# Fire

## Problem Description
One day a forest where Tarzan lives is on fire. The forest is a rectangular grid of cells, where every cell has one tree growing in it.

The fire is spreading fast. If a tree is burning, it will remain on fire forever. If a tree is not burning and there is a burning tree adjacent to it (horizontally or vertically), then the tree will get burnt as well after 1 minute. Otherwise the tree remains safe.

Tarzan asks your help to count how many trees are burnt after **T** minutes. You will also need to answer several queries on how many minutes a tree on a cell is safe until it gets burnt.

## Input
The first line contains two integers **M**, the number of rows and **N**, the number of columns in the forest grid ($1 <= M, N <= 20$). The next lines are the forest grid of size **M** x **N**, where **F** means that the tree is on fire, while **S** means that the tree is safe. The next line contains an integer **T** ($1 <= T <= 100$), the time elapsed in minutes.

The next line contains an integer **Q** ($1 <= Q <= 100$), the number of queries. Then **Q** lines will follow, each of them contains the coordinate ($x, y$) of the cell of interest, i.e. the y-th column of the x-th row. Note that the indices are 1-based, so the top left corner will have the coordinate (1,1). You can assume that there is at least one tree is on fire.

## Output
You need to print the number of burnt trees after **T** minutes in a single line.
Then for each query, print the longest period (in minutes) the tree is safe from fire, with the format "Tree at (x,y) is safe for t minutes."

## Sample Input 1
```
3 3
S S S
S F S
S S S
1
3
1 1
1 2
2 2
```

## Sample Output 1
```
Number of burnt trees: 5.
Tree at (1,1) is safe for 2 minutes.
Tree at (1,2) is safe for 1 minutes.
Tree at (2,2) is safe for 0 minutes.
```

## Explanation
At the beginning, tree at (2,2) is on fire. Hence it is safe for 0 minutes.

After 1 minute, the forest configuration will be:

```
S F S
F F F
S F S
```

After 2 minutes, all of the trees in the forest are on fire.

### Sample Input 2

```
5 5
S S S S S
S S F S S
S S S S F
S S S S S
S S S S S
2
2
2 1
2 2
```

### Sample Output 2

```
Number of burnt trees: 17.
Tree at (2,1) is safe for 2 minutes.
Tree at (2,2) is safe for 1 minutes.
```

### Explanation

After 1 minute, the forest configuration will be:

```
S S F S S
S F F F F
S S F F F
S S S S F
S S S S S
```

After 2 minutes:

```
S F F F F
F F F F F
S F F F F
S S F F F
S S S S F
```