

## 5186 Calling Circles

If you've seen television commercials for long-distance phone companies lately, you've noticed that many companies have been spending a lot of money trying to convince people that they provide the best service at the lowest cost. One company has "calling circles." You provide a list of people that you call most frequently. If you call someone in your calling circle (who is also a customer of the same company), you get bigger discounts than if you call outside your circle. Another company points out that you only get the big discounts for people in your calling circle, and if you change who you call most frequently, it's up to you to add them to your calling circle.

LibertyBell Phone Co. is a new company that thinks they have the calling plan that can put other companies out of business. LibertyBell has calling circles, but they figure out your calling circle for you. This is how it works. LibertyBell keeps track of all phone calls. In addition to yourself, your calling circle consists of all people whom you call and who call you, either directly or indirectly.

For example, if Ben calls Alexander, Alexander calls Dolly, and Dolly calls Ben, they are all within the same circle. If Dolly also calls Benedict and Benedict calls Dolly, then Benedict is in the same calling circle as Dolly, Ben, and Alexander. Finally, if Alexander calls Aaron but Aaron doesn't call Alexander, Ben, Dolly, or Benedict, then Aaron is not in the circle.

You've been hired by LibertyBell to write the program to determine calling circles given a log of phone calls between people.

### Input

The input file will contain one or more data sets. Each data set begins with a line containing two integers,  $n$  and  $m$ . The first integer,  $n$ , represents the number of different people who are in the data set. The maximum value for  $n$  is 25. The remainder of the data set consists of  $m$  lines, each representing a phone call. Each call is represented by two names, separated by a single space. Names are first names only (unique within a data set), are case sensitive, and consist of only alphabetic characters; no name is longer than 25 letters.

For example, if Ben called Dolly, it would be represented in the data file as

```
Ben Dolly
```

Input is terminated by values of zero (0) for  $n$  and  $m$ .

### Output

For each input set, print a header line with the data set number, followed by a line for each calling circle in that data set. Each calling circle line contains the names of all the people in any order within the circle, separated by comma-space (a comma followed by a space). Output sets are separated by blank lines.

### Sample Input

```
5 6
Ben Alexander
Alexander Dolly
Dolly Ben
Dolly Benedict
```

Benedict Dolly  
Alexander Aaron  
14 34  
John Aaron  
Aaron Benedict  
Betsy John  
Betsy Ringo  
Ringo Dolly  
Benedict Paul  
John Betsy  
John Aaron  
Benedict George  
Dolly Ringo  
Paul Martha  
George Ben  
Alexander George  
Betsy Ringo  
Alexander Stephen  
Martha Stephen  
Benedict Alexander  
Stephen Paul  
Betsy Ringo  
Quincy Martha  
Ben Patrick  
Betsy Ringo  
Patrick Stephen  
Paul Alexander  
Patrick Ben  
Stephen Quincy  
Ringo Betsy  
Betsy Benedict  
Betsy Benedict  
Betsy Benedict  
Betsy Benedict  
Betsy Benedict  
Betsy Benedict  
Quincy Martha  
0 0

### Sample Output

Calling circles for data set 1:  
Ben, Alexander, Dolly, Benedict  
Aaron

Calling circles for data set 2:  
John, Betsy, Ringo, Dolly  
Aaron  
Benedict  
Paul, George, Martha, Ben, Alexander, Stephen, Quincy, Patrick