Lake Biwa

Description

Lake Biwa in Shiga Prefecture is a well-known landscape, especially for the Biwa Island in the middle of the lake.

Biwa Island is a rectangle island that is divided into $n \times m$ grids in convenience. What's more, each grid area has a certain height $h_{i,j}(1 \leq i \leq n, 1 \leq j \leq m)$.

Unfortunately, these years the water level of Lake Biwa has started rising, and it will rise to i meters high (compare to its original height, i.e. 0 meter) in the i-th year. Biwa Island is formed by soft soil, and the water of Lake Biwa can penetrate into it freely. In other words, if a grid area is not higher than the current water level $(h_{i,j} \leq h_{water})$, it will be flooded.

As the water level rises, penetrated water may separate Biwa Island into several smaller islands. Here, one island consists of one group of connected grids (grids with common edge) that haven't been flooded. Given the initial appearance of Biwa Island, Kyaru wants to know how many smaller islands that the water will separate Biwa Island into in some certain years.

Input

The first line contains two integers n and m, separated by a space, indicating the size of Biwa Island.

The i-th line of the following n lines contains m positive integer, the j-th of which denotes $h_{i,j}$.

The next line contains an integer T denoting the number of years Kyaru would like to ask, followed by a line containing T integers $t_1 \ldots t_T$ where t_i means Kyaru would like to know the number of islands in the t_i-th year. It is guaranteed that $t_1 \leq t_2 \leq \cdots \leq t_{T-1} \leq t_T$.

Output

Print a single line with T integers $c_k(1 \leq k \leq T)$ seperated by spaces, where c_k represents the number of smaller islands in t_k-th year.

Sampe Input/Output

Input

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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
```

Output

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2 3 1 0 0
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Constraint

$1 \leq n, m \leq 500, 1 \leq h_{i,j} \leq 10^9, 1 \leq T \leq 10^5, 0 \leq t_k \leq 10^9$.

Hint

Process t_k in reverse order, use disjoint-set to maintain information.