Problem I
Rectangular Pool

You are the owner of a land that can be represented as a grid G of size $N \times M$, with rows numbered from 1 to N, and columns numbered from 1 to M. Define $G_{i,j}$ as the cell of the grid on the row i and column j. Each cell of G has either of the following terrains: puddle represented as `.` and dirt represented as `#`. A connected component of puddles are defined as a **pool**. A connected component is a set of cells such that any two cells in the set are connected by traversing between cells that share a side.

Your land is very bizarre that, for the next Q days, exactly one cell will change its type. Formally, suppose cell at row R and column C change its type. If the cell $G_{R,C}$ is a puddle, it will transform into dirt; if the cell is dirt, it will transform into a puddle.

You have an abnormal obsession to rectangles, so you will get sick if a pool is not rectangular. A rectangular pool is defined as follows: let r_{min}, r_{max}, c_{min}, and c_{max} as the minimum row number, maximum row number, minimum column number, and maximum column number of all puddles in the pool respectively, then there are exactly $(r_{max} - r_{min} + 1) \times (c_{max} - c_{min} + 1)$ puddles in the pool.

At the end of each day, determine if there exists any non-rectangular pool in your land!

Input

The first line contains two integers N and M ($1 \leq N \leq M \leq 1000$). Each of the next N lines contains M characters of either `.` or `#`, where the character at i-th row and j-th column represents the type of cell $G_{i,j}$.

The next line contains an integer Q ($1 \leq Q \leq 300\,000$). Each of the next Q lines contains two integers R and C ($1 \leq R \leq N$; $1 \leq C \leq M$) meaning that the cell $G_{R,C}$ change its type.

Output

Output Q lines representing the existence of non-rectangle pool at the end of each day. Each of the lines contains either `RECTANGLES` if all pools are rectangular, or `NO` if there exists a non-rectangular pool.

Sample Input 1	Sample Output 1
5 5 #...# #...# ##### #...# ##### 3 4 3 1 3 2 3	RECTANGLES NO RECTANGLES

Explanation of Sample 1: The following are the states of the land after each day:

```
#...#   #.#.#   #.#.#
#...#   #...#   #.#.#
#####   #####   #####
#.#.#   #.#.#   #.#.#
#####   #####   #####
```

After the first day, all three pools are rectangular pools. After the second day, the pool formed by cells $(1, 2)$, $(1, 4)$, $(2, 2)$, $(2, 3)$, $(2, 4)$ is not rectangular. All pools are rectangular again after the third day.

Sample Input 2	Sample Output 2
3 4 #### #.## #### 1 2 2	RECTANGLES