

## 4627 Islands

Deep in the Carribean, there is an island even stranger than the Monkey Island, dwelled by Horatio Torquemada Marley. Not only it has a rectangular shape, but is also divided into an  $n \times m$  grid. Each grid field has a certain height. Unfortunately, the sea level started to raise and in year  $i$ , the level is  $i$  meters. Another strange feature of the island is that it is made of sponge, and the water can freely flow through it. Thus, a grid field whose height is at most the current sea level is considered *flooded*. Adjacent unflooded fields (i.e., sharing common edge) create unflooded areas. Sailors are interested in the number of unflooded areas in a given year.

An example of a  $4 \times 5$  island is given below. Numbers denote the heights of respective fields in meters. Unflooded fields are darker; there are two unflooded areas in the first year and three areas in the second year.

Year 1:

1	2	3	3	1
1	3	2	2	1
2	1	3	4	3
1	2	2	2	2

Year 2:

1	2	3	3	1
1	3	2	2	1
2	1	3	4	3
1	2	2	2	2

### Input

The input contains several test cases. The first line of the input contains a positive integer  $Z \leq 20$ , denoting the number of test cases. Then  $Z$  test cases follow, each conforming to the format described below.

The first line contains two numbers  $n$  and  $m$  separated by a single space, the dimensions of the island, where  $1 \leq n, m \leq 1000$ . Next  $n$  lines contain  $m$  integers from the range  $[1, 10^9]$  separated by single spaces, denoting the heights of the respective fields. Next line contains an integer  $T$  ( $1 \leq T \leq 10^5$ ). The last line contains  $T$  integers  $t_j$ , separated by single spaces, such that  $0 \leq t_1 \leq t_2 \leq \dots \leq t_{T-1} \leq t_T \leq 10^9$ .

### Output

For each test case, your program should output a single line consisting of  $T$  numbers  $r_j$  separated by single spaces, where  $r_j$  is the number of unflooded areas in year  $t_j$ .

### Sample Input

```

1
4 5
1 2 3 3 1
1 3 2 2 1
2 1 3 4 3
1 2 2 2 2
5
1 2 3 4 5

```

**Sample Output**

2 3 1 0 0