

Example Problem: 1998 Southeast Regional

The problem is to infer the geographic relationship between two cities, given a set of facts about the geographic relationship between cities. The input to the program is divided into two sets of data: the facts and the queries. The first set defines a geography relationship between cities, and the second set is a collection of questions about this relationship. Each data set consists of pairs of distinct city names.

In the first data set, a line

```
city1 city2
```

means that the first city of the pair is south of the second city.

In response to each pair of cities in the second data set, the program is to print one of the following lines of output:

```
city1 is south of city2.  
city1 is north of city2.  
The relative position of city1 and city2 is unknown.
```

The correct response depends upon all the facts established by the first data set.

The relation "is south of" is a transitive relationship, so if *city1* is south of *city2* and *city2* is south of *city3*, then *city1* is south of *city3*. You may assume that the input is consistent, that is, there will be no information that implies a city is south of itself.

Sample Input and Output

For the following input:

```
Melbourne DaytonaBeach  
DaytonaBeach Jacksonville  
Orlando Jacksonville  
#  
Melbourne Jacksonville  
Tampa Melbourne  
Jacksonville Orlando  
Orlando DaytonaBeach  
#
```

the output should be

```
Melbourne is south of Jacksonville.  
The relative position of Tampa and Melbourne is unknown.  
Jacksonville is north of Orlando.  
The relative position of Orlando and DaytonaBeach is unknown.
```

In the input, the city pairs will be on the same line and separated by a least one space. You may assume that there are no leading and trailing spaces. The names of the cities consist only of upper and lower-case letters [a-zA-Z]. Capitalization of the names is significant. That is, DaytonaBeach is considered a different city than Daytonabeach. Each of the two sections of the input is ended by a line containing the single character #.

Files and I/O

Write the program in one file named `north` as appropriate for the language. (`North.java`, `north.cpp`, `north.pas`, etc) All input is from the standard input; all output is to the standard output. The program does not read or write any files.

History

This problem originally appeared as "Problem B: North and South" in the 1998 Southeast USA Region Programming Contest at the University of Florida.