

Problem 245: Helicopter Rescue

Difficulty: Hard

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Problem Background

You are working with Lockheed Martin Rotary and Mission Systems to develop a program to assist Sikorsky helicopter pilots on rescue missions. A critical component of this program is the ability to analyze terrain for potential landing zones, ensuring that the helicopters are able to land in the safest possible areas.

Problem Description

The program must analyze a given terrain map to find all of the safest landing zones. The map is represented as a grid, where each cell will indicate the elevation at that point and if that location is covered by water (e.g. a river or lake).

A cell is considered to be a safe landing zone if it has a lower or equal elevation compared against each of the eight cells surrounding it (up, down, left, right, and diagonally) and does not contain water. Cells that appear on the edges of the map need only consider the neighbors that actually exist in the map; for example, the top-left corner may be a landing zone if it does not contain water and is lower than the cells to its right, bottom-right, and bottom.

Your program must locate all such cells and provide their coordinates, sorted by the following criteria:

- By elevation, in ascending order
- In the case of ties, by the Y-coordinate, in ascending order (the top row has Y-coordinate 0, so this is North to South)
- In the case of continued ties, by the X-coordinate, in ascending order (the left column has X-coordinate 0, so this is West to East)

Sample Input

The first line of your program's input, received from the standard input channel, will contain a positive integer representing the number of test cases. Each test case will include:

- A row containing two positive integers separated by a space, H and W, respectively representing the height and width of the map. Both values will be between 1 and 100, inclusive.
- H rows, each containing W cells separated by spaces. Each cell contains the following information:
 - A positive integer less than 30,000, representing the elevation of the cell

- A capital letter "L" or "W", indicating if the cell contains land or water, respectively

```
1
3 3
1000W 2000L 1100W
2000W 3000L 2000W
1200L 2000L 1500L
```

Sample Output

For each test case, your program must print a line for each potential landing zone presented in the map. For each landing zone, the line printed should contain the following information, separated by spaces:

- The elevation of the landing zone
- The Y-coordinate of the landing zone (the top row has a Y-coordinate of 0)
- The X-coordinate of the landing zone (the left column has an X-coordinate of 0)

When multiple landing zones exist within a given map, sort the landing zones according to the criteria provided above.

```
1200 2 0
1500 2 2
```