



Practice Problem B

Limited Correspondence

Problem ID: correspondence

Emil, a Polish mathematician, sent a simple puzzle by post to his British friend, Alan. Alan sent a reply saying he didn't have an infinite amount of time he could spend on such non-essential things. Emil modified his puzzle (making it a bit more restricted) and sent it back to Alan. Alan then solved the puzzle.

Here is the original puzzle Emil sent: given a sequence of pairs of strings $(a_1, b_1), (a_2, b_2), \dots, (a_k, b_k)$, find a non-empty sequence s_1, s_2, \dots, s_m such that the following is true:

$$a_{s_1} a_{s_2} \dots a_{s_m} = b_{s_1} b_{s_2} \dots b_{s_m}$$

where $a_{s_1} a_{s_2} \dots$ indicates string concatenation. The modified puzzle that Emil sent added the following restriction: for all $i \neq j$, $s_i \neq s_j$.

You don't have enough time to solve Emil's original puzzle. Can you solve the modified version?

Input

Each test case starts with a line containing an integer $1 \leq k \leq 11$, followed by k lines. Each of the k lines contains two space-separated lowercase alphabetic strings which represent a pair. Each individual string will be at most 100 characters long.

Output

For each case, display the case number followed by the sequence found (if it is possible to form one) or "IMPOSSIBLE" (if it is not possible to solve the problem). If it is possible but there are multiple sequences, you should prefer the shortest one (in terms of the length of the output). If there are multiple shortest sequences, choose the one that is lexicographically first. Follow the format of the sample output.



Sample Input

```
5
are yo
you u
how nhoware
alan arala
dear de
8
i ie
ing ding
resp orres
ond pon
oyc y
hello hi
enj njo
or c
3
efgh efgh
d cd
abc ab
3
a ab
b bb
c cc
```

Output for Sample Input

```
Case 1: dearalanhowareyou
Case 2: ienjoycorresponding
Case 3: abcd
Case 4: IMPOSSIBLE
```