

## North and South

input file: north.in

output file: north.out

Gainesville is a well known stop on Interstate 75, a north south route. But it is far from the only town along the highway. This problem asks you to look at a number of towns and determine their relative positions.

### Input and Output

The input for this problem comes in two sets. The first part of the input gives the relative positions of towns. There will be 0 or more lines in this set, each of which has a pair of city names. In this input, the city listed first is to the south of the city listed second. So, the line:

*City\_1 City\_2*

represents the fact "City\_1 is south of City\_2."

The list of relative positions will end with a line containing just a single # sign.

After the pound signs will be questions about the data in the format:

*City\_1 City\_2*

This represents the question: What is the position of City\_1 relative to City\_2? Your program should print one of the following lines of output for each question:

*City\_1 is north of City\_2.*

*City\_1 is south of City\_2.*

*The relative positioning of City\_1 and City\_2 is unknown.*

Where the appropriate city names are substituted into the output. Have one blank line after each line of output.

The list of questions will be ended by a line containing a single # sign.

In both sections, each name is a string of up to 11 letters, and the names will be separated by at least one blank. Any blanks before or after a name should be ignored. Case is significant in names, so Gainesville and GAINESVILLE should be considered different cities by your program.

Recall, "is north of" is a transitive relationship, so if City\_1 is north of City\_2 and City\_2 is north of City\_3, you may conclude City\_1 is north of City\_3. You may assume the input is consistent, that is, there will be no information that indicates a city is north of itself.

### Sample Input

```
Gainesville Valdosta
Valdosta Atlanta
LakeCity Valdosta
#
Gainesville Atlanta
Tampa Gainesville
Atlanta Valdosta
LakeCity Gainesville
#
```

### Sample Output (corresponding to the given input)

Gainesville is south of Atlanta.

The relative positioning of Tampa and Gainesville is unknown.

Atlanta is north of Valdosta.

The relative positioning of LakeCity and Gainesville is unknown.