Participation 4

Due Thursday, July 10, at 9 AM (GMT-7)

CSc 345 – Summer 2014

Instructor: Qiyam Tung

Instructions

1. This is an individual assignment. You must do your own work.
2. If you are having difficulty and need to ask a question you can:
   (a) Ask questions in class.
   (b) Stop by my office hours (or make an appointment).
   (c) Post a question on Piazza.
   (d) Post a private question on Piazza if the question is too specific.
3. Show all work. I will be grading on whether you put effort into this problem (i.e. participation) and not correctness. Showing your work helps me identify your thought process and helps me with grading.
4. You may write your solutions by hand, or you may type them using any appropriate program such as Microsoft Word, OpenOffice Writer, LaTeX, etc...
   However, the final copy should be in PDF form and formatted so that it is legible.
5. If the listed problem is only a number, refer to the online book for the description of the problem (starting at page 46).

Hashing (5 points)

In this problem, you are required to answer two problems. Make sure you give an answer for both problems. If you cannot answer the questions, write the best response you've come up with and prove your results (even if they're wrong). Remember, this is a class on analysis, so do not ignore that part of the assignment.

Hashing Collisions

Ideally, we would like a hash function to be able to do its operations in $O(1)$ time. However, the larger the universe of keys, which has a size of $|U|$, and the more elements to insert, n, the more likely it is to get collisions. But the larger your table, m, the less likely you are to get collisions. Show that it is possible to guarantee a subset of keys from U will all hash to the same index, guaranteeing the hash table will run in $O(n)$. Give your answer in terms of $|U|$, n, and m. By "show", I mean "prove."

Birthday Problem

There are 365 days in a year. Assuming people are born uniformly throughout the year, what is the probability that 2 people in a group of 23 share a birthday? Prove it.