Grid Game II

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	256 megabytes

The puzzle club at your university is working on a new word association game. The game consists of sixteen words, arranged in a four-by-four grid. To win the game, a player has to categorise the words into four groups of four words each, so that each pair of words in the same group is related.

Consider the example below.

UNIVERSITY	C	WALNUT	PEANUT
OF	MARSDEN	PARK	PISTACHIO
JAVA	ALMOND	WALES	PYTHON
KENSINGTON	SOUTH	HASKELL	RANDWICK

A player would be expected to know many pairs of related words:

- all pairs of words in "University of New South Wales" are related to each other,
- all pairs of words in suburb names (Kingsford, Randwick, Kensington and Marsden Park) are related to each other,
- all pairs of programming languages (C, C++, Python, Haskell and Java) are related to each other, and
- all pairs of nuts (peanut, walnut, cashew, almond and pistachio) are related to each other.

There is only one way to group these words into four groups of four. This is displayed below by colouring the grid using yellow, green, blue and purple, but the particular colour assigned to a group holds no significance.

UNIVERSITY	C	WALNUT	PEANUT
OF	MARSDEN	PARK	PISTACHIO
JAVA	ALMOND	WALES	PYTHON
KENSINGTON	SOUTH	HASKELL	RANDWICK

The club needs your help to check whether a given puzzle can be solved or not! Given a grid of words, and a list of pairs of related words from the grid, report whether the puzzle can be solved, and if so, find a valid grouping.

Input

The first four lines of input each contain four words, and each word comprises up to 15 uppercase English letters. All sixteen words are distinct.

The next line contains a single integer m ($24 \leq m \leq 120$), which is the number of pairs of related words.

The next m lines each represent a pair of related words. Each such line contains two distinct words out of the sixteen listed in the first three lines. No pair of related words appears more than once (in either ordering). So if `a b` appears, then `b a` does not.

Output

If there is no valid grouping, display `Impossible`.

Otherwise, display `Possible`, then four lines each containing four words. Each of these lines must correspond to a group, so the first four words must be pairwise related, as well as the next four, the next four and the final four. If there are multiple solutions, you can output any.

Example

standard input	standard output
UNIVERSITY C WALNUT PEANUT OF MARSDEN PARK PISTACHIO JAVA ALMOND WALES PYTHON KENSINGTON SOUTH HASKELL RANDWICK 24 UNIVERSITY OF UNIVERSITY SOUTH UNIVERSITY WALES OF SOUTH OF WALES SOUTH WALES RANDWICK KENSINGTON RANDWICK MARSDEN RANDWICK PARK KENSINGTON MARSDEN KENSINGTON PARK MARSDEN PARK C PYTHON C HASKELL C JAVA PYTHON HASKELL PYTHON JAVA HASKELL JAVA WALNUT PEANUT WALNUT ALMOND WALNUT PISTACHIO PEANUT ALMOND PEANUT PISTACHIO ALMOND PISTACHIO	Possible UNIVERSITY OF SOUTH WALES KENSINGTON RANDWICK MARSDEN PARK C PYTHON HASKELL JAVA WALNUT PEANUT ALMOND PISTACHIO