CS 577: Introduction to Algorithms 10/19/15

Homework 3 (Rubric)

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Problem 3 [10 points]

- [3 points] for using a divide-and-conquer approach to the problem
- [4 points] for using a correct divide-and-conquer approach to the problem
- [2 points] for a correctness argument
- [1 point] for run-time analysis

A large fraction of submissions invoked the "approximate median algorithm" in their solutions. There is no "approximate median algorithm". One of the recursive calls in the linear-time selection algorithm returns an approximate median of the original list, but this is still an invocation of the linear-time selection algorithm. In particular, there is no need to find an "approximate median" in linear time when it takes just as long (asymptotically) to find an exact median.

Many submissions included proofs of termination for their algorithms along with a run-time analysis. If the run-time analysis is correct, this automatically implies termination (is it possible for an algorithm to never terminate if its runtime is bounded by cn for some constant c?), so the termination proof is entirely superfluous.

About a third of the submissions used something similar to the following schema for their recursive solutions. If the array has one element, return that element; otherwise partition the array into one containing all elements less than the median and one containing the remaining elements. Sum the weights of each of these arrays, and recurse on the one that is guaranteed to contain the search item. This schema produces an infinite loop when all entries of the array are equal since the array being recursed on contains all of the elements.