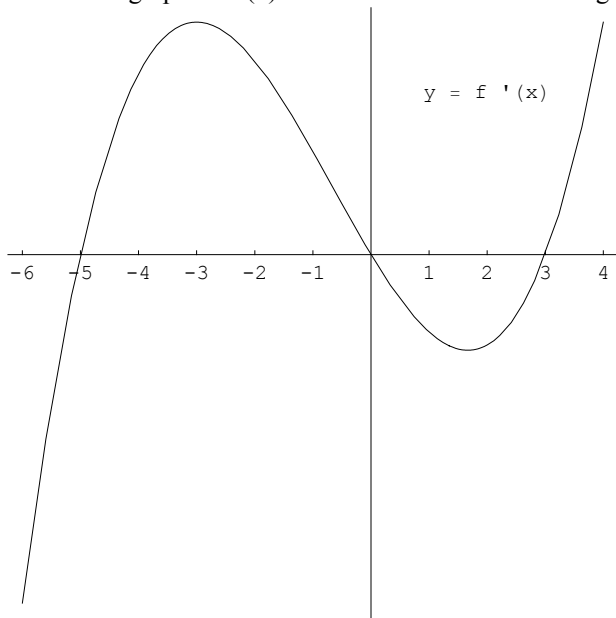


AP Calculus Test
Chapter 2

1. Given $f(x) = x \sin x$, $-10 \leq x \leq 10$, answer each of the following questions.

- How many zeros does $f(x)$ have on this interval?
- Is f increasing or decreasing at $x = 1$? At $x = 4$?
- On which interval is the average rate of change greater: $0 \leq x \leq 2$ or $6 \leq x \leq 8$?
- Is the instantaneous rate of change greater at $x = -9$ or $x = 1$?

2. Use the graph of $f'(x)$ below to answer the following questions about $f(x)$. The domain of f is $(-6, 4)$.



- On what intervals is $f(x)$ increasing? Decreasing?
- For what values of x does $f(x)$ have horizontal tangent lines? (Approximate these values)
- On what intervals is the graph of f concave upward?

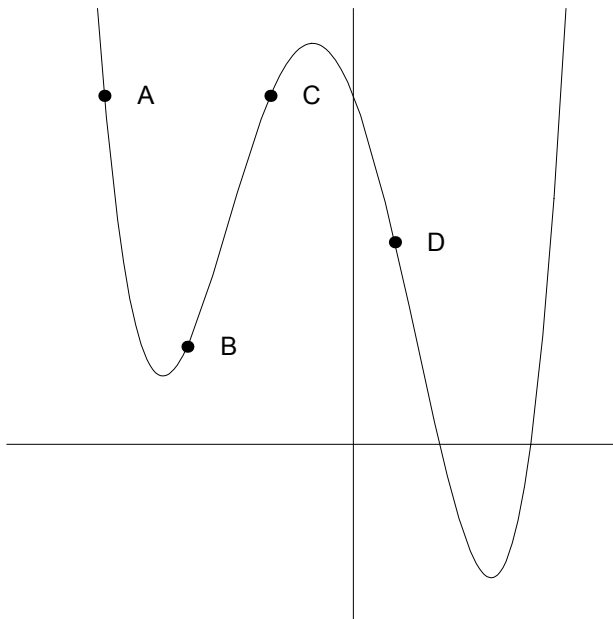
3. Which of the points labeled by letters in the graph below have:

a) $f' < 0$ and $f'' < 0$?

b) $f' < 0$ and $f'' > 0$?

c) $f' > 0$ and $f'' < 0$?

d) $f' > 0$ and $f'' > 0$?



4. Fill in the blank with the appropriate word or phrase.

a) If $f'(x)$ is positive on an interval then $f(x)$ is _____ on that interval.

b) If $f'(x)$ is negative on an interval then $f(x)$ is _____ on that interval.

c) If $f''(x)$ is positive on an interval then $f(x)$ is _____ on that interval.

d) If $f''(x)$ is negative on an interval then $f(x)$ is _____ on that interval.

e) If $f''(x)$ is positive on an interval then $f'(x)$ is _____ on that interval.

f) If $f''(x)$ is negative on an interval then $f'(x)$ is _____ on that interval.

5. The **derivative of f at a**, written $f'(a)$, is defined as

$$\begin{array}{l} \text{Rate of change} \\ \text{of } f \text{ at } a \end{array} = f'(a) =$$

6. For any function f , we define the **derivative function**, f' , by

$$f'(x) = \text{Rate of change of } f \text{ at } x =$$

7. If $f(x) = k$ where k is a constant, then $f'(x) =$

8. If $f(x) = mx + b$, then $f'(x) =$

9. If $f(x) = x^n$, then $f'(x) =$

10. The temperature, T , in degree Fahrenheit, of a cold yam placed in a hot oven is given by $T = f(t)$, where t is the time in minutes since the yam was put in the oven.

a) What is the sign of $f'(t)$? Why?

b) What are the units of $f'(20)$? What is the practical meaning of the statement $f'(20) = 2$?

11. Given $f(x) = 5x^2 + 3x - 1$, find the average rate of change of f from $x = 1$ to $x = 3$. What is the graphical interpretation of your answer?