Problem
Ring of Beads
Time limit: 2 seconds

Little Cyan Fish has n beads arranged in a ring, labeled from 1 to n in clockwise order. Each bead can be colored either cyan or white. He wants to use $S(l, r)$ to denote the number of cyan beads in the *interval* $I(l, r)$, where the *interval* $I(l, r)$ is defined as follows:

- If $l \le r$, it includes the beads with labels $l, l + 1, \ldots, r$.
- If $l > r$, it includes the beads with labels $l, l + 1, \ldots, n, 1, 2, \ldots, r$ (a circular interval that wraps around from n to 1).

He has not yet decided which beads to color cyan, but he has written down m constraints he wants the final coloring to satisfy. There are a total of m constraints of three different types, each denoted by a tuple (t, l, r, v), where $t \in \{1, 2, 3\}$. The meanings of these three types of constraints are as follows:

- Type 1 ($t = 1$): $S(l, r)$ must be at least v ($S(l, r) \ge v$).
- Type 2 ($t = 2$): $S(l, r)$ must be at most v ($S(l, r) \le v$).
- Type 3 ($t = 3$): $S(l, r)$ must be exactly v ($S(l, r) = v$).

Little Cyan Fish wants to know if a coloring satisfying all these constraints exists. If at least one valid coloring exists, he also wants to know how many intervals $I(l, r)$ ($1 \le l, r \le n$) have the same value of $S(l, r)$ in every valid coloring. Two intervals $I(l_1, r_1)$ and $I(l_2, r_2)$ are considered different if and only if $l_1 \ne l_2$ or $r_1 \ne r_2$.

Input

The first line of the input contains two integers n ($2 \le n \le 10^9$) and m ($1 \le m \le 1\,000$), indicating the number of beads and the number of constraints, respectively.

The next m lines describe all the constraints. Each of these lines contains four integers t, l, r, v ($t \in \{1, 2, 3\}$, $1 \le l, r \le n$, $0 \le v \le L$, where $L = |I(l, r)|$ is the total number of beads in the interval $I(l, r)$), describing a constraint of type t.

Output

If no valid coloring exists, output a single line with a single integer -1. Otherwise, output a single line containing a single integer, denoting the number of intervals $I(l, r)$ whose value $S(l, r)$ is the same in every valid coloring.

Sample Input 1	Sample Output 1
16 8 1 1 3 1 1 5 7 1 1 9 11 1 1 13 15 1 2 2 6 1 2 6 10 1 2 10 14 1 2 14 2 1	128

Sample Input 2

```
1000000000 1
2 114514 114513 0
```

Sample Output 2

```
1000000000000000000
```

Sample Input 3

```
100 3
3 1 10 1
3 91 100 1
3 81 20 2
```

Sample Output 3

```
253
```

Sample Input 4

```
6 3
1 1 3 2
1 4 6 2
2 2 5 1
```

Sample Output 4

```
-1
```

Explanation of Sample 1: There are only two possible colorings (`W` = white, `C` = cyan):

- `CWWWCWWWCWWWCWWW`
- `WWCWWWCWWWCWWWCW`

Exactly half of the 16^2 intervals, namely 128 of them, contain the same number of cyan beads in both colorings. Note that although the intervals $I(1,16), I(2,1), I(3,2), \ldots, I(16,15)$ all include all 16 beads, they are counted as distinct intervals when computing the answer.

In the second example, the only valid coloring is the one in which all beads are white.