Fire Safety

In the concrete maze of the CBD, it was recently discovered that there is no universal fire safety coverage! Construction of a safety system begins immediately: high pressure water mains are installed in some buildings, while pipes are built to connect them to other buildings. Any building that contains a water main, or is connected to one by a series of pipes via other buildings, is considered *safe*.

Unfortunately, the safety inspection bureau has started doing spot checks immediately, giving companies no time to prepare, so they hire you to figure out which spot checks will be failed, given a schedule of the safety system rollout and inspections.

Input

The first line of input will contain two space-separated integers, N ($1 \leq N \leq 1,000,000$) and Q ($1 \leq Q \leq 100,000$), the number of buildings in the CBD (numbered 1 to N), and the length of the schedule, respectively. Each of the following Q lines will be of the form:

- `P i j`: a pipe is installed connecting buildings i and j
- `M i`: a high pressure water main is installed in building i
- `C i`: a spot check is conducted in building i

Output

For each input line describing a spot check, output a line containing a single integer `0` if the building fails the spot check, or `1` if it passes.

Sample Input

```
4 7
P 1 2
C 1
P 1 3
M 2
C 3
P 1 4
C 4
```

Sample Output

```
0
1
1
```

Explanation

When the first check is conducted, there are no water mains installed, so building 1 fails the check. By the second check, pipes have been installed connecting building 3 to building 2 via building 1, and there is a water main at building 2, so building 3 is safe. Building 4 is also connected indirectly to the water main in building 2 when its check occurs, so it also passes.