

## Problem J. 2D Travel

Input file:            **standard input**  
Output file:         **standard output**  
Time limit:          3 seconds  
Memory limit:       1024 megabytes

There is a robot in the 2D rectangular region  $W = \{(x, y) \mid 0 \leq x \leq n, 0 \leq y \leq m\}$ . Assume that the robot is at  $(x, y)$  currently, it can move in the following four directions:

- U : go from  $(x, y)$  to  $(x, y + 1)$  if  $(x, y + 1) \in W$ ;
- D : go from  $(x, y)$  to  $(x, y - 1)$  if  $(x, y - 1) \in W$ ;
- L : go from  $(x, y)$  to  $(x - 1, y)$  if  $(x - 1, y) \in W$ ;
- R : go from  $(x, y)$  to  $(x + 1, y)$  if  $(x + 1, y) \in W$ .

An instruction contains a character  $c$  of “U”, “D”, “L”, “R” and an integer  $t$  ( $1 \leq t \leq 10^9$ ), indicating that the robot moves in the direction  $c$  for  $t$  times consecutively under the instruction.

Given a list of instructions of length  $k$ , there are  $q$  queries, you should report the final position and the length of the moving route if the robot starts moving from the given position  $(x, y)$  and does the  $l$ -th,  $(l + 1)$ -th,  $(l + 2)$ -th, ...,  $r$ -th instructions one by one for each query.

### Input

The first line contains four integers  $n, m$  ( $1 \leq n, m \leq 10^9$ ),  $k, q$  ( $1 \leq k, q \leq 10^5$ ), denoting the size of the rectangular region, the number of instructions, and the number of queries respectively.

Each of the following  $k$  lines contains a character  $c$  of “U”, “D”, “L”, “R” and an integer  $t$  ( $1 \leq t \leq 10^9$ ), denoting an instruction.

Each of the following  $q$  lines contains four integers  $x$  ( $0 \leq x \leq n$ ),  $y$  ( $0 \leq y \leq m$ ),  $l, r$  ( $1 \leq l \leq r \leq k$ ), denoting a query.

### Output

For each query, output a line containing three integers  $u, v$  and  $w$ , denoting the coordinates of the final position and the length of the moving route.

### Example

standard input	standard output
3 2 5 2	1 0 3
L 2	3 2 4
D 2	
R 1	
R 1	
U 2	
1 1 1 3	
2 1 2 5	

### Note

- For the first query, the moving route is  $(1, 1) \xrightarrow{L} (0, 1) \xrightarrow{L} (0, 1) \xrightarrow{D} (0, 0) \xrightarrow{D} (0, 0) \xrightarrow{R} (1, 0)$ , where the final position is  $(1, 0)$  and the length of the moving route is 3.
- For the second query, the moving route is  $(2, 1) \xrightarrow{D} (2, 0) \xrightarrow{D} (2, 0) \xrightarrow{R} (3, 0) \xrightarrow{R} (3, 0) \xrightarrow{U} (3, 1) \xrightarrow{U} (3, 2)$ , where the final position is  $(3, 2)$  and the length of the moving route is 4.