Heidi Ho Project 2001 - 2002
Calculus Laboratory 3: Maxima and Minima

1. Find all maxima, minima, and inflection points for your speed function s(t) from laboratory 2 by graphing s(t), s'(t), and s''(t) on the same axes. Find where s'(t) and s''(t) equal zero by seeing where they cross the x-axis. Use four-decimal-place accuracy.

2. Prove, with calculus, your answers to question 1 by calculating s'(t) at the maxima and minima and s''(t) at the inflection points. Show your calculus.

3. Find s''(t) at the maxima and minima of s(t). Is this the result you expected? Why or why not? Be clear and concise about your answer.

4. On a graph, show where s(t) is increasing and decreasing. On another graph show where s(t) is concave up and concave down. Explain the connection between these graphs to each other. Explain what these graphs (shapes) mean in terms of Heidi's trip from Bloomington to Columbus.

5. What is the largest speed obtained on the trip and when did it occur? Use calculus to determine this. Make sure your calculations and explanations are clear and make sense.

6. When Heidi had reached the midpoint (time) of her trip, it was dark and she was approaching a 25 foot streetlight. Based on the height of her car, the speed she was traveling at that instant and the length of the shadow cast by the streetlight find out how fast the tip of the shadows of her car was moving. Use the exact vehicle you chose from project #2.

7. What was Heidi's average velocity for the final fourth (time) of her trip. Make sure your calculations and explanations are clear. Find where s(t) actually takes on that value. Compare this to Heidi's average rate of change from project #2.

8a. Use an Outside source from the internet that has something to do with the calculus that you understand up to this point; consult with other teams in the class and do not use the same site.

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8b. You may chose to create a web page devoted to Heidi. In this event you will consult with other teams and link your sites.

9. In class presentation will focus on your strategy, experience, and findings on the Internet or a demonstration of your web site.

Project is due…before the end of the third quarter.