Problem B
Banana Problem
Problem ID: bananaproblem

Gon is playing the game 'Greedy Monkeys'.
The game is setup as follows:

- There are N ladders, numbered from 1 to N. Each ladder has height H, and has $H + 1$ steps at height $0, 1 \ldots, H$. Let (ℓ, h) represent the step at height h of the ℓ-th ladder.
- There are R horizontal ropes. Each rope connects two steps at the same height of two different ladders. The ropes are numbered from 1 to R, and the i-th rope's length is b_i. No rope is connected to any 0-th or H-th step of any ladders. **A step in a ladder has at most one rope connected to it**.
- There are B special positions, numbered from 1 to B. The i-th position is parameterized by 4 integers ℓ_i, h_i, x_i and y_i, where $1 \leq \ell_i \leq N$ and $1 \leq h_i \leq H$. For every non-negative integer t:
  - At time $t \cdot (x_i + y_i) + 0.5$, a new banana appears at position (ℓ_i, h_i).
  - At time $t \cdot (x_i + y_i) + x_i + 0.5$, this banana disappears from position (ℓ_i, h_i).

  For example, if $x_i = 2$ and $y_i = 3$: a banana appears at 0.5 and disappears at 2.5. Then a **different** banana appears at 5.5 and disappears at 7.5, and so on. It is guaranteed that **no rope is connected to a special location**. All special locations are distinct.

At the beginning of the game, there are N monkeys, numbered from 1 to N. The i-th monkey stands at $(i, 0)$. It takes the i-th monkey c_i seconds to climb up one step of any ladders, and d_i seconds to move one unit along any ropes.

A monkey can eat a banana if and only if the monkey is at the same position as the banana, and the banana has not yet disappeared. It takes a monkey a negligible amount of time to eat a banana. Naturally, a banana can only be eaten once. If multiple monkeys is at the same position as a banana at the same time, only one monkey can eat that banana. However, if monkeys arrive at a special location multiple times, they may eat more than one banana in this location.

The player needs to control the monkeys. As Gon is a simple boy, he controls the monkeys using a very simple strategy:

- If a monkey is at a step of a ladder connected to a rope, and **the monkey has not moved along this rope in either directions**, it will immediately start moving along the rope towards the other end.
- Otherwise, the monkey will move up the ladder.
- The monkeys always move according to the above two rules, unless they can no longer moves (which happens only when they reach the H-th step of some ladders).

- The monkeys can freely pass through each other.

How many bananas will the monkeys eat, if Gon follows this strategy?

Input

The first line of input contains 4 integers N, H, R and B ($1 \le N \le 3 \cdot 10^5, 0 \le R, B \le 3 \cdot 10^5, 1 \le H \le 10^9$) — the number of ladders, the height of each ladder, the number of ropes and the number of special locations.

In the next R lines, the i-th line contains 4 integers b_i, $\ell_{1,i}$, $\ell_{2,i}$ and s_i ($1 \le b_i \le 10^4, 1 \le \ell_{1,i}, \ell_{2,i} \le N, \ell_{1,i} \ne \ell_{2,i}, 1 \le s_i < H$), meaning that the i-th rope has length b_i and connects two positions $(\ell_{1,i}, s_i)$ and $(\ell_{2,i}, s_i)$.

In the next N lines, the i-th line contains 2 integers c_i and d_i ($1 \le c_i, d_i \le 10^4$) — the number of seconds it takes for a monkey to move up one step of some ladder, and move one unit along some rope.

In the next B lines, the i-th line contains 4 integers ℓ_i, h_i, x_i and y_i ($1 \le \ell_i \le N, 1 \le h_i \le H, 1 \le x_i, y_i \le 10^4$) — where (ℓ_i, h_i) is the position of the i-th special location. x_i and y_i are its parameters.

It is guaranteed that:

- Each position is connected to at most one rope.
- All special positions, where bananas appear, are distinct.
- Special positions are not connected to any ropes.

Output

Output a single integer — the number of bananas that the monkeys eat, following Gon's strategy.

Explanation of Sample input

In the first example:

- There is only 1 ladder and no ropes.
- The monkey initially stands at $(1, 0)$. It takes 2 seconds for the monkey to move up one step of a ladder.
- There are 2 special locations:
  - The first special location is at $(1, 1)$. A banana appears at time 0.5, disappears at time 1.5. Another banana appears at time 3.5, disappears at time 4.5, and so on.
  - The second special location is at $(1, 2)$. A banana appears at time 0.5, disappears at time 2.5. Another banana appears at time 3.5, disappears at time 5.5, and so on.
- The monkey arrives at $(1, 1)$ at time 2. There is no banana at $(1, 2)$ at this time.

- The monkey arrives at $(1, 2)$ at time 4. The monkey eats 1 banana here.
- Thus, the answer is 1.

In the second example:

- There are 2 ladders, and 1 rope connecting $(1, 1)$ and $(2, 1)$ with length 1.
- The first monkey is initially at $(1, 0)$. It will be at:
  - $(1, 1)$ at time 1,
  - $(2, 1)$ at time 3,
  - $(2, 2)$ at time 4.
- The second monkey is initially at $(2, 0)$. It will be at:
  - $(2, 1)$ at time 2,
  - $(1, 1)$ at time 3,
  - $(1, 2)$ at time 5.
- There are 2 special locations:
  - The first special location is at $(1, 2)$. There is a banana from 0.5 to 3.5, another banana from 4.5 to 7.5 and so on.
  - The second special location is at $(2, 2)$. There is a banana from 0.5 to 2.5, another banana from 5.5 to 7.5 and so on.
- The second monkey can eat the banana at the first special location, and the first monkey can not eat any banana.
- Thus, the answer is 1.

Sample Input 1

```
1 2 0 2
2 1000
1 1 1 2
1 2 2 1
```

Sample Output 1

```
1
```

Sample Input 2

```
2 2 1 2
1 1 2 1
1 2
2 1
1 2 3 1
2 2 2 3
```

Sample Output 2

```
1
```