Problem A : Arrows

inputfile: input.A
outputfile: output.A

Description

The game 'Arrows' is played on a board, on which a coloured directed graph is drawn. Not only the locations in the graph are coloured, also the arrows pointing from location to location are coloured. Each of the two players has a piece. At the beginning of the game, the pieces of both players are in fixed positions on the board. In turn, the players may do a move. A move consists of moving one's own piece along an arrow to a new location on the board. The following constraint is imposed on this: the piece may only be moved along arrows of the same colour as the location of the opponent's location. For example, if the opponent's piece is currently at a red location, the player may only move his own piece along a red arrow.

In the sixties ('*make love not war*') a one-person variant of the game emerged. In this variant one person moves both pieces, not necessarily one after the other. Goal of this game is to get both pieces onto the same location, using as few moves as possible.

Problem

The problem to be solved is to find out the smallest number of moves that is necessary to get both pieces into the same location, for a given board layout and starting positions.

The board locations are identified by upper-case letters ranging from *A* to *Z*. The colours of the locations and arrows are represented by the letters *a* to *z*.

Input

The input file starts with a line containing the number of games to be analysed.
Each of the game descriptions starts with a line containing the number of locations on the board. For each location, there is one line describing it.
This line first contains an upper-case letter denoting the name of the location, followed by a lower-case letter denoting its colour. The number of arrows leaving this location follows. Then for each of these arrows, there are two letters, first an upper-case letter denoting the endpoint of the arrow, followed by a lower-case letter denoting its colour. All fields are separated by a single space.

There are no arrows from a location to itself, and for every pair of locations, there are at most two arrows between them (at most one in each direction).

Finally, for each game description, there is one line containing two upper-case letters, which are the starting positions of the game pieces.

Output

The output file should contain one line for every analysed game, containing the minimum number of moves required to get both pieces into the same location, or the word `impossible` if that is not possible for the given board and starting position.

Example

Sample input

```
3
4
A r 1 B y
B g 1 A b
C b 1 A r
D y 1 C g
A D
3
A x 1 M x
Z x 1 M x
M x 0
A Z
2
A x 1 M y
Z x 1 M y
M x 0
A Z
```

Correct output for the sample input

```
4
2
impossible
```