Problem Solving Practice
HW Problem #2

CSE4152
Sogang University

Largest N numbers

Let M be an N × N integer matrix, where each element in M is distinct, ensuring that no two elements are equal. Propose an algorithm that efficiently identifies the N largest elements among the elements of M. Furthermore, provide a proof of the correctness of this algorithm. Note that the algorithm does not need to preserve M's initial state.

⇒ min heap

Position of k

Consider an N × N matrix of integers where both its rows and columns are arranged in non-decreasing order. Propose an algorithm that, given such a matrix and an integer k, efficiently determines the position of k within the matrix. In cases where there are multiple occurrences of k in the matrix, the algorithm will identify one of them.

Example

Input

1 5 9 13 25

2 6 11 16 27

3 7 14 18 28

4 8 15 21 30

10 11 20 23 50

8 ; k = 8

Answer:

(4, 2) ; Position of 8