MA 113 Calculus I, Fall 2017
Written Assignment #2
Due Friday, September 8, 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) A soccer ball is thrown vertically up in the air starting at ground level. The height of the ball in meters after t seconds is given by the equation

$$h(t) = 21.8t - 4.9t^2.$$

   (a) Find the average velocity of the soccer ball over the time interval $[1, 3]$.

   (b) Compute the average velocity of the soccer ball over the time interval $[1, t]$ (Hint: Compute $h(t) - h(1)$ and show that you can factor out $(t - 1)$).

   (c) Use the equation for the average velocity over $[1, t]$ to find the average velocity over several intervals $[1, t]$ with t close to 1. Then estimate the instantaneous velocity of the soccer ball at time $t = 1$.

   (d) Sketch a graph of $h(t)$. Explain using the graph when the instantaneous velocity of the soccer ball is positive, negative, and when it is equal to 0.

2. (3 points) Let $f(x) = \dfrac{x+1}{2x+1}$.

   (a) Find the inverse function f^{-1} of the function $f(x)$.

   (b) Find the domain of f and find the domain of the inverse function f^{-1}.

   (c) Find the range of f and find the range of the inverse function f^{-1}.