2371. Minimize Maximum Value in a Grid

Description

You are given an `m x n` integer matrix `grid` containing **distinct** positive integers.

You have to replace each integer in the matrix with a positive integer satisfying the following conditions:

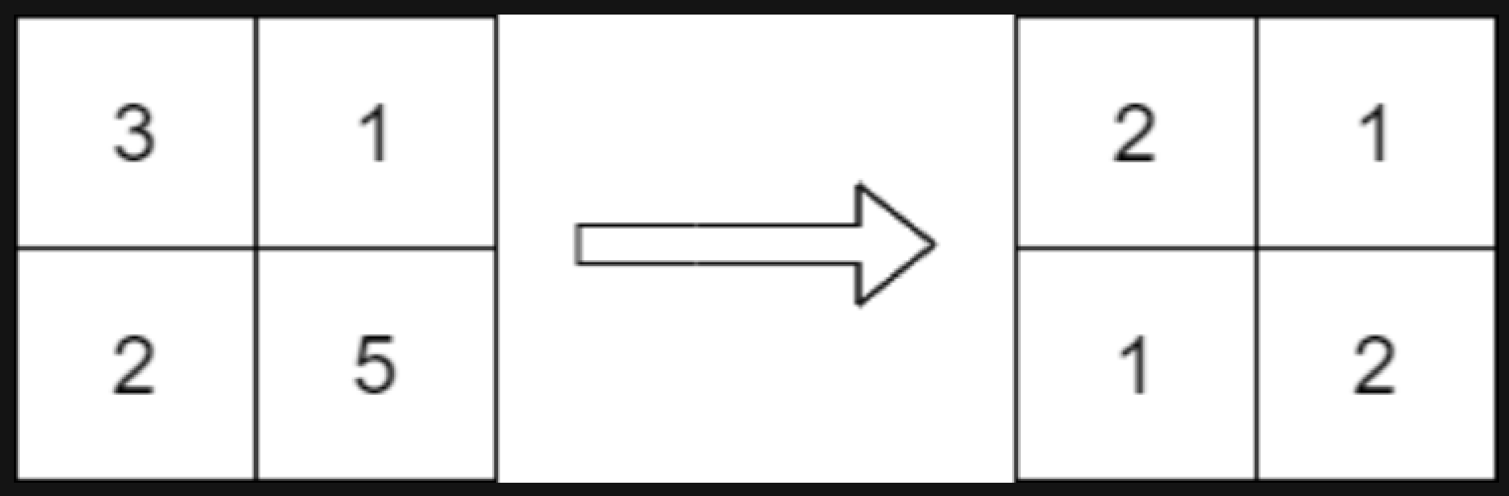
- The **relative** order of every two elements that are in the same row or column should stay the **same** after the replacements.
- The **maximum** number in the matrix after the replacements should be as **small** as possible.

The relative order stays the same if for all pairs of elements in the original matrix such that $grid[r_1][c_1] > grid[r_2][c_2]$ where either $r_1 == r_2$ or $c_1 == c_2$, then it must be true that $grid[r_1][c_1] > grid[r_2][c_2]$ after the replacements.

For example, if `grid = [[2, 4, 5], [7, 3, 9]]` then a good replacement could be either `grid = [[1, 2, 3], [2, 1, 4]]` or `grid = [[1, 2, 3], [3, 1, 4]]`.

Return *the **resulting** matrix.* If there are multiple answers, return **any** of them.

Example 1:



```
Input: grid = [[3,1],[2,5]]
Output: [[2,1],[1,2]]
Explanation: The above diagram shows a valid replacement.
The maximum number in the matrix is 2. It can be shown that no smaller value can be obtained.
```

Example 2:

```
Input: grid = [[10]]
Output: [[1]]
Explanation: We replace the only number in the matrix with 1.
```

Constraints:

- `m == grid.length`
- `n == grid[i].length`
- `1 <= m, n <= 1000`
- $1 <= m * n <= 10^5$
- $1 <= grid[i][j] <= 10^9$
- `grid` consists of distinct integers.