Homework 6

Math 147, Fall 2017

This homework is due on Thursday, October 5.

0. Read Sections 4.2 and 4.3.

1. Consider the following function:

$$f(x) = \begin{cases} \sin x & \text{if } x < \frac{\pi}{2} \\ mx + b & \text{if } x \geq \frac{\pi}{2} \end{cases}$$

   (a) Which ordered pairs (m, b) of real numbers make $f(x)$ continuous? (Describe the set of those pairs.)

   (b) Which pairs (m, b) make $f(x)$ differentiable?

2. Consider the following function:

$$f(x) = \begin{cases} x + 1 & \text{if } x \leq 0 \\ 1 & \text{if } 0 < x < 1 \\ (x-1)^2 + 1 & \text{if } 1 \leq x \end{cases}$$

   (a) Graph $f(x)$.

   (b) Where is $f(x)$ discontinuous? Where is $f(x)$ NOT differentiable?

   (c) Graph $f'(x)$.

   (d) Where is $f'(x)$ discontinuous? Where is $f'(x)$ NOT differentiable?

   (e) Graph $f''(x)$ (the derivative of $f'(x)$).

3. Section 4.2 #12, 26, 44, 58, 70

4. Section 4.3 #16, 20, 28, 36, 70

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

   (a) Section 4.2 #5, 11, 17, 25, 31, 43, 49, 69, 71

   (b) Section 4.3 #3, 9, 17, 25, 31, 35, 37, 43, 51, 71, 83, 89