

Interview Questions: Quicksort

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Warning: The hard deadline has passed. You can attempt it, but **you will not get credit for it**. You are welcome to try it as a learning exercise.

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

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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).

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

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.

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