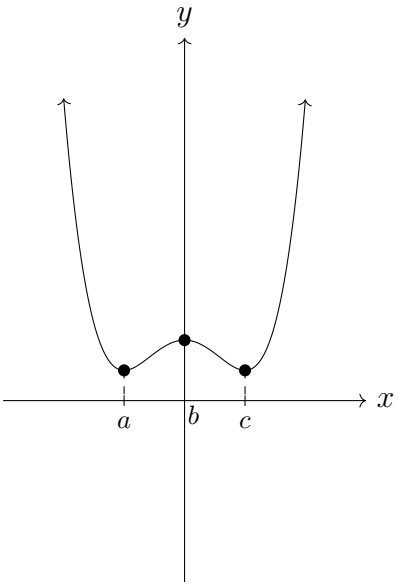


(b)

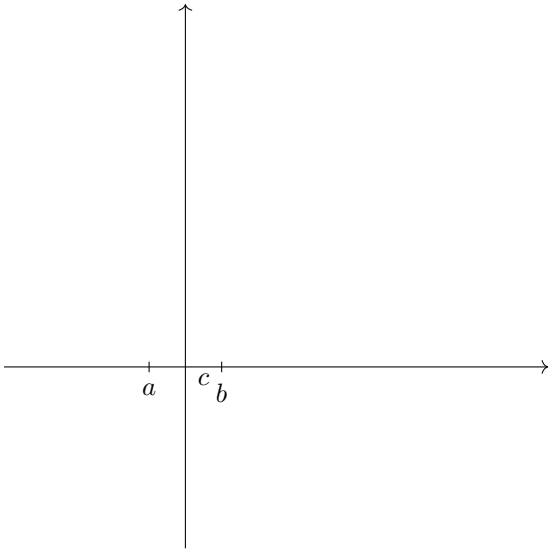


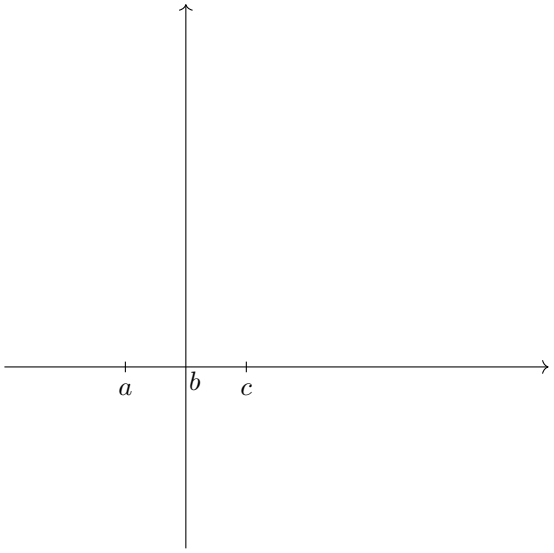




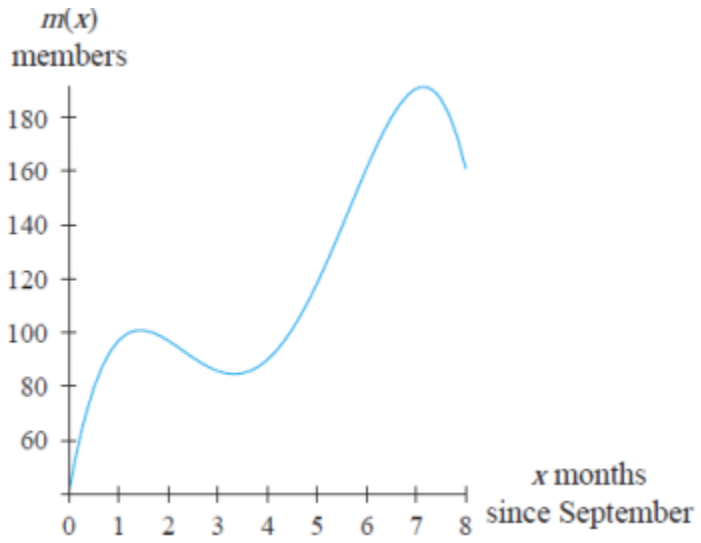


(c)





Example 2.6.3. The figure below shows the membership in a campus organization during its first year. Round all answers to the nearest member.

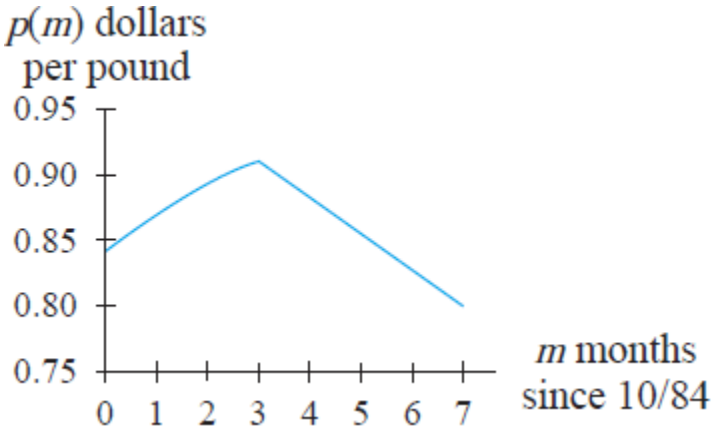


(a) Estimate the average rate of change of membership from September through May.

(b) Estimate the instantaneous rate of change in October, December, and April.

(c) Sketch a rate-of-change graph for membership. Label both axes.

Example 2.6.4. The figure below shows cattle prices (for choice of 450-pound steer calves) from October 1994 through May 1995.



(a) For which input value does the derivative fail to exist? Give a clear, mathematical reason why.

(b) Sketch a slope graph of p. Label both axes.

Example 2.6.5. Sketch the slope graph of a function f with input t that meets the following criteria:

- $f(-2) = 5$
- the slope is positive for $t < 2$
- the slope is negative for $t > 2$
- $f'(2)$ does not exist

Example 2.6.6. Sketch the slope graph of a function g with input x that meets these criteria:

- $g(3)$ does not exist
- $g'(0) = -4$
- $g'(x) < 0$ for $x < 3$
- g is concave down for $x < 3$
- $g'(x) > 0$ for $x > 3$
- g is concave up for $x > 3$
- $\lim_{x \to 3^+} g(x) \to \infty$
- $\lim_{x \to 3^-} g(x) \to -\infty$