

Find Max in 2D region

Problem Code	hw01c_minmax2
Running Time Limit	1 sec
Memory Limit	16 mb

Objective

- Be able to read/write data into a 2D array
- Be able to iterate over 2D region on a grid.

Introduction

This problem introduces a 2D array. Given an integer matrix of size N by M , the task is to find the maximum value within given rectangular regions described by its top-left and bottom-right coordinate.

1	2	5	7	8	2
4	3	3	6	2	9
5	-1	2	3	-7	8
8	9	6	-5	-2	0
0	1	3	7	-9	0

Fig. 1: A 5 x 6 matrix. The region is described by (2,3) and (4,5). The maximum value in the region is 6

For the given matrix, there are several regions that we need to find maximum value. It is possible that the given region is not valid. The program should report this case as well. The region described by top-left coordinate of $(r1, c1)$ and bottom-right coordinate of $(r2, c2)$ is invalid when $(r1 > r2)$ or $(c1 > c2)$.

It is also possible that a region is valid but it is not entirely contained in the matrix, we will consider only the part of the region that is in the matrix. Additionally, when a region does not intersect the matrix, the program should also report this case. If the region is both non-intersect and invalid, the region should be reported as invalid.

Task

Find maximum value in given rectangular regions of the given matrix.

Input

The first line contains the number N and M ($1 \leq N, M \leq 100$), that describes the number of row and column of a matrix. The second line gives the number R that describes the number of regions of interest. Each of the following R lines describes four integer $r1, c1, r2$ and $c2$ that are the coordinate of top-left and bottom-right of the region of interest. The coordinate in these lines might not be contained in the matrix.

Output

The output must have R lines. Each line must describe the maximum value in the respective region. The i^{th} line must contain maximum value of element within the region given by the $(i + N + 2)^{\text{th}}$ line in the input. If the respective region in the input is not valid, print the word "INVALID" instead. If the region is entirely outside the matrix, print the word "OUTSIDE"

Example

Ex1

Input	Output
5 6	6
3	7
1 2 5 7 8 2	1
4 3 3 6 2 9	
5 -1 2 3 -7 8	
8 9 6 -5 -2 0	
0 1 3 7 -9 0	
2 3 4 5	
2 3 100 5	
1 1 1 1	

Ex2

Input	Output
3 3	-1
4	INVALID
-1 -2 -3	OUTSIDE
-4 -5 -6	INVALID
-7 -8 -9	
1 1 3 3	
3 3 1 1	
4 0 5 1	
5 5 4 4	