HW 2 Due on Thursday 01/26/06

0. Memorize all definitions and go over examples given in class.
1. Do Question 2, Question 3 on p.13 and Exercises #1-#5 on p.20 after reading p.11-p.21 of Sawyer’s book carefully.
2. Suppose an object moves following the rule \( s(t) = -t^2 + 2t + 1 \) which is the position of the object at the time \( t \) seconds.
   (1) Find the average rate of change (average velocity) between \( t = 1 \) and \( t = 2 \), between \( t = 2 \) and \( t = 3 \).
   (2) Describe the motion of objects between \( t = 1 \) and \( t = 3 \) by using the information given in (1). Does it travel backwards or forwards or rapidly or slowly etc...?
3. Which of the following functions are continuous at every real number \( x \)? Justify your answer by verifying all conditions of the definition of continuity.
   (1) \( f(x) = \begin{cases} \frac{x^2 - 2x + 1}{x - 1} & \text{if } x \neq 1 \\ 0 & \text{if } x = 1 \end{cases} \)
   (2) \( f(x) = \begin{cases} \frac{x}{|x|} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases} \)
   (3) \( f(x) = \begin{cases} \frac{x^2 - 3x}{x} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases} \)
4. Find \( f'(t), f'(1) \) and \( f'(0) \) of the following functions by using the original limit definition of the derivative. (Don’t use the derivative formula directly.)
   (1) \( f(t) = 3t + 1 \)
   (2) \( f(t) = 4 \)
   (3) \( f(t) = 2t^2 - 1 \)
   (4) \( f(t) = -t^3 + 2t - 1 \)
   (5) \( f(t) = \frac{1}{t} \)

Date: January 18, 2006.