

124 Following Orders

Background

Order is an important concept in mathematics and in computer science. For example, Zorn's Lemma states: "a partially ordered set in which every chain has an upper bound contains a maximal element." Order is also important in reasoning about the fix-point semantics of programs.

This problem involves neither Zorn's Lemma nor fix-point semantics, but does involve order.

The Problem

Given a list of variable constraints of the form $x < y$, you are to write a program that prints all orderings of the variables that are consistent with the constraints.

For example, given the constraints $x < y$ and $x < z$ there are two orderings of the variables x , y , and z that are consistent with these constraints: $x y z$ and $x z y$.

The Input

The input consists of a sequence of constraint specifications. A specification consists of two lines: a list of variables on one line followed by a list of constraints on the next line. A constraint is given by a pair of variables, where $x y$ indicates that $x < y$.

All variables are single character, lower-case letters. There will be at least two variables, and no more than 20 variables in a specification. There will be at least one constraint, and no more than 50 constraints in a specification. There will be at least one, and no more than 300 orderings consistent with the constraints in a specification.

Input is terminated by end-of-file.

The Output

For each constraint specification, all orderings consistent with the constraints should be printed. Orderings are printed in lexicographical (alphabetical) order, one per line. Characters on a line are separated by whitespace.

Output for different constraint specifications is separated by a blank line.

Sample Input

```
a b f g
a b b f
v w x y z
v y x v z v w v
```

Sample Output

abfg
abgf
agbf
gabf

wxzvy
wzxvy
xwzvy
xzwvy
zwxvy
zxwvy