Homework 11

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

This homework is due on Wednesday, April 8.

0. Read Sections 5.4 and 5.5. After reading these sections, you should be able to answer the following questions (which are *not* to be turned in).
   - Why is it important to find the domain of the function you want to optimize?
   - How do you evaluate a limit with indeterminate form $\infty - \infty$?
     (Read Examples 9 and 10 on page 250.)
1. Section 5.4 # 6, 10, 12, 14, 18
2. Section 5.5 # 8, 16, 26, 40, 50
3. Compute the following limit:
$$\lim_{x\to\infty} \left(\frac{3x-1}{2-x}\right) + \left(1+\frac{5}{x}\right)^x .$$
4. For each of the following functions, find *all* local extrema (max or min) and *all* global extrema. (*Hint*: ideas from the next problem might be useful. Also, you can always check your answer using a graphing calculator.)
   (a) $2x^3 - 3x^2$
   (b) $\frac{1}{3}x^3 + 4x$
   (c) $e^x + \sin x$.
   (d) $e^x + x^x$ with domain $(1, \infty)$
5. These problems, which are are *not* to be turned in, pertain to the *discriminant* introduced in class. You can review this topic on page 13 in your textbook.
   (a) Does $x^2 - 5x + 2 = 0$ have a real solution? Explain.
   (b) Does $x^2 - 2x + 5 = 0$ have a real solution? Explain.
   (c) Does $x^2 + 4 = 0$ have a real solution? Explain.
   (d) Is $f(x) = x^2 - 6x + 1$ always positive? Explain.
   (e) Is $f(x) = -x^2 + x + 6$ always negative? Explain.
6. (These problems are *not* to be turned in!)
   (a) Section 5.4 # 3, 5, 7, 13, 21, 23, 27
   (b) Section 5.5 # 5, 7, 11, 17, 25, 29, 31, 33, 35, 37, 39, 45, 55, 61, 65