Electric Box

sahuang

1 Problem Statement

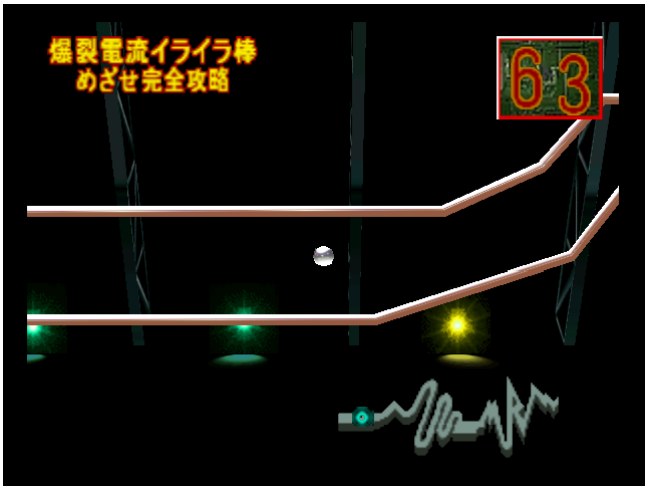


Figure 1: *Denryu Iraira Bou*

Miku is recently obsessed with a game called *The Irritating Maze*. Known as ウルトラ電流イライラ棒 (*Ultra Denryu Iraira Bou*), it is a 2D maze game where players need to guide an electrode ball through a course while avoiding the metallic frame and other obstacles (shown in Figure 1).

For simplicity, the course is modelled as a tube with infinite length in East-West direction and width W in North-South direction. The course is restricted from South by a horizontal line at $y = 0$ and from North by a horizontal line at $y = W$. There is a rectangular "maze" of length L inside the tube filled with circular obstacles. The maze spans all the way from the South line to the North line.

After cracking all levels, *Miku* is thinking of something different: she wants to make the ball as large as possible while still passing the game. Obviously, when the ball is too big it either touches the wall or collides with obstacles. To increase the ball size, *Miku* needs to wrap some layers of metal to the ball. The in-game editor provides a set of metal layers and she can add them in any order until the ball cannot become larger.

In two dimensions, the electrode ball can be described as a circle with radius R. She has N metal layers, the i^{th} of which has thickness t_i. Using the i^{th} layer would increase ball radius by t_i. *Miku* has to move the ball through the obstacles without getting shocked, so she must not touch any of the side walls, nor any of the obstacles. The ball starts far

to the left of the maze and the game is passed if the ball can be moved arbitrarily far to the right of the maze.

What is the maximum number of metal layers *Miku* can apply to the electrode ball such that she can still pass the game?

2 Input

The first line of input contains two space-separated integers R ($1 \leq R \leq 1,000$) and N ($1 \leq N \leq 10^4$), the ball's initial radius and the number of metal layers available.

The second line contains N space-separated integers, the i^{th} of which, t_i, is the thickness of i^{th} metal layer ($0 < t_i \leq 100$).

The third line contains three space-separated integers L ($1 \leq L \leq 10^4$), W ($1 \leq W \leq 10^4$), and M ($0 \leq M \leq 2000$): the maze length, the course width, and number of obstacles, respectively. We assume bottom-left of the maze to be $(0, 0)$ and top-right (L, W). All centers of obstacles will fall inside.

The next M lines describe the obstacles. The i^{th} line contains three space-separated integers x_i ($0 \leq x_i \leq L$), y_i ($0 \leq y_i \leq W$), and r_i ($0 < r_i \leq 10^4$) indicating that the i^{th} obstacle is a circle of radius r_i centered at position (x_i, y_i).

It is guaranteed that any two obstacles will not intersect. All obstacles are fully contained inside the maze, but can touch each other or the side walls.

3 Output

Output the maximum number of metal layers *Miku* can apply to the electrode ball, between 0 and N, inclusive. Display `-1` if it is not possible.

4 Samples

Sample Input 1	Sample Output 1

`200 1`
`10`
`10000 10000 0`
	`1`

Sample Input 2	Sample Output 2

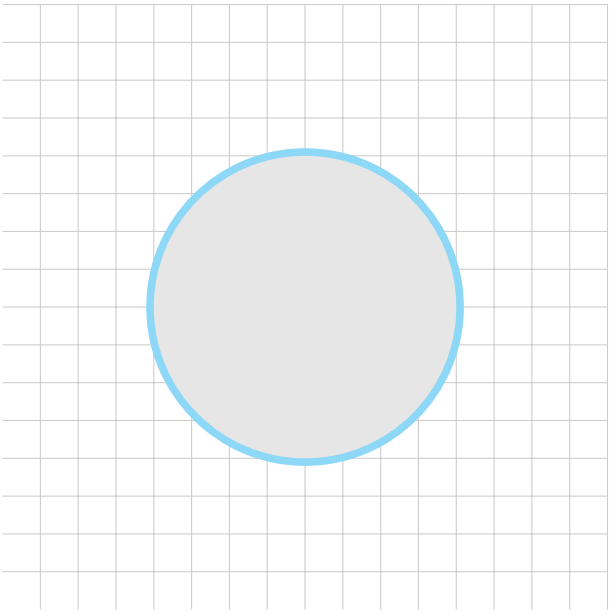
`200 10`
`5 5 5 5 5 5 5 5 5 5`
`10000 450 0`
	`4`

Sample Input 3	Sample Output 3
50 10 1 3 5 7 9 10 8 6 4 2 10000 500 1 5000 250 100	6

