

# HEDGE MAZE

Puss and Kitty must face the diabolical challenge of the *Down-Right Hedge Maze*. The maze is an  $R \times C$  grid of cells with  $R$  rows (numbered 1 to  $R$  from top to bottom) and  $C$  columns (numbered 1 to  $C$  from left to right). The cell in the  $r$ th column and  $c$ th row is denoted  $(r, c)$ . There are three types of cells, denoted by an uppercase character:

- D: It is only allowed to move downwards from this cell (if there is a cell there).
- R: It is only allowed to move rightwards from this cell (if there is a cell there).
- B: It is allowed to move downwards or rightwards from this cell (if there is a cell there).

It is possible to reach cell  $(R, C)$  from every cell in the maze.

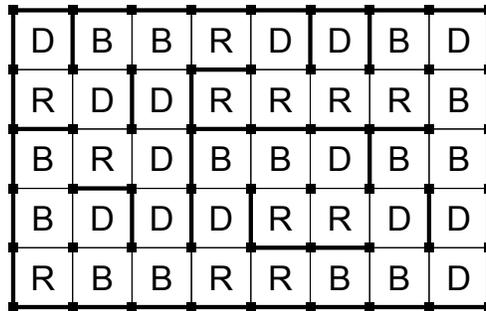


Figure 1: The maze from Sample Input 1. Thick black lines are drawn between cells where a move is disallowed.

To defeat the challenge, Puss and Kitty must answer  $Q$  queries. In each query, you are given four integers  $a_i, b_i, c_i$  and  $d_i$  and must answer the following question: If Puss starts in the cell  $(a_i, b_i)$  and Kitty starts in the cell  $(c_i, d_i)$ , what is the the fewest total moves they must make to meet at a common cell? Puss and Kitty start in different cells.

## Subtasks and Constraints

For all subtasks:

- $2 \leq R \leq 1000$
- $2 \leq C \leq 500\,000$
- $4 \leq R \times C \leq 1\,000\,000$
- $1 \leq Q \leq 100\,000$
- $1 \leq a_i \leq R$  and  $1 \leq b_i \leq C$  for all  $i$ .
- $1 \leq c_i \leq R$  and  $1 \leq d_i \leq C$  for all  $i$ .
- $(a_i, b_i) \neq (c_i, d_i)$  for all  $i$ .

Additional constraints for each subtask are given below.

Subtask	Points	Additional constraints
1	9	$R, C \leq 20$
2	17	$(a_i, b_i) = (1, 1)$ for all $i$ .
3	20	Each cell will be type D or R.
4	29	There is a sequence of moves from $(1, 1)$ to any cell in the maze.
5	25	No additional constraints.

## Input

- The first line of input contains the three integers  $R, C, Q$ .
- $R$  lines follow, each containing a string of  $C$  characters, describing the maze. The  $c$ th character on the  $r$ th line represents the type of the cell  $(r, c)$ .
- $Q$  lines follow, describing the queries. The  $i$ th line contains the four integers  $a_i, b_i, c_i$  and  $d_i$ .

## Output

Output  $Q$  lines. On the  $i$ th line, print the answer to the  $i$ th query.

### Sample Input 1

```
5 8 3
DBBRDDBD
RDDRRRRB
BRDBBDBB
BDDRRRDD
RBBRRBBD
1 2 3 7
3 3 1 1
3 6 4 4
```

### Sample Output 1

```
9
4
7
```

### Sample Input 2

```
4 4 4
BBRD
DRBB
BDRD
BBRB
2 1 3 3
1 3 2 2
3 3 1 3
4 1 3 2
```

### Sample Output 2

```
7
4
4
2
```

### Explanation

In Sample Input 1:

- For the first query, Puss and Kitty start in cell (1, 2) and (3, 7) respectively. They can meet in cell (3, 8), requiring 8 and 1 moves respectively, for a total of 9 moves.
- For the second query, Puss and Kitty start in cell (3, 3) and (1, 1) respectively. They can meet in cell (3, 3), requiring 0 and 4 moves respectively, for a total of 4 moves.
- For the third query, Puss and Kitty start in cell (3, 6) and (4, 4) respectively. They can meet at cell (5, 7), requiring 3 and 4 moves respectively, for a total of 7 moves.

