

# Advanced Coding Practice

## HW Problem #2

2023 Fall, CSE4152  
Sogang University



# Largest N numbers

Let  $M$  be an  $N \times N$  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.

# Position of k

Consider an  $N \times N$  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