**Problem 5. 2014**

A great misfortune happened to the human race - the Mayans proved right in their prediction but they miscalculated the date - a sequence of horrible cataclysms struck the Earth on 21.12.204.

The Earth changed so much, that years passed before a team of scientists was able to create а map of the new Earth.The map is represented by a table consisting of **N** rows and **M** columns, with **N \* M** non-negative numbers, showing the height of a given area(0 means that the given area is under water). In other words, Earth is divided into islands and water - an island is such a set of cells on the map, every two of which are connected by a path on land and no other cell can be added to this set. A path on land consists of sequence of moves in one of the four directions(from cell (**x**,**y**)one can move to cells (**x**+1,**y**),(**x**,**y**+1)**,** (**x**-1,**y**)**,** (**x**,**y**-1)). You may assume that water is surrounding the area shown on the map.

The bad news don’t end up here - with every day the level of all the ground above the sea decreases by a unit.

Nevertheless, the life continues and this constant geological changes affect the plane navigation -gps doesn’t work and the only thing left for the pilots to do is try to navigate the plane by looking at the ground. As it happens, there are islands looking the same way from above which makes this even harder. Two islands **p** and **q** look the same way, if we can cover **p** by **q** and **q** by **p** only by translating the islands(moving the islands in directions parallel to the map’s borders). When comparing two islands we only care about their shape(not their height).

Your task is by having the map of the Earth today to calculate how many pairs of similar islands there are after a given a number of days.

**Input**

On the first line of the input file **2014.in** thera are two numbers **N, M** - the number of rows and columns of the map.

On the next **N** lines the map is given.

Followed by the number **Q.**

On the next line there are **Q** numbers separated by a space - days **Pi**, for which we want to know the number of similar islands, given in a increasing order.

**Output**

The output file **2014.out**  consist of **Q** lines - numbers of similar islands, in the order given in the input.

*Note: when printing long integers use printf with “%I64d” or cout.*

**Constraints:**

3 **N,М**  1,000

1 **Q**  100,000

0 height in the map 1,000,000,000

0 **Pi** 1,000,000,000

**Time Limit: 2.5s**

**Example:**

|  |  |
| --- | --- |
| **2014.in** | **2014.out** |
| 5 5  3 1 0 2 2  2 4 0 0 2  0 0 0 2 0  0 0 0 2 5  0 5 0 0 0  4  0 1 3 10 | 0  1  3  0 |

After one day the table will look like:  
2 0 0 1 1

1 3 0 0 1

0 0 0 1 0

0 0 0 1 4

0 4 0 0 0

After three days:

0 0 0 0 0

0 1 0 0 0

0 0 0 0 0

0 0 0 0 2

0 2 0 0 0