MA/CSSE 473 – Design and Analysis of Algorithms

Homework 7 (includes a description of an implementation problem due later)

71 points total

(Summer: Drop box) These are to be turned in as hard copy. You can write solutions out by hand, or write them on your computer and print them. If there are multiple pages, please staple them together.

When a problem is given by number, it is from the textbook. 1.1.2 means "problem 2 from section 1.1" .

Problems for enlightenment/practice/review (not to turn in, but you should think about them):

How many of them you need to do serious work on depends on you and your background. I do not want to make everyone do one of them for the sake of the (possibly) few who need it. You can hopefully figure out which ones you need to do.

4.2.1	(quicksort example)
4.2.4	(quicksort sentinel)
4.2.6	(increasing arrays in quicksort)
4.6.1	(one-dimensional closest-pair divide-and-conquer)
4.6.3	(implement closest-pair divide-and-conquer)
4.6.8	(case that leads to $O(n^2)$ behavior for quickhull)
4.6.10	(reasonably efficient shortest-path)

Problems to write up and turn in:

1. (6) 4.2.2 (Quicksort partition scan properties)
2. (15) 4.2.7 (average case for quicksort) Feel free to look up a solution, understand it, and write it in your own words (and symbols). The Weiss Data Structures book is one source.
3. (10) 4.2.8 (Negatives before positives)
4. (10) 4.2.9 (Dutch National Flag)
5. (10) 4.2.11 (nuts and bolts)
6. (10) 4.6.2 (Recurrence/analysis for simpler divide-and-conquer closest points algorithm)

   To solve the recurrence, try backwards substitution (a review of this technique is on pages 475-476)
7. (10) 4.6.6 (Find p_{max} analytically)