1. Use the given graph to find the indicated quantities:

(a) \( \lim_{x \to -1^-} f(x) = \)

(b) \( \lim_{x \to -1^+} f(x) = \)

(c) \( \lim_{x \to -1} f(x) = \)

(d) \( \lim_{x \to 1^-} f(x) = \)

(e) \( \lim_{x \to 1^+} f(x) = \)

(f) \( \lim_{x \to 1} f(x) = \)

(g) \( \lim_{x \to 2^-} f(x) = \)

(h) \( \lim_{x \to 2^+} f(x) = \)

(i) \( \lim_{x \to 2} f(x) = \)

(j) \( f(-1) = \)

(k) \( f(1) = \)

(l) \( f(2) = \)

2. Where does the function in problem 1 fail to be continuous? Why?

3. Given the graph of \( y = f(x) \), select a graph that best represents the graph of \( y = f'(x) \):
4. Evaluate the following limits:

(a) \( \lim_{x \to 1} 7 - x + 3 \)

(b) \( \lim_{x \to 1} \frac{x - 1}{\sqrt{x^2 - 1}} \)

(c) \( \lim_{x \to 0} \frac{x^2 + x - 6}{x^2 - 5x + 6} \)

5. Differentiate the following functions using the definition of the derivative. Show whatever work you do to calculate them.

a) \( x^2 + 2x + 1 \)

b) \( \frac{1}{x} \)

c) \( \sqrt{1 - x} \)

6. At what value of \( x \) does the following function have a removable discontinuity? What value of \( f \) at the discontinuity will remove it? At what point does it have an infinite discontinuity?

\[ f(x) = \frac{x - 2}{x^2 - x - 2} \]

7. A particle moves along a straight line with an equation of motion \( s = t^2 - 3t + 2 \). What are the velocity and acceleration of the particle? Find the value of \( t \) at which the particle reverses its direction.

8. Evaluate

\[ \lim_{x \to 0} \frac{\sin 3x}{\tan 3x} \]

*Hint: Simplify it as much as possible before you take the limit.*

9. Use the Intermediate Value Thm to show there is a root of \( x^4 - x^3 + x - 1 \) on the interval \((0,1)\). Draw a picture to illustrate the idea.

10. **Extra Credit** A cellular phone company has a roaming charge of 32 cents for every minute or fraction of a minute when you are out of your zone. Sketch a graph of the “out-of-your-zone” costs of cellular phone usage as a function of the length of the call. Discuss the discontinuities of this function and their significance to the cell phone user.