

CPSC 320: TUTORIAL 4

1. This question considers the problem of finding the k smallest elements of an array in sorted order using a comparison-based algorithm. Find the algorithm that implements each of the following methods with the best asymptotic worst-case running time, and analyze the running time of the algorithms in terms of n and k .
 - (a) Sort the numbers, and list the k smallest.
 - (b) Build a min-priority queue from the numbers, and call `ExtractMin` k times.
 - (c) Use a k -select algorithm to find the k th smallest number, compare it to all the others to find the k smallest numbers, and then sort them.

Which method is best?

2. Suppose you have a room full of n people some of whom always tell the truth and some of whom occasionally lie. You may ask person i about person j and if person i is a truth-teller, they will tell you (correctly) if person j is a liar or not. However, if person i is a liar, then they may (or may not) tell you the correct type of person j .

Under what conditions can you determine who are the truth-tellers and who are the liars? What algorithm should you use?