MAKE SQUARE

MAKE SQUARE is a game played on an a grid of cells with R rows and C columns. Each cell belongs to one of K *regions*, numbered from 1 to K. The cell in the i-th row and j-th column belongs to region a_{ij}. Every region has at least one cell.

The cells belonging to each region form a *4-neighbourhood connected component*. That is, there exists a sequence of up, down, left and right movements from any cell in a region to any other cell in the same region, using only cells from that region.

Figure 1: An example grid.

A subgrid is *good* if:

- It is **square**, and
- All regions are either **completely inside** of, or **completely outside** of the subgrid.

What is the side length of the largest good subgrid? If no subgrid satisfies the requirements, output 0 instead.

Subtasks and Constraints

For all subtasks, you are guaranteed that:

- $2 \leq R, C$ and $R \neq C$.
- $1 \leq K \leq R \times C$.
- $1 \leq a_{ij} \leq K$ for all i and j.
- There is an i and j where $a_{ij} = x$, for all $1 \leq x \leq K$.
- Each region is a 4-neighbourhood connected component.

Additional constraints for each subtask are given below.

Subtask	Points	Additional constraints
1	15	$R, C \leq 5$
2	25	$R, C \leq 50$
3	30	$R, C \leq 300$
4	30	$R, C \leq 2500$

Input

- The first line of input contains the integers R, C and K.
- R lines follow, containing C integers each. In the i-th of these lines, the j-th integer is a_{ij}.

Output

Output a single integer: the side length of the largest square subgrid you could choose. If no subgrid satisfies the requirements, output 0 instead.

Sample Input 1

```
5 8 10
1 6 6 6 6 6 7 7
1 1 1 6 8 4 4 7
2 2 2 9 3 4 4 7
2 5 2 9 3 3 4 7
2 2 2 2 10 10 7 7
```

Sample Input 2

```
6 5 8
8 8 8 8 8
8 8 6 6 8
8 8 6 1 3
2 2 2 3 3
5 5 2 2 7
5 5 2 4 4
```

Sample Input 3

```
2 5 3
1 1 1 2 2
3 3 1 1 2
```

Sample Output 1

```
3
```

Sample Output 2

```
2
```

Sample Output 3

```
0
```

Explanation

The sample cases are illustrated below along with their largest square subgrids. Sample Input 1 corresponds to the example shown above.

In Sample Input 1, there is only one good subgrid of the largest size 3.

In Sample Input 2, there are three square subgrids of the largest size 2.

In Sample Input 3, there are no square subgrids, so the answer is 0.

Figure 2: Sample Input 1

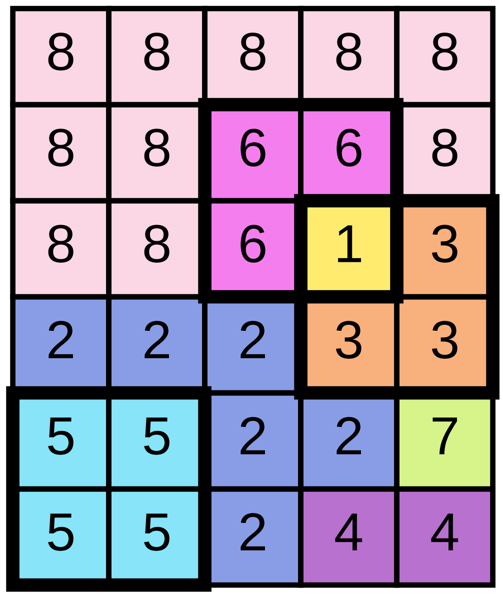

Figure 3: Sample Input 2

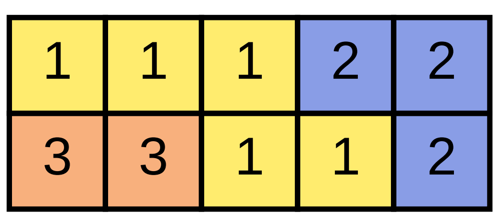

Figure 4: Sample Input 3