417. Pacific Atlantic Water Flow

Difficulty : Medium

https://leetcode.com/problems/pacific-atlantic-water-flow

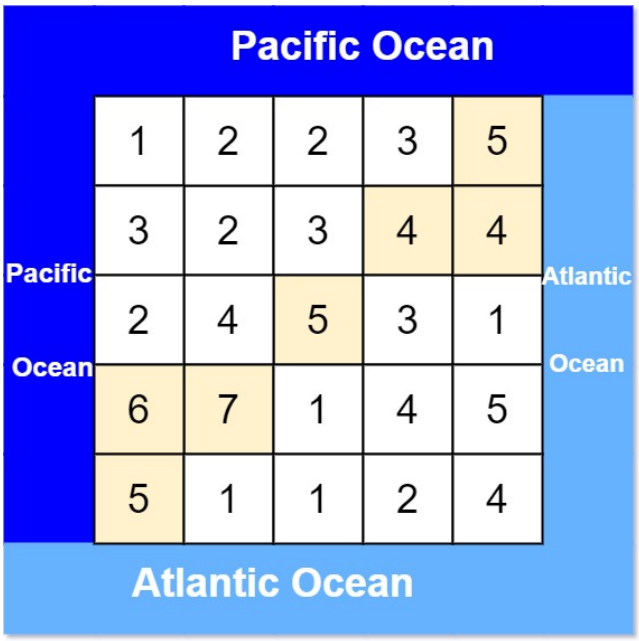
There is an `m x n` rectangular island that borders both the **Pacific Ocean** and **Atlantic Ocean**. The **Pacific Ocean** touches the island's left and top edges, and the **Atlantic Ocean** touches the island's right and bottom edges.

The island is partitioned into a grid of square cells. You are given an `m x n` integer matrix `heights` where `heights[r][c]` represents the **height above sea level** of the cell at coordinate `(r, c)`.

The island receives a lot of rain, and the rain water can flow to neighboring cells directly north, south, east, and west if the neighboring cell's height is **less than or equal to** the current cell's height. Water can flow from any cell adjacent to an ocean into the ocean.

Return *a **2D list** of grid coordinates* `result` *where* `result[i] = [r_i, c_i]` *denotes that rain water can flow from cell* `(r_i, c_i)` *to **both** the Pacific and Atlantic oceans*.

Example 1:




```
Input: heights = [[1,2,2,3,5],[3,2,3,4,4],[2,4,5,3,1],[6,7,1,4,5],[5,1,1,2,4]]
Output: [[0,4],[1,3],[1,4],[2,2],[3,0],[3,1],[4,0]]
Explanation: The following cells can flow to the Pacific and Atlantic oceans, as shown below:
[0,4]: [0,4] -> Pacific Ocean
       [0,4] -> Atlantic Ocean
[1,3]: [1,3] -> [0,3] -> Pacific Ocean
       [1,3] -> [1,4] -> Atlantic Ocean
[1,4]: [1,4] -> [1,3] -> [0,3] -> Pacific Ocean
       [1,4] -> Atlantic Ocean
[2,2]: [2,2] -> [1,2] -> [0,2] -> Pacific Ocean
       [2,2] -> [2,3] -> [2,4] -> Atlantic Ocean
[3,0]: [3,0] -> Pacific Ocean
       [3,0] -> [4,0] -> Atlantic Ocean
[3,1]: [3,1] -> [3,0] -> Pacific Ocean
       [3,1] -> [4,1] -> Atlantic Ocean
[4,0]: [4,0] -> Pacific Ocean
       [4,0] -> Atlantic Ocean
Note that there are other possible paths for these cells to flow to the Pacific and Atlantic oceans.
```

Example 2:

```
Input: heights = [[1]]
Output: [[0,0]]
Explanation: The water can flow from the only cell to the Pacific and Atlantic oceans.
```

Constraints:

- `m == heights.length`

- `n == heights[r].length`
- `1 <= m, n <= 200`
- `0 <= heights[r][c] <= 10^5`