

## Problem Statement

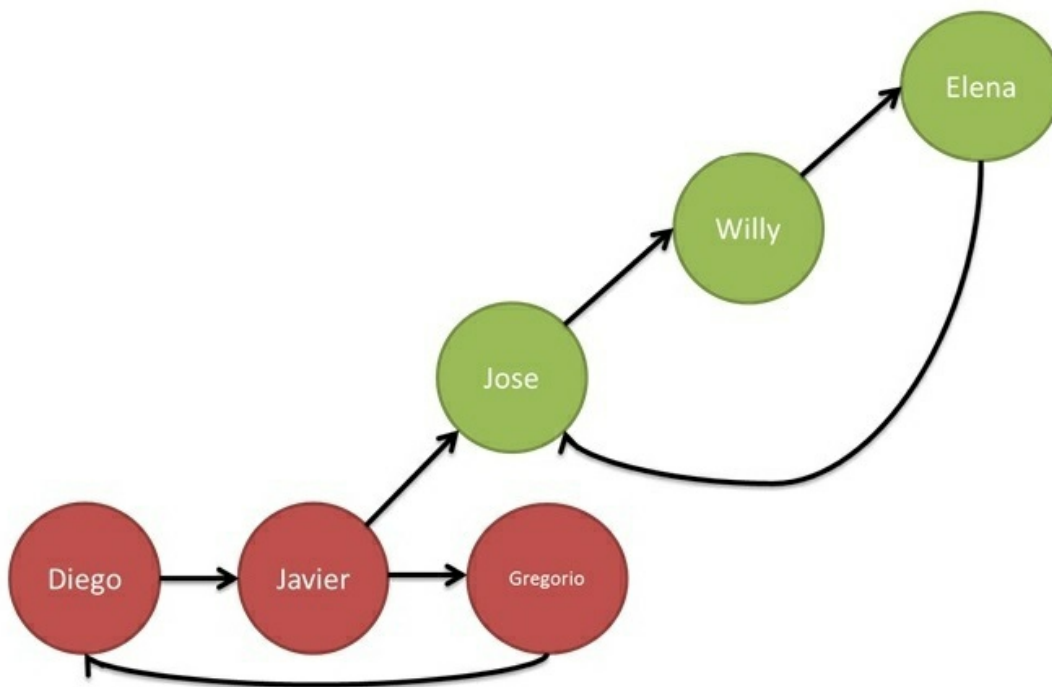
Social media networks and the amount of information they aggregate is astonishing. With so much information, new patterns and interactions of human society can be identified.

In our social network, the relationships model the flow of information, and they are directed. Alice may subscribe to Bob's newsfeed, while Bob does not subscribe to Alice's. Moreover, the flow of information in our network is such that a person can see the newsfeeds of all people who could reach the person following along a path in the network. Suppose, then, that Alice subscribes to Bob's newsfeed, Bob subscribes to Chuck's newsfeed, and Chuck subscribes to Dave's newsfeed. This would correspond to a simple linear graph:

Alice <- Bob <- Chuck <- Dave

Then Dave would be able to read his own news items only; Chuck would be able to read news items posted by either Dave or himself; Bob would be able to read news items posted by either Chuck, Dave or himself; and Alice would be able to read everyone's news items. Note that everyone can read their own newsfeed.

We are interested in the defining a community metric for our social network. We define a community as a group of people who are able to see all news items posted by any member of the group. As an example, in the figure below, there are two communities, each shown in a different color.



Note that in the community shown in green above, Jose, Willy, and Elena can all read each other's posts. While Jose, Willy, and Elena can also read Javier's news items. However, Javier cannot read news items from Jose, Willy, or Elena, and is therefore not included in their community.

Your task is to identify the sizes of these communities from biggest to smallest.

## Input Format

The first line of input will contain two space separated integers: the total number of people that devise the social network,  $n$  ( $1 \leq n \leq 10000$ ) and  $m$ , the number of communities for which you should print the size. The following lines will contain a directed relationship between 2 people. If the line reads "Jon Peter",

then Peter subscribes to Jon's news feed, and the relation is Jon -> Peter.

The word "END" will appear on a line by itself after the list of relationships.

All of the names are strings containing fewer than 50 characters.

### Output Format

The output consists of  $m$  lines, where each line will correspond to the size of a community from biggest to smallest. If there are fewer than  $m$  communities, after outputting the size of all existing communities, output lines containing "Does not apply!" for the missing values.

### Sample Input

```
6 2
Jose Willy
Willy Elena
Elena Jose
Diego Javier
Javier Gregorio
Gregorio Diego
Javier Jose
END
```

### Sample Output

```
3
3
```

### Explanation

This input corresponds to the graph described in the problem statement above.

Note that two additional sample inputs are available if you click on the "Run Code" button.