Math 151
Quiz 2
Fall 2008

Justify all answers with neat and organized work. Clearly indicate your answers. 20 points possible.

1. (5 pts.) The graph of $y = f(x)$ is given on the supplemental page.

(a) Find

$$\lim_{x \to 4} [x^2 f(x)].$$

(b) At what numbers is f discontinuous?

(c) For each number found in part (b), is f continuous from the right at that number?

2. (5 pts.) Suppose that a function f is continuous on $[1, 3]$ except at 2 and that $f(1) = 4$ and $f(3) = 7$. Let $N = 5$.

(a) Sketch a possible graph of f, showing that f might not satisfy the conclusion of the Intermediate Value Theorem.

(b) Sketch a possible graph of f, showing that f might still satisfy the conclusion of the Intermediate Value Theorem (even though it doesn't satisfy the hypothesis).

3. (5 pts.) An astronaut stands near the edge of a platform on another planet, reaches out over the edge, and throws a rock upward. The rock first rises and then falls down to the planet's surface. Its height (in meters) above the planet's surface after t seconds is given by $H = -x^2 + 8x + 18$.

(a) Find the average velocity of the rock over the time interval $[3, 3.5]$.

(b) Find the instantaneous velocity of the rock when $t = 3$.

(c) When will the rock hit the surface?

(d) With what velocity will the rock hit the surface?

4. (5 pts.) Find the following limit. Your work must completely justify your answer algebraically.

$$\lim_{x \to 2} \frac{\sqrt{5x - 1} - 3}{x - 2}$$