Problem J. Program

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	512 mebibytes

You are given a program operating with integer variable X, which is initially equal to 1. The program consists of n instructions of two types:

- "`1 p`" ($1 \le p \le n$), assigns value p to variable X.
- "`2 p q`" ($1 \le p, q \le n$, $p \ne q$), assigns value q to variable X only if the current value of X is p.

In one step, you can remove any single instruction from the program. You can't reorder instructions or add new instructions. What is the minimum number of steps required to get such a program that, after it runs, the variable X has value k? You are asked to solve this problem for each k from 1 to n.

Input

The first line of input contains a single integer n ($2 \le n \le 10^6$), the number of instructions in program.

The next n lines contains descriptions of instructions in the format described above.

Output

Output n integers, where i-th integer is the minimum number of steps required to make program set value i to variable X, or -1 if it is impossible.

Examples

standard input	standard output
3 1 1 1 2 1 3	2 1 0
4 2 1 2 1 3 2 2 3 2 3 1	0 2 1 -1