Family Tree

Computer Science Society
Programming Contest
Winter 2008

As far as I know, every person—a child—has a single biological father and mother—their parents. The child is a descendant of each of the parents, as are each of the child's children and so on. Both parents are ancestors of the child, as are the parents' parents and so on. To the mathematically inclined, the child relation is the reversal of the parent relation, and the descendant and ancestor relations are the transitive closures of the child and parent relations, respectively. In this problem you are given birth records, each naming a father, a mother and their child, and are subsequently asked to compute the number of known descendants and ancestors of arbitrary persons.

Input Format

The input consists of one or more nonempty lines containing birth records, followed by an empty line, followed by a line containing arbitrary names. A name is a nonempty string of non-whitespace characters. Each line of the birth records contains the name of a father, the name of a mother, and the name of their child, separated by one or more blanks. Following the empty line, the last line contains the names of one or more persons, separated by one or more blanks. No child appears in more than one birth record, the set of all fathers is disjoint from the set of all mothers, and both the child and parent relations are acyclic. Note that children can be produced by incestuous procreation; i.e. closely related mothers and fathers might produce a child.

Output Format

For each person whose name appears on the last input line, compute the number of distinct descendants and number of distinct ancestors that can be determined using the birth records, and output that information as shown in the sample below.

Input Sample

```
a b c
a b d
j b e
c f g
c f h
e f i

a b c d e f g h i j
```

Output Sample

```
a has 4 descendants and 0 ancestors
b has 6 descendants and 0 ancestors
c has 2 descendants and 2 ancestors
d has 0 descendants and 2 ancestors
e has 1 descendants and 2 ancestors
f has 3 descendants and 0 ancestors
g has 0 descendants and 4 ancestors
h has 0 descendants and 4 ancestors
i has 0 descendants and 4 ancestors
j has 2 descendants and 0 ancestors
```