Ellis and the Ethereal Cat
Problem ID: ellisetherealcat

Ellis, a regular high-school student, is on their way home after a typical school day. But then they spots an ethereal cat floating around! Out of curiosity, they begins to chase after it. However, to Ellis's surprise, the ethereal cat can manipulate space, time, and even travel between parallel universes!!

Initially, the distance between Ellis and the cat is d unit distance. If the distance between Ellis and the cat is not zero, Ellis always moves toward the cat at a unit distance per second. The ethereal cat can take the following actions:

1. Wait for x units of time without moving in the current universe.
2. Teleport d unit distance further away from Ellis instantly in the current universe.
3. Rewind time backward x units. This action creates and enters a new parallel universe where everything that happened in this universe until the current time minus x (including any teleportation at exactly that time) has already happened in the newly created parallel universe.
4. Return to the parallel universe from which it entered the current universe. That universe's time and the positions of Ellis and the cat are the same as when the cat left it.

At any time, Ellis of the current universe may also ask you to compute the closest distance ever between them and the cat in the current universe's history. "But that would be too easy for you!" says the cat. So it would not tell you the details of its further plans unless you could answer Ellis's questions correctly.

Input

The first line of the input contains two integers $(1 \leq n \leq 2 * 10^5)$ and $(1 \leq d \leq 10^9)$, the total number of actions and the initial distance between Ellis and the ethereal cat.

Each of the following n lines contains two encrypted integers $(0 \leq x', y' \leq 2147483647)$. The first integer describes the type of the action, and the second integer is the parameter.

To decrypt the integers, you must compute the xor value of the input and the answer to the previous query or 0 if there haven't been any queries.

Let x and y be the decrypted values of x', y' respectively. It is guaranteed that $0 \leq x \leq 4$ and $0 \leq y \leq 10^9$. If x is 0, this is a query you must answer, and y is not used; otherwise, this is the x-th kind of action the cat may perform described above, and y would be the parameter for a wait, teleport, or rewind action, and not used for the return action.

It is guaranteed that the cat will not move time before time 0 or perform a return action in the initial universe.

Output

For each query outputs a single integer, the minimal distance between Ellis and the cat in the query's parallel universe's history so far.

Sample Input 1	Sample Output 1
8 10 2 5 1 8 0 10 4 4 7 3 14 1 11 0 10 15	7 10 0