Cleanliness Drive

Problem Statement

A cleanliness drive was undertaken by the volunteers who are students of UVCE. The drive takes place in an area with length **L** and breadth **B**. **N** volunteers are part of the cleanliness drive, the $\mathbf{i^{th}}$ of which collects trash of weight $\mathbf{W_i}$. Also, there are **M** dust bins in different places, the $\mathbf{i^{th}}$ of which has a maximum capacity of $\mathbf{C_i}$. In addition to the dust bins, there are **K** landfills which have unlimited capacity.

All the three entities, volunteer, dust bin and land fill have integer coordinates, $\mathbf{X_i}$ and $\mathbf{Y_i}$. Each volunteer must throw the trash that is in their possession to either a dust bin or a landfill. To do this, the volunteer must walk from their position to the position of either a dust bin or landfill, which consumes a time which is equal to the Manhattan distance between the position of the volunteer and that of the dust bin or landfill. Manhattan distance is the sum of absolute differences between the x-coordinates and y-coordinates of two points.

$$\mathbf{D_m = | X_2 - X_1 | + | Y_2 - Y_1 |}$$

where $\mathbf{D_m}$ is the Manhattan distance between the points $\mathbf{(X_1, Y_1)}$ and $\mathbf{(X_2, Y_2)}$.

It is necessary for all the volunteers to throw away the trash that they have collected. The volunteer can throw the trash into a land fill without any restriction. But the volunteer can throw the trash into a dust bin only if the dust bin's maximum capacity will not be exceeded.

Your task is to assign a dust bin or a land fill for each volunteer to throw their trash into. Among the time taken by all volunteers to throw away the trash, the maximum time should be minimized.

Input Format

- Each input data is provided in a plain text file containing exclusively ASCII characters with lines terminated with a single '\n' character.

- When a single line contains multiple elements, they are separated by single spaces.
- The first line of each test case, consists of five integers, **L**, **B**, **N**, **M** and **K**, the deadline, the length of the area, the breadth of the area, the number of students, the number of dust bins and the number of landfills, respectively.
- The next **N** lines consists of three integers. The three integers in the $\mathbf{i^{th}}$ line are $\mathbf{X_i}$, $\mathbf{Y_i}$ and $\mathbf{W_i}$, the x-coordinate, y-coordinate and the weight of trash with the $\mathbf{i^{th}}$ student.
- The next **M** lines consists of three integers. The three integers in the $\mathbf{i^{th}}$ line are $\mathbf{X_i}$, $\mathbf{Y_i}$ and $\mathbf{C_i}$, the x-coordinate, y-coordinate and the maximum capacity of the $\mathbf{i^{th}}$ dust bin.
- The next **K** lines consists of two integers. The two integers in the $\mathbf{i^{th}}$ line are $\mathbf{X_i}$ and $\mathbf{Y_i}$, the x-coordinate and y-coordinate of the $\mathbf{i^{th}}$ landfill.

Constraints

- $1 \leq \mathbf{L}, \mathbf{B} \leq 2\times10^3$
- $1 \leq \mathbf{N}, \mathbf{M}, \mathbf{K} \leq 2\times10^3$
- $1 \leq \mathbf{W}, \mathbf{C} \leq 10^4$
- $0 \leq \mathbf{X} \leq \mathbf{L}$
- $0 \leq \mathbf{Y} \leq \mathbf{B}$

Output Format

- The output file must contain **N** lines.
- The $\mathbf{i^{th}}$ line must consist of a character and an integer, separated by space. The character must be ‘D’ if the $\mathbf{i^{th}}$ volunteer is assigned to throw the trash collected by them into a dust bin, followed by the index of the dust bin, in which the volunteer must throw the trash. The character must be ‘L’ if the $\mathbf{i^{th}}$ volunteer is assigned to throw the trash collected by them into a landfill, followed by the index of the landfill, in which the volunteer must throw the trash.

