British Informatics Olympiad Final

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Sponsored by Data Connection

Coloured Routes

A groups of towns is connected together by a rail network. To help travel around the network some routes have been given colours; each station has one 'red' route leaving it, and one 'blue' route. Routes have an associated direction, so a route from A to B does not necessarily mean there is a corresponding route from B to A.

You are trying to give directions to a friend, so that you can meet them at a station of your choosing. Unfortunately you do not know which station your friend will start from, and due to their identical layouts they cannot be distinguished. To direct your friend, you need to give them a sequence of coloured routes to take, so that they will finish at the your chosen station irrespective of where they start. Due to limitations on the rail tickets and the placement of barriers, it is not enough that they pass through this station before the end of the sequence.

Write a program which reads in details of the rail network, and returns a sequence of coloured routes. To make life simple for your friend, you should return the shortest route possible.

The first line of your input will be an integer $2 \leq x \leq 16$, specifying how many towns are connected in the network. There will then follow x lines of two integers; the first integer on the ith of these lines is the destination of the red route from town i, and the second the destination of the blue route. Towns are numbered from 1 to x.

You should output the length of the shortest possible route sequence, followed by an example sequence, using `r` and `b` to denote the two types of route, and the town your friend will finish in. If there is no possible route sequence you should just output `Impossible`.

Sample Input

```
5
2 3
4 3
4 5
5 1
1 2
```

Sample Output

```
6
rbrrbb
3
```