COMPETITIE

PROG-A-THON

7: Rat infestation

Level: intermediate/difficult
Time limit: 5.000 seconds

You are trying to get rid of a rat invasion by placing traps in the rooms. After taking some other measures, you are now left with catching the last rat. However, you only have one trap available that you can use and you don't know where the rat is hiding. You do however know that every night, the rat will have to move to an adjacent room. You also happen to know the underground network of rat tunnels under your house, so you know which rooms are adjacent to each other. If the rat comes into the room where you have placed your trap, it will be killed with certainty.

Every night, you can choose to place your trap in a different room to maximize your chances of catching the rat. You are wondering whether there is a strategy of placing your trap in different rooms such that the rat must be killed eventually.

For example, if your house only consists of two rooms and they are connected to each other, then you can use the following strategy: place the trap in room 1 on the first day and on the second day. If the rat was already in room 1 in the first night, he will be killed instantly. If however, he was hiding in room 2, he will have to move to room 1 in the second night and thus be killed by your trap.

On the other hand, if your house consists of three rooms that are all connected, it is impossible to devise such a strategy. No matter where you put your trap at night, the rat could always choose the other room to travel to (in the worst-case scenario).

Input

The input consists of multiple test cases. The test cases are separated by an extra blank line. Each test case starts with a line containing two integers n and m ($1 \leq n \leq 21$). n is the number of rooms in the building, and m is the number of routes that the rat can take between the rooms. The next m lines each contain two distinct integers (a, b) between 0 and $n-1$ (inclusive), specifying that the rooms a and b are adjacent. The order of both

rooms within a pair has no meaning and every pair appears at most once. You may further make the assumption that no rooms is adjacent to itself, and that there always exists a path between any two rooms in the building. At the end of all the test cases, there is a line containing two zeroes (also preceded with a blank line).

Output

For each test case, output a single line. This line should contain the word `Impossible` if it is not possible to kill the rat with 100% certainty. Otherwise, it should contain the shortest strategy of placing the trap, in the format `L:T1 T2 ... TL`, where L is the length of the sequence, and `T1, T2, ..., TL` are integers containing the numbers of the rooms to place the trap in the right order. If several shortest sequences exist, print the one that is the lexicographically smallest. (A sequence A is lexicographically smaller than another sequence B if the first element on which they are different is smaller in A than in B).

Sample input 1

```
2 1
0 1

4 3
0 1
1 2
2 3

3 3
0 1
2 1
0 2

0 0
```

Sample output 1

```
2: 0 0
4: 1 2 2 1
Impossible
```