Clean UP

SEASON 2021/2022 – FIFTH ROUND

Sashka is a vacuum cleaner. Not just any vacuum cleaner, but a space robot vacuum cleaner. She's hired to clean Harry's room, which can be represented as a table with N rows and N columns. Initially, all the cells are dirty. Harry is weird, so he placed K concentrated black holes in his room, the i-th of them located in cell (a_i, b_i). Sashka is unaffected by the attraction of the black holes (after all, her creator Kyusho has foreseen all sorts of events), but they do affect the cosmic dust she assiduously wants to collect. The more cosmic dust Sashka collects, the better. Let Sashka be in cell (c, d) of the table. Then the distance between her and the i-th black hole is equal to $\left\lfloor \sqrt{(c-a_i)^2 + (d-b_i)^2} \right\rfloor$, where the notation $\lfloor q \rfloor$ represents the largest integer $\leq q$. She finds the distance D to the nearest black hole and denotes it as the dust collection factor. If the cell was dirty, Sashka would collect p_D grams of dust. Otherwise, sadly, she won't collect any space dust. Notice, $0 \leq D \leq \lfloor (N-1)\sqrt{2} \rfloor$. Sashka is initially in cell (x, y) at moment zero. She can move into adjacent cells of side (x, y) in 1 second. In each cell Sashka goes through, she vacuums everything. She will vacuum her initial cell as well. Sashka will wander around the table for exactly S seconds before her battery runs out. That means, she will move between cells exactly S times.

The black holes in Harry's room warp the spacetime so much, that they themselves change locations every $\lfloor \sqrt{S} \rfloor$ seconds. The new location of the i-th black hole would be $((a_i * W + Z) \bmod N + 1, (b_i * Z + W) \bmod N + 1)$. More precisely, at each shift, for each black hole, $a_i := (a_i * W + Z) \bmod N + 1$ and $b_i := (b_i * Z + W) \bmod N + 1$, where $:=$ denotes the assignment sign. Also, each cell becomes dirty again.

Surpriseeee! It turns out you're Sashka. Write a program `cleanUP.cpp` that outputs a route that you will clean around the table.

Input

The first line of `cleanUP.in` contains seven positive integers – N, K, S, W, Z, x и y. The next line contains $\lfloor (N-1)\sqrt{2} \rfloor + 1$ positive integers, $p_0, p_1, p_2, \ldots, p_{\lfloor (N-1)\sqrt{2} \rfloor}$ respectively. Next, K lines follow, the i-th of which contains two positive integers, a_i and b_i.

Output

On one line of `cleanUP.out` print S symbols, describing your route of vacuuming. Suppose after $i-1$ moves, you are positioned in $(x`, y`)$. Then if:

- i-th symbol of the output is `L` – you move to cell $(x`, y` - 1)$.
- i-th symbol of the output is `U` – you move to cell $(x` - 1, y`)$.
- i-th symbol of the output is `R` – you move to cell $(x`, y` + 1)$.
- i-th symbol of the output is `D` – you move to cell $(x` + 1, y`)$.

Your route of vacuuming will be valid only if each of the following requirements is complied with:

- Contains exactly S symbols.

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- Each of them is `L`, `U`, `R` or `D`.
- You don't exit the table.

Constraints

$2 \leq N, S \leq 100\,000$

$1 \leq K \leq 50$

$1 \leq a_i, b_i, x, y \leq N$

$0 \leq p_i \leq 100\,000$

$0 \leq W, Z \leq 10^9$

Scoring

The score of a participant for a test is the amount of space dust he has collected.

If your route is not valid for a test, you will get 0 points for it. Otherwise, let $yourScore$ be your score and $maxScore$ be the maximum score among all participants. Then your score for the test will be $\frac{yourScore+1}{maxScore+1} \times the\_points\_for\_the\_test$.

Subtasks

Percentage of tests	Constraints
30%	$N \leq 100, S \leq 1000$
40%	$N \leq 1000, S \leq 10^5$
30%	$N \leq 10^5, S \leq 10^5$

Time Limit: 5.0 sec.
Memory limit: 256 MB.

Sample test

Input (cleanUP.in)	Output (cleanUP.out)
10 2 15 2 1 6 1 8 10 8 1 6 6 4 1 2 6 8 2 7 4 2 3 2	UUUUURRRRRRRRD

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Explanation of the sample test

Second	Event	New values	Result	Explanation
1	Cleaning	Location: (6,1)	8	Minimal distance: 2
2	Cleaning	Location: (5,1)	10	Minimal distance: 1
3	Cleaning	Location: (4,1)	10	Minimal distance: 1
4	Moving	The new loctiton of the black holes respectively are (10,5) и (8,5).		
4	Cleaning	Location: (3,1)	4	Minimal distance: 6
5	Cleaning	Location: (2,1)	1	Minimal distance: 7
6	Cleaning	Location: (1,1)	2	Minimal distance: 8
7	Moving	The new loctiton of the black holes respectively are (2,8) и (8,8).		
7	Cleaning	Location: (1,2)	4	Minimal distance: 6
8	Cleaning	Location: (1,3)	6	Minimal distance: 5
9	Cleaning	Location: (1,4)	6	Minimal distance: 4
10	Moving	The new loctiton of the black holes respectively are (6,1) и (8,1).		
10	Cleaning	Location: (1,5)	4	Minimal distance: 6
11	Cleaning	Location: (1,6)	1	Minimal distance: 7
12	Cleaning	Location: (1,7)	1	Minimal distance: 7
13	Moving	The new loctiton of the black holes respectively are (4,4) и (8,4).		
13	Cleaning	Location: (1,8)	6	Minimal distance: 5
14	Cleaning	Location: (1,9)	6	Minimal distance: 5
15	Cleaning	Location: (1,10)	4	Minimal distance: 6
16	Moving	The new loctiton of the black holes respectively are (10,7) и (8,7).		
16	Cleaning	Location: (2,10)	4	Minimal distance: 6
		Sum:	77 grams of dust	

The table explains Sashka's(Your) behaviour, if she follows the route, described in the sample output. In the "Event" column is described the current event, cleaning when the vacuum cleans and moving, when the black holes move. The grams of space dust collected by the vacuum is given in the "Result" column. The minimal distance to black hole is given in the "Explanation" column.