Task overview

TASK	ARHIPELAG	BUKA
input data	standard input	
output data	standard output	
time limit	3 sec	5 sec
memory limit	128 MB	256 MB
points	**100**	**100**
	200	

One popular touristic country is situated on a sunny archipelago. Citizens of that country are very proud of their numerous islands. There are so many islands that some of them even have completely equal layout: two islands have equal layout if we can **translate** one so that **his layout completely overlaps** with the layout of the second island. This fact delights tourists so much that they decided to measure **the beauty of the archipelago** as the **total number of pairs of islands with identical layouts**.

However, global warming has worried the citizens: elevation of the sea level results in the higher loss of the shore, which causes changes in the beauty of the archipelago.

More precisely, the map of the archipelago is shown with **R** x **C** squares. In some moment for each square this elevation was measured: elevation is equal to 0 if there was sea on that square when the measurement was taken, else it's equal to some natural number - elevation of that square in meters. The sea level **rises for 1 meter every year**, and after T years it will flood all the squares which had their elevation smaller or equal to T when they were measured. Considering that the archipelago is rocky and porous in origin, the sea penetrates the inside of the island, flooding all the parts which are not above the sea level. Two ground squares belong to the same island if it's possible to go from one square to the other by doing consecutive moves on the contiguous left, right, lower or top ground square.

5	8	0	9	7	6
7	0	0	9	2	6
8	0	6	7	9	7
0	0	8	7	0	0
0	5	0	0	3	2
0	9	0	0	6	0
8	1	0	0	7	0

Archipelago in the moment the elevation is measured

5	8	0	9	7	6
7	0	0	9	2	6
8	0	6	7	9	7
0	0	8	7	0	0
0	5	0	0	3	2
0	9	0	0	6	0
8	1	0	0	7	0

Archipelago after 5 years

Citizens are interested in knowing how the beauty of their archipelago is going to change over the course of a few centuries. Write a program which will, for each of the given years, determine the beauty of the archipelago after that many years pass from the moment of measurement of elevation.

INPUT DATA

In the first line there are natural numbers **R** and **C** ($3 \le$ **R**, **C** ≤ 1000), dimensions of the map.

In each of the following **R** lines there are **C** nonnegative integers divided by space, of value at most 10^9, which represent elevations of the squares in the moment of measurement.

In the next line there is a natural number **Q** ($1 \le$ **Q** $\le 100\,000$), number of years for which we need to determine the beauty of the archipelago.

In the next line there are Q natural numbers divided by space, of value at most 10^9, which represent years for which we need to determine the beauty of the archipelago. Years are listed sorted, from less to greater.

OUTPUT DATA

You must output a total of **Q** lines.

In every line output the beauty of the archipelago after the appropriate number of years in the input data, in the same order as listed there.

SCORING

In test cases worth 50% of total points the following will hold - **R**, **C**, **Q** will be at most 100.

TEST EXAMPLES

input

```
5 6
100 2 3 4 5 6
20 4 45 12 3 4
0 0 1 2 3 0
0 0 0 0 0 0
0 0 1 2 3 0
3
1 4 10
```

output

```
0
1
0
```

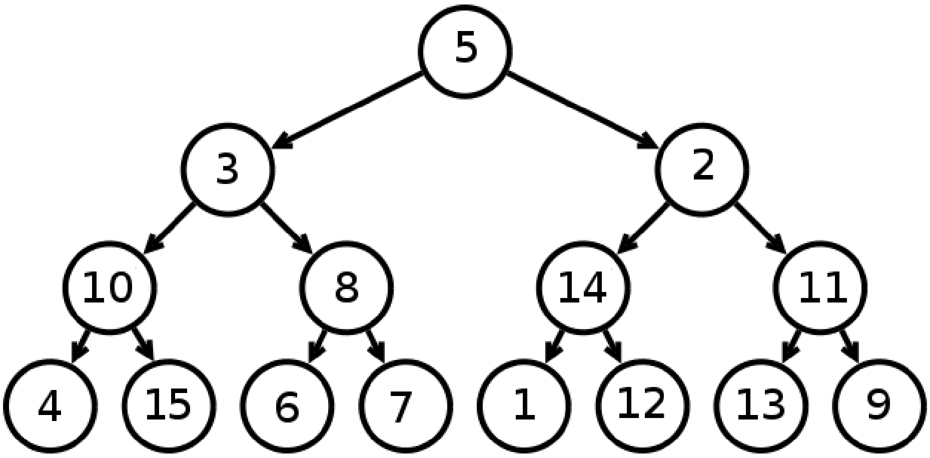
input

```
7 6
5 8 0 9 7 6
7 0 0 9 2 6
8 0 6 7 9 7
0 0 8 7 0 0
0 5 0 0 3 2
0 9 0 0 6 0
8 1 0 0 7 0
1
5
```

output

```
4
```

City college is in the shape of the **complete binary tree** with **N** vertices. Each building corresponds to one of its vertices and each road to one of its edges. The buildings are labeled with numbers 1, ..., N, but the order is not known. The following picture represents college where N is 15 and one of the possible ways to label them.



One warm evening, in the building which corresponds to **the root** of the trees (node 5 in the picture), a very loud party was beign held. Music could be heard even in the outermost buildings of the college. Also, during the evening many students were walking around the college. Moreover, for each pair of buildings (**A, B**) there is a student who was walking the shortest route from A to B. We can ask this student where on his path **was the music loudest**, i.e. what is the building closest to the root which he walked by on his path. Of course, on his way from A to B he can only walk by the edges and the total length of the path is the number of these edges.

For example in the picture above, by walking from bulding 15 to 8 the music was the loudest at building 3, from 6 to 12 at building 5, from 13 and 2 at building 2 and on a route from 10 to 10 of course at building 10.

Your task is to write a program which will by asking **at most 50 000 queries** described above, determine the building labelling of the college. It is sufficient to determine **the parent of for each building**. Exceptionally, we define that the parent of the root is the root itself.

INTERACTION

Before asking queries, you must read the number **N** ($1 \leq N \leq 10\ 000$), the number of buildings. N will always be in the form of $\mathbf{2^K-1}$ for **K** being positive integer.

After reading N you can ask queries in the form '**pitaj A B**', for some pair of buildings A and B. After each query it is neccessary to *flush* the output and then read the label of the building which is the answer to the query.

After determining the configuration of the college, you should output '**kraj**' and after that N integers in N lines. The number in the i-th line represents the parent of the building labeled with number i. Finally, you must *flush* the output one last time.

TESTING

You can test your solutions in two ways, either locally or through the evaluation system. Anyhow, you must first create a file containing the test case that you want to test your solution with.

- In the first line there should be an integer **N**, the number of buildings.

- Next **N** lines should contain labels of buildings, sorted by levels (higher levels first), and within each level ordered from left to right.

One example of the input file which corresponds to the labelling in the picture:

```
15
5
3
2
10
8
14
11
4
15
6
7
1
12
13
9
```

To test using the evaluation system you must first submit your source code through the SUBMIT page, and then send the test case in the TEST page. You will be informed if your program correctly solved your test example.

Local testing is done using a script '**buka_test**' that can be acquired through the evaluation system. It is necessary to write the following command:

```
./buka_test ./your_solution input_file
```

You will be informed if your program exactly solved your test example, and information on the queries your program had asked. Queries your program has asked and the responses it has received will be printed to a file '**buka.log**'.