

Problem I. It's All Squares

Input file: *standard input*
Output file: *standard output*
Time limit: 4 seconds
Memory limit: 512 mebibytes

One day when Little Q woke up, he found himself being inside a 2D pixel world. The world is a grid with $n \times m$ square cells. Little Q can only walk along the sides of these cells, which means he can stay at a point (x, y) if and only if $0 \leq x \leq n$ and $0 \leq y \leq m$, where x and y are integers. There is a number written at the center of each cell, number $w_{i,j}$ ($1 \leq i \leq n$, $1 \leq j \leq m$) is written at the point $(i - 0.5, j - 0.5)$.

Little Q had no idea about how to escape from the pixel world, so he started wandering. You will be given q queries, each query consists of two integers (x, y) and a string S , denoting the route of Little Q. Initially, Little Q will stand at (x, y) , then he will do $|S|$ steps of movements $S_1, S_2, \dots, S_{|S|}$ one by one. Here is what he will do for each type of movement:

- “L” : Move from (x, y) to $(x - 1, y)$.
- “R” : Move from (x, y) to $(x + 1, y)$.
- “D” : Move from (x, y) to $(x, y - 1)$.
- “U” : Move from (x, y) to $(x, y + 1)$.

It is guaranteed that Little Q will never walk outside of the pixel world, and the route will form a simple polygon. For each query, please tell Little Q how many distinct numbers there are inside the polygon formed by the route.

Fortunately, after solving this problem, Little Q woke up on his bed. The pixel world had just been a dream!

Input

The first line contains a single integer T ($1 \leq T \leq 10$), the number of test cases. For each test case:

The first line contains three integers n, m, q ($1 \leq n, m \leq 400$, $1 \leq q \leq 200\,000$) denoting the dimensions of the pixel world and the number of queries.

Each of the following n lines contains m integers, the i -th line contains m integers $w_{i,1}, w_{i,2}, \dots, w_{i,m}$ ($1 \leq w_{i,j} \leq n \times m$) denoting the number written in each cell. (Note that you will have to rotate this representation if you want “U” to actually mean “up”, etc.)

Each of the following q lines contains two integers x and y ($0 \leq x \leq n$, $0 \leq y \leq m$) and a non-empty string S ($S_i \in \{L, R, D, U\}$) describing each query.

It is guaranteed that $\sum |S| \leq 4\,000\,000$.

Output

For each query, output a line with a single integer: how many distinct numbers are inside the polygon.

Example

| standard input | standard output |
|------------------|-----------------|
| 1 | 6 |
| 3 3 2 | 2 |
| 1 2 3 | |
| 1 1 2 | |
| 7 8 9 | |
| 0 0 RRRUUULLLDDD | |
| 0 0 RRUULLDD | |