Sample Input 4	Sample Output 4
100 3 1 3 2 10000 200 0	-1

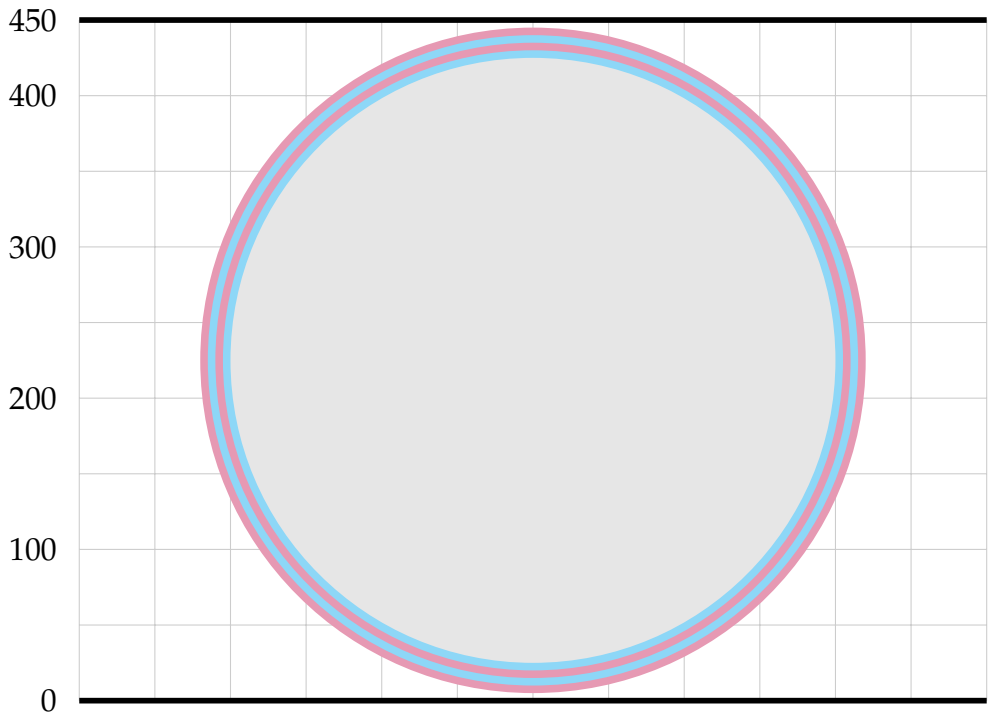
5 Explanation

5.1 Sample 1



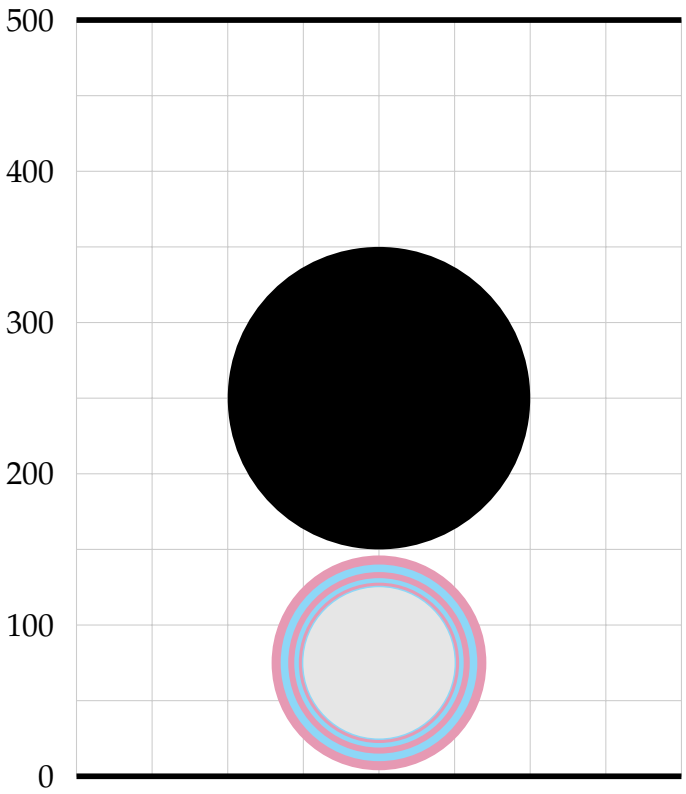
Original ball radius is 200. We can apply a metal layer of thickness 10 without trouble.

5.2 Sample 2

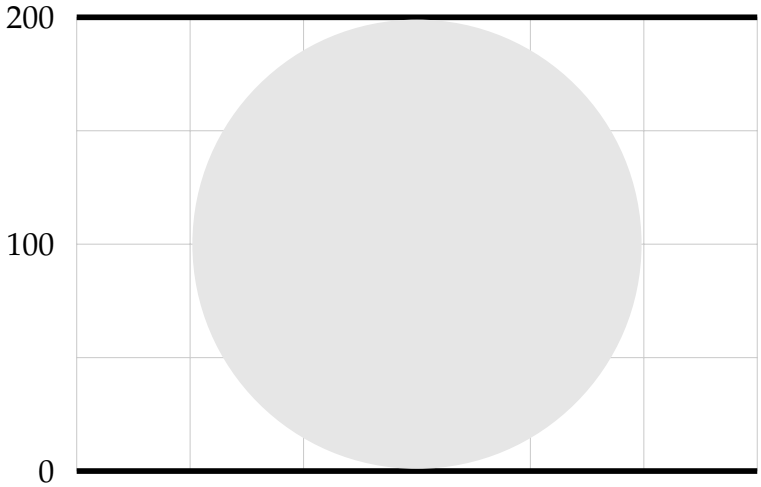


Only 4 layers can be applied to make ball radius 220. It is not possible to use 5 metal layers because the ball would touch the walls.

5.3 Sample 3



5.4 Sample 4



Even the original ball will touch the side walls, so it is not possible to pass the game.