1632. Rank Transform of a Matrix

Description

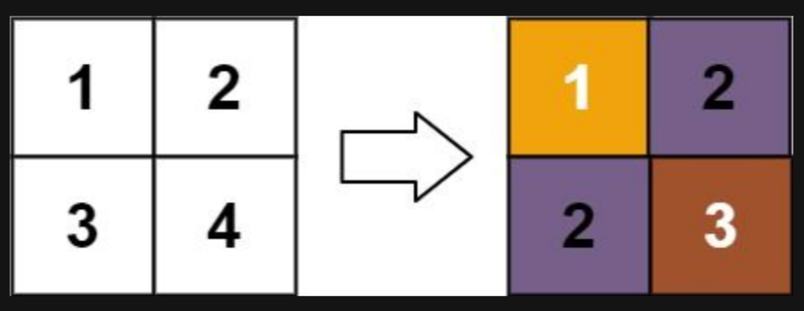
Given an `m x n` `matrix`, return *a new matrix* `answer` *where* `answer[row][col]` *is the* ***rank*** *of* `matrix[row][col]`.

The **rank** is an **integer** that represents how large an element is compared to other elements. It is calculated using the following rules:

- The rank is an integer starting from `1`.
- If two elements `p` and `q` are in the **same row or column**, then:
  - If `p < q` then `rank(p) < rank(q)`
  - If `p == q` then `rank(p) == rank(q)`
  - If `p > q` then `rank(p) > rank(q)`
- The **rank** should be as **small** as possible.

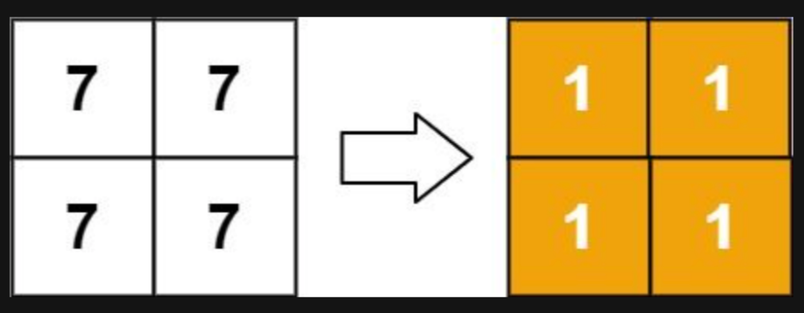
The test cases are generated so that `answer` is unique under the given rules.

Example 1:



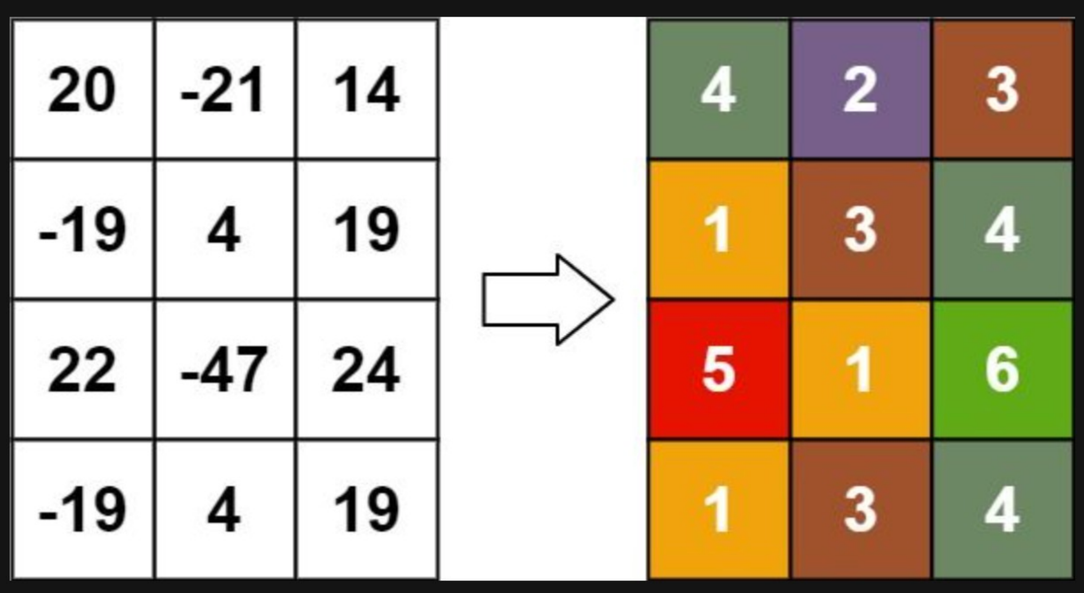

```
Input: matrix = [[1,2],[3,4]]
Output: [[1,2],[2,3]]
Explanation:
The rank of matrix[0][0] is 1 because it is the smallest integer in its row and column.
The rank of matrix[0][1] is 2 because matrix[0][1] > matrix[0][0] and matrix[0][0] is rank 1.
The rank of matrix[1][0] is 2 because matrix[1][0] > matrix[0][0] and matrix[0][0] is rank 1.
The rank of matrix[1][1] is 3 because matrix[1][1] > matrix[0][1], matrix[1][1] > matrix[1][0], and both matrix[0][1] and matrix[1][0] are rank 2.
```

Example 2:




```
Input: matrix = [[7,7],[7,7]]
Output: [[1,1],[1,1]]
```

Example 3:




```
Input: matrix = [[20,-21,14],[-19,4,19],[22,-47,24],[-19,4,19]]
Output: [[4,2,3],[1,3,4],[5,1,6],[1,3,4]]
```

Constraints:

- `m == matrix.length`
- `n == matrix[i].length`
- `1 <= m, n <= 500`
- `-10^9 <= matrix[row][col] <= 10^9`