Problem E
Is-A? Has-A? Who Knowz-A?

Two familiar concepts in object oriented programming are the is-a and has-a relationships. Given two classes A and B, we say that A is-a B if A is a subclass of B; we say A has-a B if one of the fields of A is of type B. For example, we could imagine an object-oriented language (call it ICPC++) with code like that in Figure E.1, where the class `Day` is-a `Time`, the class `Appointment` is both a `DateBook` and a `Reminder`, and class `Appointment` has-a `Day`.

```
class Day extends Time
{
   ...
}
```

```
class Appointment extends Datebook, Reminder
{
   private Day date;
   ...
}
```

Figure E.1: Two ICPC++ classes.

These two relationships are transitive. For example if A is-a B and B is-a C then it follows that A is-a C. This holds as well if we change all the is-a's in the last sentence to has-a's. It also works with combinations of is-a's and has-a's: in the example above, `Appointment` has-a `Time`, since it has-a `Day` and `Day` is-a `Time`. Similarly, if class `DateBook` has-a `Year` then `Appointment` has-a `Year`, since `Appointment` is-a `DateBook`.

In this problem you will be given a set of is-a and has-a relationships and a set of queries of the form A is/has-a B. You must determine if each query is true or false.

Input:

Input starts with two integers n and m, ($1 \leq n, m \leq 10\,000$), where n specifies the number of given is-a and has-a relationships and m specifies the number of queries. The next n lines each contain one given relationship in the form c_1 r c_2 where c_1 and c_2 are single-word class names, and r is either the string "is-a" or "has-a". Following this are m queries, one per line, using the same format. There will be at most 500 distinct class names in the $n + m$ lines, and all class names in the last m lines will appear at least once in the initial n lines. All is-a and has-a relationships between the given classes can be deduced from the n given relationships. Is-a relationships can not be circular (apart from the trivial identity "x is-a x").

Output

For each query, display the query number (starting at one) and whether the query is true or false.

Sample Input 1	Sample Output 1
5 5 Day is-a Time Appointment is-a Datebook Appointment is-a Reminder Appointment has-a Day Datebook has-a Year Day is-a Time Time is-a Day Appointment has-a Time Appointment has-a Year Day is-a Day	Query 1: true Query 2: false Query 3: true Query 4: true Query 5: true