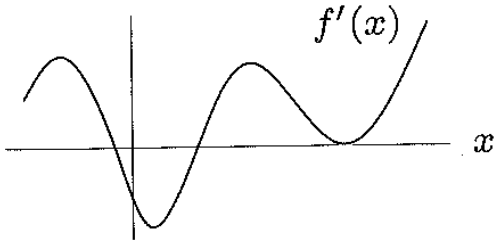
WEEKLY 7
APPLIED CALCULUS
DUE 10-10

Show your work! There are 5 total questions; be sure to check p. 2!

(1) Suppose that S measures the weekly sales of a certain product. What do the following sentences tell you about the signs of S' and S''?
   (a) Sales are decreasing more slowly.
   (b) Sales are increasing at a constant rate.
   (c) Sales are steady.
   (d) Sales have hit bottom, and are about to start increasing.

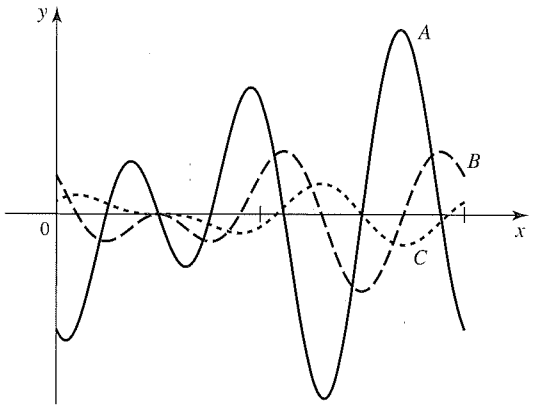
(2) Consider functions of the form $y = xe^{-bx}$, where b is a constant.
   (a) In terms of b, what is the inflection point of y?
   (b) If y has an inflection point at $x = 4$, where is its critical point? Is that critical point a local maximum, local minimum, or neither?

(3) Consider the function $f(x)$ whose *derivative* is graphed below.



This is **not** the graph of $y = f(x)$.
   (a) Where is $f(x)$ increasing? Where is it decreasing? (HINT: You already answered this on Weekly #6.4(b).)
   (b) Where is $f(x)$ concave up? Where is it concave down? **Justify your answer.**
   (c) Use the information in (a) and (b) to sketch a possible graph of $f(x)$.

(4) The figure below



shows the graphs of a function $f(x)$, its derivative $f'(x)$, and its second derivative $f''(x)$ on the same set of axes. Which graph is which? **Justify your answer.**

- **One** book problem: #12.2.61. Use the quadratic formula!