

Heidi Ho Project 2001 - 2002

Calculus Laboratory 2: Acceleration

The following should already be completed: derivative of original $s(t)$, expanded $s(t)$, derivative of expanded $s(t)$, derivative of original $s(t)$ using logarithmic differentiation, confirmation of each by graphing. Include the graphs with your project with clear labels. NOTE: You should be using the expanded version (revised) of your speed function $[s(t)]$ and clear any constant that may still linger. This should result in a true zero and make the rest of the project(s) go smoother.

The derivative (instantaneous rate of change) of the velocity with respect to time is called the acceleration. For the revised equation you used in Project 1, find the acceleration at the beginning and the end of Heidi Ho's trip in the following way: On the graph of the function itself, show the sequence of three approximations (secant lines) that you used to find the tangent lines. You may have to magnify the graph. Show your x -values; evaluate to find y -values. Speed and velocity are identical for this problem, since the velocity is always positive. [You are illustrating the definition of the derivative for this problem.]

Find all places where the acceleration is zero. Your answers should be accurate to 5 decimal places. Magnify the graph to show these zeros. Explain how you reached your conclusions.

Show the graph of Heidi's acceleration with her velocity function. Describe increasing/decreasing, maximum/minimum of $s(t)$ and how $a(t)$ behaves accordingly. Make sure your answers for acceleration and time make sense according to your scale used in the last project.

Find the average rate of change in velocity over the last quarter of Heidi's trip. Is there any place in the interval where the instantaneous rate of change is equal to the average rate of change? If so, where?

Prepare an oral presentation of approximately 3 minutes to be given on the final exam day. Your presentation should focus on a discussion of your solution to the previous paragraph. You must use at least one outside source which does not include your textbook. Heidi's story needs to be extended including a determination of the exact type of vehicle she is driving.

Presentations and projects will be due on the scheduled final exam day.