Congratulations! You passed!

TO PASS 1% or higher

Keep Learning

GRADE
100%

Interview Questions: Quicksort (ungraded)

TOTAL POINTS 3

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 at most proportional to $n \log n$ compares (probabilistically). **1 / 1 point**

   Note: these interview questions are ungraded and purely for your own enrichment. To get a hint, submit a solution.

   Use Quick sort.

   Correct

   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.

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 $n = n_1 + n_2$. **1 / 1 point**

   - Version 1: $n_1 = n_2$ and $k = n/2$
   - Version 2: $k = n/2$
   - Version 3: no restrictions

   i DONT KNOW

   Correct

   Hint: 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.

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. **1 / 1 point**

   I DONT KNOW

   Correct

   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.