CS302 - Assignment 3

Due: Thursday, Feb. 21 at the beginning of class

Hand-in method: paper

http://recursivelyrecursive.wordpress.com/category/recursive-humour/

For this assignment you must use latex to generate your work.

1. (12 points) Give the asymptotic bounds for each of the recurrences below. Assume that $T(n)$ is constant for sufficiently small n. Make your bounds as tight as possible. If you use the master method, you must specify Θ bounds, but only need to specify O if you use another approach.

   (a) $T(n) = 9T(n/3) + n^2$

(b) $T(n) = 2T(n/2) + n^3$

(c) $T(n) = 3T(n/2) + n \log n$

(d) $T(n) = T(n-2) + n$

(e) $T(n) = 4T(n/2) + n^2\sqrt{n}$

(f) $T(n) = T(\sqrt{n}) + 1$

2. For the following problems, write **pseudocode** solutions and *state the worse case running time* (in terms of Θ or O where appropriate). You will be graded on the efficiency of your solutions.

    (a) (5 points) Given two lists of numbers A and B of lengths m and n respectively, return the intersection of the lists, i.e. all those numbers in A that also occur in B. You can use procedures that we've discussed in class, but no others (e.g. no hashtables). You can assume that in any given list, the numbers are unique.

    (b) (10 points) Given a *sorted* list of unique integers A[1...n], determine if an entry exists such that $A[i] = i$. If an entry exists, return the index, otherwise, return *null*. (Hint: You can do better than $O(n)$. Think divide-and-conquer.)

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