MA 113 Calculus I, Fall 2017
Written Assignment #5
Due Friday, October 27, 2017, at beginning of lecture

Instructions: The purpose of this assignment is to develop your ability to formulate and communicate mathematical arguments. Your complete assignment should have your name and section number on each page, be stapled, and be neat and legible. *Unreadable work will receive no credit.*

You should provide well-written, complete answers to each of the questions. We will look for correct mathematical arguments, complete explanations, and correct use of English. Your solution should be formulated in complete sentences. As appropriate, you may want to include diagrams or equations written out on a separate line. You may read your textbook to find examples of how we communicate mathematics.

Students are encouraged to use word-processing software to produce high quality solutions. However, you may find that it is simpler to add graphs and equations using pen or pencil.

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1. (4 points) The position of an object moving in a straight line is given by a function $s(t)$ where t is the time in seconds and $s(t)$ is the number of meters of the object from its starting point. Let $v(t)$ denote the velocity of the object given in meters per second. Assume that $s(t)$ and $v(t)$ are both differentiable functions.

   Suppose that $s(5) = 8$, $s(7) = 18$, and $s(10) = 48$. Use the Intermediate Value Theorem and the Mean Value Theorem to carefully explain why the velocity of the object is exactly 7 meters per second at some moment between $t = 5$ and $t = 10$.

2. (3 points) At 2:00 pm a car's speedometer reads 30 miles per hour (mi/h). Ten minutes later, the speedometer reads 50 miles per hour. Assume that the velocity function of the car is given by a differentiable function. Carefully explain why there must be a time between 2:00 pm and 2:10 pm when the acceleration is exactly 120 miles per hour per hour (mi/h^2).