CS 457, Data Structures and Algorithms I
First Problem Set

September 22, 2016

Due on September 29. Collaboration is allowed; please mention your collaborators.

1. (5 pts) Problem 1-1 on Page 14 of your textbook.

2. (10 pts) Exercise 2.1-3 on Page 22 of your textbook.

3. (15 pts) Problem 2.2 on Page 40 of your textbook. Solve all four sub-problems. For the last sub-problem, prove a running time bound of the form $\Theta(g(n))$ for some $g(n)$; not just $O(g(n))$.

4. (10 pts) Prove that the following properties are true:

   - $f(n) = \Theta(g(n))$ and $g(n) = \Theta(h(n))$ imply $f(n) = \Theta(h(n))$
   - $f(n) = O(g(n))$ if and only if $g(n) = \Omega(f(n))$

5. (10 pts) Prove the following

   - $5 + cos(n) = \Theta(1)$
   - $10n^2 - 100n - 20 \neq \Theta(nlogn)$

6. (10 pts) Exercise 3.1-1 on Page 52 of your textbook.

7. (10 pts) Exercise 3.1-5 on Page 53 of your textbook.

8. (10 pts) Exercise 3.1-7 on Page 53 of your textbook.

9. (20 pts) Problem 3.2 on Page 61 of your textbook. But, in addition to the "yes" or "no" answer, you need to also provide a short argument for each answer (not a formal proof).