Problem G. Watering System

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	1024 mebibytes

There are n flower pots in a row, numbered from 1 to n. Along the row, you can place watering machines. Each watering machine is characterized by its position x (an integer between 1 and n) and its direction: left or right.

All watering machines share the same watering range L (a non-negative integer).

- A watering machine at position x pointing to the right waters all pots with indices in the segment $[x, x + L]$.
- A watering machine at position x pointing to the left waters all pots with indices in the segment $[x - L, x]$.

Only pots with indices between 1 and n exist.

Initially, there are no watering machines. You need to process q operations of two types:

- **Insert a watering machine**. An operation of the form "`1` d x" inserts a new watering machine at position x.

  If $d = 0$, the watering machine points to the left.

  If $d = 1$, the watering machine points to the right.

  Multiple watering machines may be placed at the same position. Operations are given in chronological order, and there are no deletions.

- **Range query**. An operation of the form "`2` ℓ r" asks the following question:

  Consider the current set of watering machines. Suppose all watering machines have the same range L. Find the smallest integer $L \geq 0$ such that every pot with index in the segment $[\ell, r]$ is watered by at least one watering machine. Note that watering machines outside the interval $[\ell, r]$ may help water pots inside $[\ell, r]$. If there is no integer L that makes all pots in $[\ell, r]$ watered (no matter how large L is), you must output -1 for this query.

Input

The first line contains two integers, n and q ($1 \leq n, q \leq 3 \cdot 10^5$), representing the number of pots and the number of operations.

Each of the next q lines describes one operation in the order they must be processed:

- "`1` d x": insert a watering machine at position x with direction d, ($d \in \{0, 1\}$, $1 \leq x \leq n$). Here, $d = 0$ means the watering machine points to the left, and $d = 1$ means it points to the right.
- "`2` ℓ r": query the minimal range L for the segment $[\ell, r]$ ($1 \leq \ell \leq r \leq n$).

Output

For each query of the form "`2` ℓ r", output a single line with one integer:

- the minimal integer $L \geq 0$ such that every pot in $[\ell, r]$ is watered, or
- -1 if it is impossible.

Example

standard input	*standard output*
10 11 1 0 6 2 5 8 1 1 3 2 9 10 2 3 9 1 1 8 2 1 9 2 1 8 1 0 4 2 3 7 2 2 9	-1 7 6 5 5 4 4