Homework 5

Math 147 (section 510–511-512), Fall 2014

This homework is due on Thursday, October 2.

-1. 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*?

0. Re-read Examples 9 and 10 from Section 1.2 (pages 25–27). After reading these sections, you should be able to answer the following questions (*not* to be turned in).

- In exponential growth functions $N(t) = N_0 \cdot b^t$, what is the interpretation of N_0 and b?
- In radioactive decay (exponential decay) modeled by $W(t) = W_0 \cdot e^{-\lambda t}$, what is the interpretation of W_0 and λ? What is a formula for the half-life?

1. Let r be a positive integer, and let $c_0, c_1, \ldots, c_r$ be positive real numbers. Consider the polynomial $f(x) = c_r x^r + c_{r-1} x^{r-1} + \cdots + c_1 x - c_0$.

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

   (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, October 2, from 7:30pm to 9:30pm, in RICH 106. 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.