

Problem Solving

Homework #1

Due: Mar-27 (Wed.) (before 03:00pm)

Instruction:

- You have 2 problems in this homework.
- Submit your report at the class on Mar-27.
- Any work that you turn in should be your own.
- Any late submission will not be accepted.

Problem #1. Largest N Numbers (10 pts)

Given a 2-dimensional array $A[1 \dots N, 1 \dots N]$ of positive integers, design an efficient algorithm to find N largest numbers and provide its time complexity. All the numbers are distinct, and the output should be in descending order. Note that, your algorithm does not have to maintain the initial state of the given array.

Problem #2. Minimum Height (10 pts)

We have two sequences of numbers, $(a_1 a_2 a_3 \dots a_N)$ and $(b_1 b_2 b_3 \dots b_N)$. The numbers are distinct in each sequence, and each number in the first sequence exists in the second sequence:

- $a_1 \neq a_2 \neq a_3 \neq \dots \neq a_N$ and $b_1 \neq b_2 \neq b_3 \neq \dots \neq b_N$
- For each a_i , there exists a unique matching b_j (i.e. $a_i = b_j$)

We want to construct a ghost leg that matches the same numbers. Design an algorithm to compute such ghost leg while minimizing the height, and provide its time complexity.