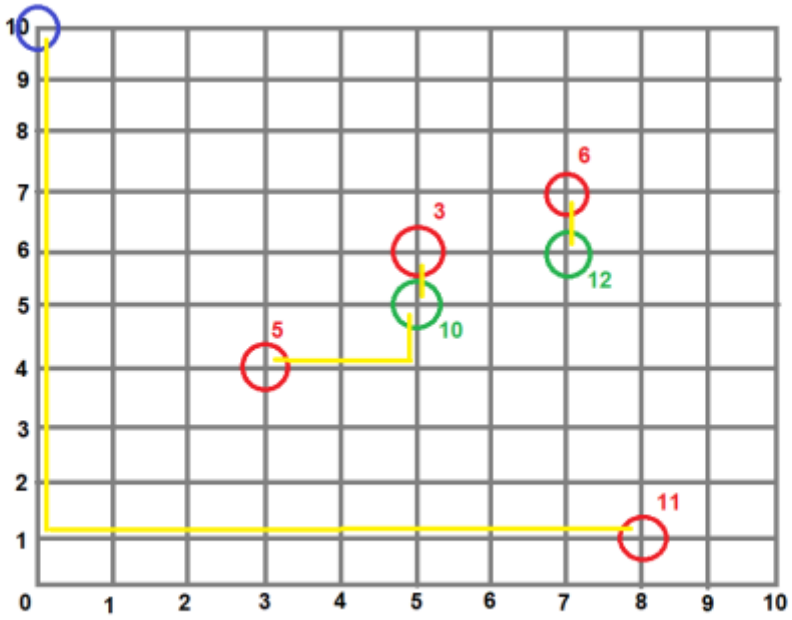
Scoring

- Let $\mathbf{T_i}$ be the time taken by the $\mathbf{i^{th}}$ volunteer to throw away the trash.
- Among all volunteers **i**, where $\mathbf{1 \le i \le N}$, let the maximum $\mathbf{T_i}$ be $\mathbf{T_{max}}$.
- The score for the test case is $\mathbf{(L+B)-T_{max}}$

Examples

Input file	**Description**
10 10 4 2 1	L = 10, B = 10, N = 4, M = 2, K = 1
3 4 5	The first volunteer is at coordinate (3, 4) and carries trash whose weight is 5.
5 6 3	The second volunteer is at coordinate (5, 6) and carries trash whose weight is 3.
7 7 6	The third volunteer is at coordinate (7, 7) and carries trash whose weight is 6,
8 1 11	The fourth volunteer is at coordinate (8, 1) and carries trash whose weight is 12.
5 5 10	The first dust bin is at coordinate (5, 5) and the maximum capacity of the dust bin is 10.
7 6 12	The second dust bin is at coordinate (7, 6) and the maximum capacity of the dust bin is 12.
0 10	The first and only landfill is at coordinate (0, 10)

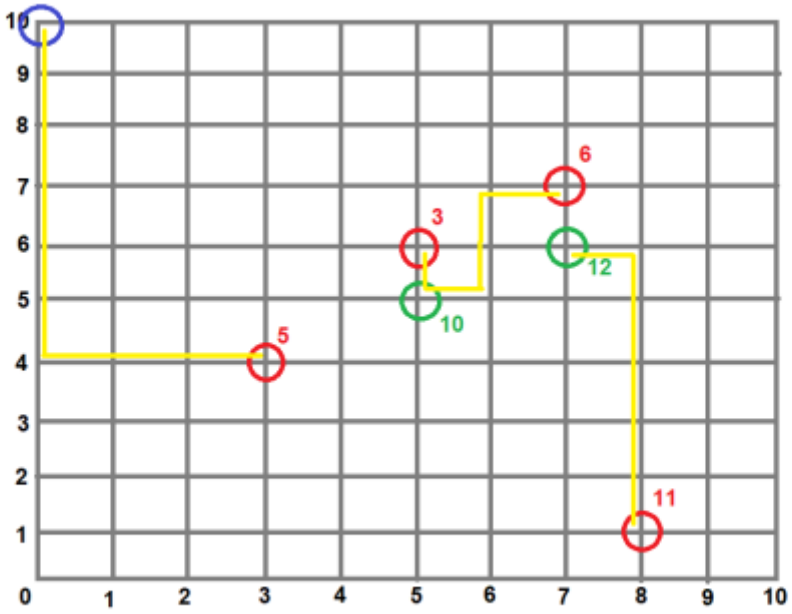
Output File	**Description**
D 1	The first volunteer is assigned to the first dust bin.
D 1	The second volunteer is assigned to the first dust bin.
D 2	The third volunteer is assigned to the second dust bin.
L 1	The fourth volunteer is assigned to the first landfill.



The above image represents the output given above. Positions of volunteers are circled in red, positions of dust bins are circled in green and positions of landfills are circled in blue.

We can easily notice that, the 4th volunteer takes the longest time to throw away the trash. The score is (10+10)-17 = 3

Output File	**Description**
L 1	The first volunteer is assigned to the first landfill.
D 1	The second volunteer is assigned to the first dust bin.
D 1	The third volunteer is assigned to the first dust bin.
D 2	The fourth volunteer is assigned to the second dust bin.



The above image represents the output given above. Positions of volunteers are circled in red, positions of dust bins are circled in green and positions of landfills are circled in blue.

The first volunteer takes 9 units of time to throw away the trash, the second volunteer takes 1 unit of time to throw away the trash, the third volunteer takes 4 units of time to throw away the trash and the fourth volunteer takes 6 units of time to throw away the trash.

The first volunteer takes the longest time to throw away the trash. Hence, the score will be (10+10)-9 = 11.