

# Problem 417: Pacific Atlantic Water Flow

## Problem Information

**Difficulty:** Medium

**Acceptance Rate:** 60.20%

**Paid Only:** No

**Tags:** Array, Depth-First Search, Breadth-First Search, Matrix

## Problem Description

There is an  $m \times n$  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  $m \times n$  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] = [ri, ci]` denotes that rain water can flow from cell  $(ri, ci)$  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] <= 105`

## Code Snippets

### C++:

```
class Solution {
public:
    vector<vector<int>> pacificAtlantic(vector<vector<int>>& heights) {

    }
};
```

### Java:

```
class Solution {
    public List<List<Integer>> pacificAtlantic(int[][] heights) {

    }
}
```

### Python3:

```
class Solution:
    def pacificAtlantic(self, heights: List[List[int]]) -> List[List[int]]:
```