Homework 5

Math 147 (section 501–502–503), Spring 2015

This homework is due on Wednesday, February 18.

0. Read Sections 3.5 and 4.1. After reading these sections, you should be able to answer the following questions (which are *not* to be turned in).

   - The Intermediate-Value Theorem guarantees (under certain hypotheses) the existence of a number c with $a < c < b$ such that $f(c) = L$. Does it tell you where in the interval (a, b) the number c is, or how many such c exist?
   - What is a secant line? What is a tangent line?
   - What is the derivative of a constant function? The derivative of a linear function?
   - What is the difference between velocity and speed?
   - Are functions with "corners" differentiable?
   - Is a function with a vertical tangent line at $x = 12$ differentiable at $x = 12$?
   - What is the *instantaneous per capita growth rate*?

1. Let r be a positive integer, and let c be a positive real number. Consider the polynomial $f(x) = cx^r - 6x^{r-1} - 6x^{r-2} - \cdots - 6x - 6$.

   (a) Evaluate $\lim_{x\to\infty} f(x)$.

   (b) Use the Intermediate-Value Theorem to explain why $f(x)$ has a positive root.

2. Section 3.5 # 5, 8

3. Section 4.1 # 10, 20, 26, 29, 38, 40, 44

4. (These problems are *not* to be turned in!)

   (a) Section 3.5 # 1, 4, 7

   (b) Section 4.1 # 13, 17, 21, 23, 27, 30, 37, 41, 45, 49, 51, 53, 55

Reminder: The first exam is on Thursday, February 19, from 7:30pm to 9:30pm, in HELD 113. Please bring pencils and a 15-question scantron form. The topics for the exam are from Sections 1.1–1.3, 3.1–3.5, 4.1.