University of Michigan
Student Name:

Math 115 Quiz 2

Section 9 - Winter 2011
Instructor: Jose Gonzalez
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(1) Estimate $\lim_{x\to 0} \frac{\ln(x+1)}{2x}$ numerically to within 0.01 (two decimal point accuracy). If the limit does not exist, explain how you know.

Solution

We estimate the limit by plugging in successively smaller values of x. With $x = 0.01$, we have $\frac{\ln(1.01)}{0.02} \approx 0.4975$, or, to 0.01, 0.50. With $x = 0.001$, we have $\frac{\ln(1.001)}{0.002} \approx 0.5000$. These agree to 0.01, so we are happy to assert that $\lim_{x\to 0} \frac{\ln(x+1)}{2x} = 0.50$ (to within 0.01).

(2) Sketch a possible graph of your position, $s(t)$ (relative to Mr. Greeks restaurant as indicated below), as a function of time, t, if your position is described by the following scenario: "After finishing breakfast at Mr. Greeks, you proceed at a brisk but steady pace in a straight line to your favorite class, Math 115. Halfway there, you realize that you might be late and Jose might get mad. At this point, you pick up your pace so that by the time you get to class you are sprinting along at a great velocity." Mark on your graph points or sections of the graph which illustrate the different parts of the scenario indicated.

Solution

At time $t = t_1$ you proceed to class at a constant velocity. At time $t = t_2$, when you are half way to the classroom, you start speading up since you might be late. At time $t = t_3$ you arrive to the classroom and at this point you are sprinting (Note that: t_2 is closer to t_3 than to t_1, the graph is a straight line in the interval $[t_1, t_2]$ and it is concave up in the interval $[t_2, t_3]$).