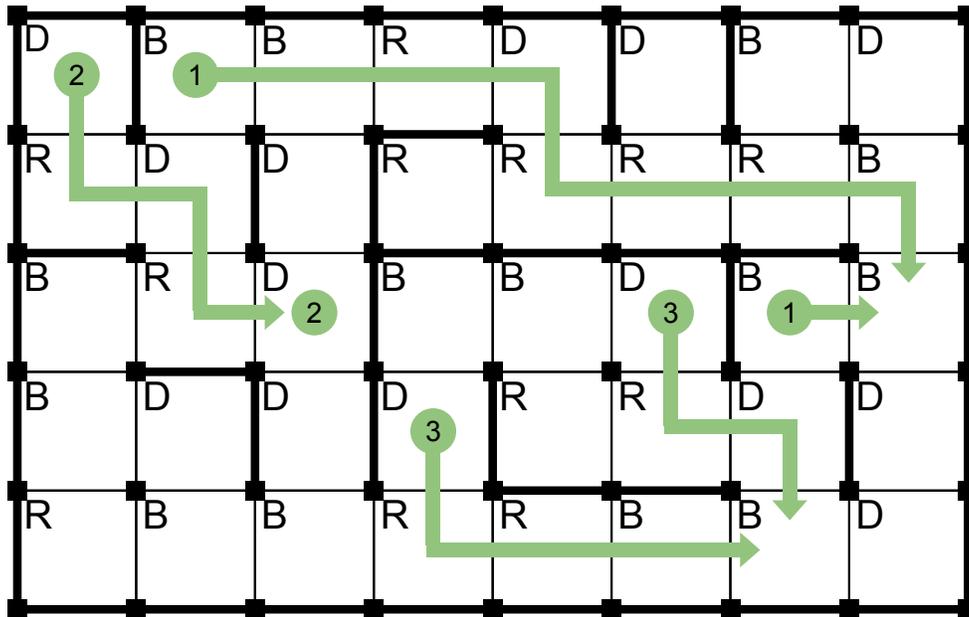


Figure 2: Sample Input 1

In Sample Input 2:

- For the first query, Puss and Kitty start in cell (2, 1) and (3, 3) respectively. They can meet in cell (4, 4), requiring 5 and 2 moves respectively, for a total of 7 moves.
- For the second query, Puss and Kitty start in cell (1, 3) and (2, 2) respectively. They can meet in cell (2, 4), requiring 2 and 2 moves respectively, for a total of 4 moves.
- For the third query, Puss and Kitty start in cell (3, 3) and (1, 3) respectively. They can meet at cell (3, 4), requiring 1 and 3 moves respectively, for a total of 4 moves.
- For the fourth query, Puss and Kitty start in cell (4, 1) and (3, 2) respectively. They can meet at cell (4, 2), requiring 1 and 1 move respectively, for a total of 2 moves.

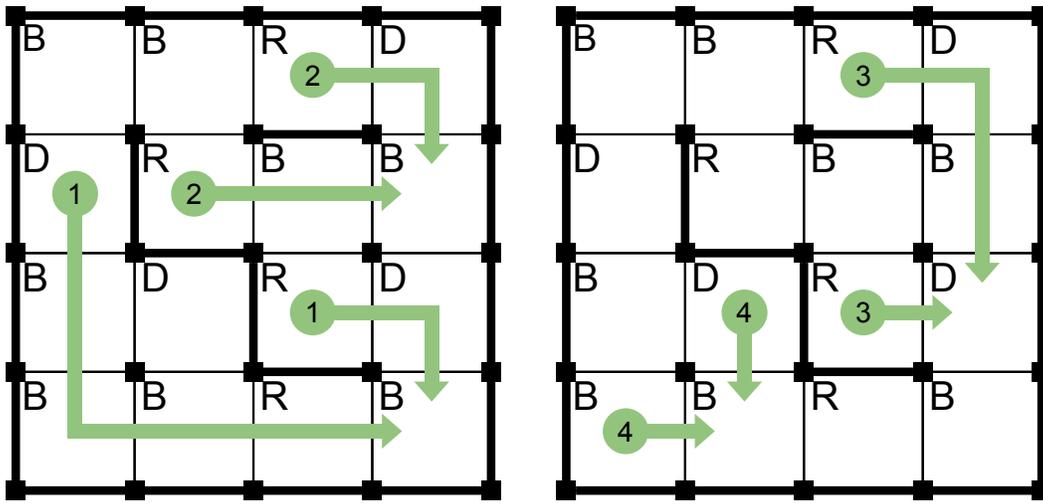


Figure 3: Sample Input 2. Queries 3 and 4 are shown on a separate copy of the maze for clarity.