Math 53
Homework 2

For next week, select a problem other than Exercise 1 to present in class. Turn in Problem 1 and solutions to 4 of the other problems below.

1. The following are a set of exercises to practice big-Oh and little-oh notation.

   a) Show that $\displaystyle\sum_{n \leq x} 3 = O(x)$.

   b) Show that $\displaystyle\sum_{n \leq x} n = O(x^2)$.

   c) Show that $\displaystyle\sum_{n \leq x} \log n = O(x \log x)$.

   d) Show that $\displaystyle\int_1^x \frac{t - \lfloor t \rfloor}{t} \, dt = O(\log t)$.

   e) Show that $e^{-a\sqrt{\log x}} = o\left(\dfrac{1}{\log x}\right)$ as $x \to \infty$ for any positive constant $a > 0$.

2. Exercise 1 from Chapter 3 in the textbook.

3. Exercise 5 from Chapter 3 in the textbook.

4. Exercise 6 from Chapter 3 in the textbook.

5. Exercise 7 from Chapter 3 in the textbook.

6. Exercise 14 from Chapter 3 in the textbook.

7. Exercise 15 from Chapter 3 in the textbook.

8. Exercise 23 from Chapter 3 in the textbook.