Homework 11

Math 147, Fall 2017

This homework is due on Thursday, Nov. 9.

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 #7 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) $e^x + \sin x$ with domain $[0, \infty)$
   (d) $e^x + x^x$ with domain $(1, \infty)$

5. (Extra credit: 1 pt.) For each problem that you missed on the exam, re-do the problem (and turn in your answers with your homework). For multiple-choice problems, you must show your work. (If you got a 100 on the exam, simply state this.)

6. (Extra credit: 1 pt.) Write one paragraph reflecting on the exam. *How did you prepare for the exam? Which topics were you most/least confident about? Which problems did you feel good about? What surprised you about the exam? How do you feel about your performance? Which types of errors (if any) did you make? How will you prepare for the next exam?*

7. 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.

8. (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