Problem C. Puzzle: Hearthstone

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	256 mebibytes

Hearthstone is one of the popular video games. **Please read the following rules carefully. They are different from the usual rules.**

There are n kinds of secret cards numbered 1, 2, ..., n. There are two types of events about secrets:

- `add`: Add a secret with an unknown number into the hero zone. No two secrets with the same number can be in the hero zone simultaneously.
- `test` x y: Test whether secret x exists. If secret x exists, then $y = 1$ and secret x is removed from the hero zone; otherwise, $y = 0$. Note that whatever y is, secret x does not exist in the hero zone after `testing` x.

An event sequence $E = [e_1, \ldots, e_m]$ is valid if and only if it is possible to assign a number from 1 to n for each `add` event and perform the events $e_1, e_2, \ldots, e_m$ in order such that:

- no secrets are in the hero zone at the beginning;
- secret x does not exist right before an event which `add`s a secret x;
- secret x exists right before an event `test` x 1;
- secret x does not exist right before an event `test` x 0.

Given q events $e_1, e_2, \ldots, e_q$, you need to maintain an event sequence E. Initially, E is empty. For each $i = 1, 2, \ldots, q$ in order, try to append e_i to the end of E. If E is invalid, remove e_i and report a bug. Otherwise, find the number of secrets that must exist in the hero zone and the number of secrets that must not exist in the hero zone after performing the events of E in order.

Note that the number of *secrets that must (not) exist* is not just the *number of* (non-)existing secrets. For example, if $n = 2$, initially, secret 1 is missing and secret 2 is missing, so the answers would be 0 and 2. After a single `add`, secret 1 is unknown (can be or not be in hero zone) and secret 2 is unknown, so the answers are 0 and 0. After `test` 2 0, secret 2 is missing, so we know the added one was certainly secret 1, so secret 1 is present, and the answers are 1 and 1. See examples for better understanding.

Input

There are multiple test cases. The first line of input contains an integer T ($1 \le T \le 10^5$), the number of test cases. For each test case:

The first line contains two integers n and q ($1 \le n, q \le 10^5$), the number of kinds of secrets and the number of events.

The i-th line of the following q lines represents e_i and contains:

- either a string "`add`";
- or a string "`test`" followed by two integers x and y ($1 \le x \le n$, $0 \le y \le 1$).

It is guaranteed that both the sum of n and the sum of q over all test cases do not exceed 10^5.

Output

For each test case:

For each event, if it can be appended, output two integers: the number of secrets that must exist in the hero zone and the number of secrets that must not exist in the hero zone; otherwise, output the string "bug".

Examples

standard input	standard output
2 1 8 test 1 0 test 1 1 add test 1 0 test 1 1 add test 1 1 test 1 0 2 10 add add add test 1 1 test 1 1 add add add test 2 1 test 2 1	0 1 bug 1 0 bug 0 1 1 0 0 1 0 1 0 0 2 0 bug 1 1 bug 2 0 bug bug 1 1 bug
1 4 7 add add test 3 0 test 4 0 add test 1 1 test 3 1	0 0 0 0 0 1 2 2 2 0 1 1 1 3