

Algorithms Homework 3*

Heaps and Sorting

Reading: GT Chapter 2.4, 4.1, 4.3, 4.4, 4.5, 4.6

- R-4.9, R-4.10 Suppose we modify the deterministic version of the quicksort algorithm so that, instead of selecting the last element as the pivot, we chose the element at index $\lfloor n/2 \rfloor$, that is, an element in the middle of the sequence. What is the running time of this version of quicksort on a sequence that is already sorted? What kind of sequence would cause this version of quicksort to run in $\Theta(n^2)$ time?
- C-4.9 Suppose we are given a sequence S of n elements, each of which is colored red or blue. Assuming S is represented as an array, give an in-place method for ordering S so that all blue elements are listed before all the red elements.
- C-4.22 Let A and B be two sequences of n integers each. Given an integer x , describe an $O(n \lg n)$ algorithm for determining if there is an integer a in A and an integer b in B such that $x = a + b$.

*Collaboration is allowed, even encouraged, provided that the names of the collaborators are listed along with the solutions. Write up the solutions on your own.