

**Assignment 2 is due March 9 (Monday), 23:30.**

**Homework 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

["VEYSEL", "ALI", "SELIN", "YASIN", "ZEYNEP"].

Please show every step of your algorithm.

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