Parking

2024/2025 SEASON – ROUND 4

In Cycleland Lazar travels to university with his bike. In front of the building where he will have a lecture, there is a large rectangular parking for bikes. The parking has size 2xN. Every vehicle parks horizontally or vertically taking exactly 2 cells.

Lazar has live data about free spaces in the parking. He receives notifications of 2 types: 1) driver parks vertically on the cells of column p_i ; 2) the bike at column p_i frees 2 cells.

Before the linear algebra lecture, Lazar thought about the following: what is the number of possible filling configurations of the parking after every notification so that: 1) there does not exist a pair of bikes which intersect; and 2) there do not exist 2 adjacent free cells, so that a bike could park. Two configurations are different if 1) there exists a cell which is filled in the first one but vacant in the second one; or 2) there exists a cell in the first configuration which is filled by a horizontally parked bike, while in the second one – by a vertically parked one.

Now it is your time to combat the problem in order to check your answers after the lecture. Since these answers can be very large, print them modulo $10^9 + 7$.

Input

The first line of the file **parking.in** contains two integers N and Q. Q lines follow, describing the notifications. They are 2 types:

- 1 p_i – the cells on column p_i are taken
- 2 p_i – the cells on column p_i are freed

It is guaranteed that cells that are freed have been taken beforehand.
It is guaranteed that cells that are taken have been free beforehand.

Output

In the file **parking.out** print 1 number after each notification – the number of valid parking configurations by modulo $10^9 + 7$.

Constraints

$1 \leq N \leq 10^{12}$

$1 \leq p_i \leq N$

$1 \leq Q \leq 10^4$

Parking

2024/2025 SEASON – ROUND 4

Time limit: 0.7 sec.

Memory limit: 256 MB

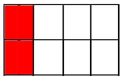
Sample test

Input (parking.in)	Output (parking.out)

4 5
1 1
1 2
2 2
1 3
1 4
	5
	2
	5
	1
	1

Sample test explanation

After notification 3 the parking looks like this:



All valid configurations are as follows: