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 4×5 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 $0 \leq t_1 \leq t_2 \leq \ldots \leq t_{T-1} \leq t_T \leq 10^9$.

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
```