Feedback — Interview Questions: Quicksort

Help

You submitted this homework on **Wed 12 Mar 2014 7:40 AM PDT**. You will be able to view your score after the deadline passes.

These interview questions are for your own enrichment and are not assessed. If you click the *Submit Answers* button, you will get a hint.

Question 1

Nuts and bolts. A disorganized carpenter has a mixed pile of N nuts and N bolts. The goal is to find the corresponding pairs of nuts and bolts. Each nut fits exactly one bolt and each bolt fits exactly one nut. By fitting a nut and a bolt together, the carpenter can see which one is bigger (but the carpenter cannot compare two nuts or two bolts directly). Design an algorithm for the problem that uses $N \log N$ compares (probabilistically).

Your Answer	Score	Explanation
Total	0.00 / 0.00	

Question Explanation

Hint: modify the quicksort partitioning part of quicksort.
Remark: This research paper gives an algorithm that runs in $N \log^4 N$ time in the worst case.

Question 2

Selection in two sorted arrays. Given two sorted arrays $a[\ ]$ and $b[\ ]$, of sizes N_1 and N_2, respectively, design an algorithm to find the k^{th} largest key. The order of growth of the worst case running time of your algorithm should be $\log N$, where $N = N_1 + N_2$.

- Version 1: $N_1 = N_2$ and $k = N/2$

- Version 2: $k = N/2$
- Version 3: no restrictions

Your Answer	Score	Explanation
Total	0.00 / 0.00	

Question Explanation

Hints: there are two basic approaches.

- Approach A: Compute the median in $a[\ ]$ and the median in $b[\ ]$. Recur in a subproblem of roughly half the size.
- Approach B: Design a constant-time algorithm to determine whether $a[i]$ is the k^{th} largest key. Use this subroutine and binary search.

Dealing with corner cases can be tricky.

Question 3

Decimal dominants. Given an array with N keys, design an algorithm to find all values that occur more than $N/10$ times. The expected running time of your algorithm should be linear.

Your Answer	Score	Explanation
Total	0.00 / 0.00	

Question Explanation

Hint: determine the $(N/10)^{th}$ largest key using quickselect and check if it occurs more than $N/10$ times.

Alternate solution hint: use 9 counters.