

I work in an office that uses antiquated approval processes, featuring paper petitions with hand-inked signatures and no tracking mechanism. A student who wants to drop a class after the third week fills out a paper withdrawal petition, signs it and submits it to a higher authority (like me) for approval, who in turn signs it and submits it to a higher authority for approval, and so on. Since petitions aren't tracked (that's right, we don't know where it is or if it was ultimately approved), lots of paper copies are made just so there's some evidence it existed... how many copies?

An *approval tree* is a tree whose nodes are people, whose leaves are *petitioners*, whose root is the *ultimate authority*, and whose parent relation is the *higher authority* relation. Petitions originate at the leaves and travel a path to the root, adding signatures at each non-leaf node. People make and store copies as follows:

- Petitioners never make copies, but they store copies given to them by their higher authority.
- The ultimate authority makes one copy after signing a petition, stores the original petition with ink signatures, and gives the copy to the underling from whence the petition came.
- All other authorities make two copies after signing a petition, storing one copy, giving one copy to the underling from whence the petition came, then submitting the petition to their higher authority. They also make one copy of any copy received from their higher authority, storing one copy and giving one copy to the underling from whence the petition came.

Input Format

The input consists of one or more approval trees. Each approval tree is described by one of more nonempty input lines followed by an empty line. Each nonempty line contains the name of a node followed by zero or more names of its children, separated by blanks.

Output Format

For each approval tree in the input, suppose that every petitioner originates one petition, and all petitions (and their copies) make it through the approval process and are stored. Compute and report the number of copies (not original petitions with ink signatures) that are stored at each node, in depth-first left-to-right order.

Input and Output Sample

see reverse side of this page

Input Sample

President Student
Student

AVP Dean1 Dean2
Dean1 Chair1 Chair2
Dean2 Student1
Chair1 Student2 Student3 Student4
Chair2 Student5 Student6 AssocChair
Student1
Student2
Student3
Student4
Student5
Student6
AssocChair Student7
Student7

Output Sample

0 copies stored at President
1 copies stored at Student

0 copies stored at AVP
12 copies stored at Dean1
9 copies stored at Chair1
3 copies stored at Student2
3 copies stored at Student3
3 copies stored at Student4
9 copies stored at Chair2
3 copies stored at Student5
3 copies stored at Student6
4 copies stored at AssocChair
4 copies stored at Student7
2 copies stored at Dean2
2 copies stored at Student1