

Assignment 2 is due April 11 (Sunday), 23:30.

Submission A pdf copy of your own solutions to Problems 1 and 2 should be submitted at SUCourse+.

Grading Full credit will be given to correct solutions that are described clearly.

Problem 1 (Order statistics) Suppose that you are given a set of n numbers. The goal is to find the k smallest numbers in this set, in sorted order. For each method below, identify relevant algorithms with the best asymptotic worst-case running time (e.g., which sorting algorithm? which order-statistics algorithm?), and analyze the running time of the overall algorithm in terms of n and k .

- (a) First sort the numbers using a comparison-based sorting algorithm, and then return the k smallest numbers.
- (b) First use an order-statistics algorithm to find the k 'th smallest number, then partition around that number to get the k smallest numbers, and then sort these k smallest numbers using a comparison-based sorting algorithm.

Which method would you use? Please explain why.

Problem 2 (Linear-time sorting) (a) How can you modify the radix sort algorithm for integers, to sort strings? Please explain the modifications.

- (b) Illustrate how your algorithm sorts the following list of strings

["AYSU", "BERK", "ESRA", "ILAYDA", "SELIN"].

Please show every step of your algorithm.

- (c) Analyze the running time of the modified algorithm.