

## Problem G

# Goombas Colliding

Atsa just bought Super Mario Maker and wants to test your skills for an analysis with a level that he prepared.

That level consists of a platform with some Goombas in it. As you know, Goombas are characters with the following behavior:

- Initially, they point in one direction, (left: 0, right: 1).
- They move in the direction they are currently facing, as long as there are no obstacles.
- If two Goombas collide, they will flip their direction immediately.
- When a Goomba reaches one end of the platform, it falls.

The platform is  $L$  blocks long, extending from the coordinate 0, to  $L$ . Above it, there will be  $G$  Goombas. The  $i$  – th Goomba will be located at  $p_i$  facing to the direction  $d_i$ . All Goombas will advance with a speed of 1 block per second.

Atsa wants you to tell him how many seconds it will take for the platform to be empty.

For this problem purposes, consider the size of a Goomba to be a single point. No two Goombas will share the same initial  $x$  coordinate.

### Input

The first line of the input contains two integers  $L$  ( $2 \leq L \leq 10^{16}$ ) and  $G$  ( $1 \leq G \leq 10^4$ ).

Each of the following  $G$  lines contains two integers  $p_i$  ( $0 < p_i < L$ ) and  $d_i$  ( $d_i \in \{0, 1\}$ ).

### Output

The time in seconds that must pass for the platform to be empty.

<b>Input example 1</b> 3 2 1 1 2 0	<b>Output example 1</b> 2
<b>Input example 2</b> 5 2 1 0 2 1	<b>Output example 2</b> 3