There is only one coding problem given 100min.

The problem is as below:

A group of farmers has some elevation data, and we’re going to help them understand how rainfall flows over their farmland. We’ll represent the land as a two-dimensional array of altitudes and use the following model, based on the idea that water flows downhill: If a cell’s four neighboring cells all have higher altitudes, we call this cell a sink; water collects in sinks. Otherwise, water will flow to the neighboring cell with the lowest altitude. If a cell is not a sink, you may assume it has a unique lowest neighbor and that this neighbor will be lower than the cell. Cells that drain into the same sink – directly or indirectly – are said to be part of the same basin. Your challenge is to partition the map into basins. In particular, given a map of elevations, your code should partition the map into basins and output the sizes of the basins, in descending order. Assume the elevation maps are square. Input will begin with a line with one integer, S, the height (and width) of the map. The next S lines will each contain a row of the map, each with S integers – the elevations of the S cells in the row. Some farmers have small land plots such as the examples below, while some have larger plots. However, in no case will a farmer have a plot of land larger than S = 1000. Note: The input uses unix line endings (\n). If you try to view the sample inputs on a windows machine with a program that does not convert line endings (like Notepad), you will see the input appear all on a single line. Your code should output a space-separated list of the basin sizes, in descending order. (Trailing spaces are ignored.) While correctness and performance are the most important parts of this problem, a human will be reading your solution, so please make an effort to submit clean, readable code. In particular, do not write code as if you were solving a problem for a competition.

A few examples are below.

Input: 3 1 5 2 2 4 7 3 6 9

Output: 7 2

The basins, labeled with A’s and B’s, are: A A B A A B A A A

Input: 1 10

Output: 1

There is only one basin in this case.

Input: 5 1 0 2 5 8 2 3 4 7 9 3 5 7 8 9 1 2 5 4 3 3 3 5 2 1

Output: 11 7 7

The basins, labeled with A’s, B’s, and C’s, are: A A A A A A A A A A B B A C C B B B C C B B C C C

Input: 4 0 2 1 3 2 1 0 4 3 3 3 3 5 5 2 1

Output: 7 5 4

The basins, labeled with A’s, B’s, and C’s, are: A A B B A B B B A B B C A C C C

Key Points:

* Think about one elevation with 2 sinks. (ie. 12321 has height of 3 with 2 sinks)
* One basin may have 2 adjacent sinks (ie. 541134 would be a basin with 2 sinks)

A sink is defined by having 4 neighboring cells with all higher altitudes (ie. 54145).

But (541145 is not a sink, as there is an additional 1 making it a basin.

Potentially use a Union-Find use Quick-Union algorithm,