

# Flashy Flood Flumes

July 2022

C++ — 2 SEC — 512 MB

Wally's Wonderfully Wacky Waterworld is the wettest way to while away the hours in the western world! Clearly, it is unsurprising that you (and all your friends) are spending the warm summer's day there.

Wally's Waterworld has  $n$  bathing pools (numbered from 0 to  $n$ ), each with  $e$  exit flumes (numbered from 0 to  $e$ ). A flume connects two (not necessarily distinct) pools. Due to health-and-safety measures, and the law of gravity, all flumes are strictly one-way.

Twice a day, Wally hosts an amazingly awesome aquatic acrobatics and aerobics assembly. Naturally, you (and all your friends) are immensely keen. Before heading over, you would like to meet up in the same bathing pool. Unfortunately, all the bathing pools look identical. However, each exit flume is marked with its number and a map of the pools can be found online.

You and your friends must decide on a sequence of  $f$  exit flumes that will ensure you all end up in the same bathing pool, regardless in which pool you started. You want to arrive at the aerobics on time, so the length of this sequence should be minimum.

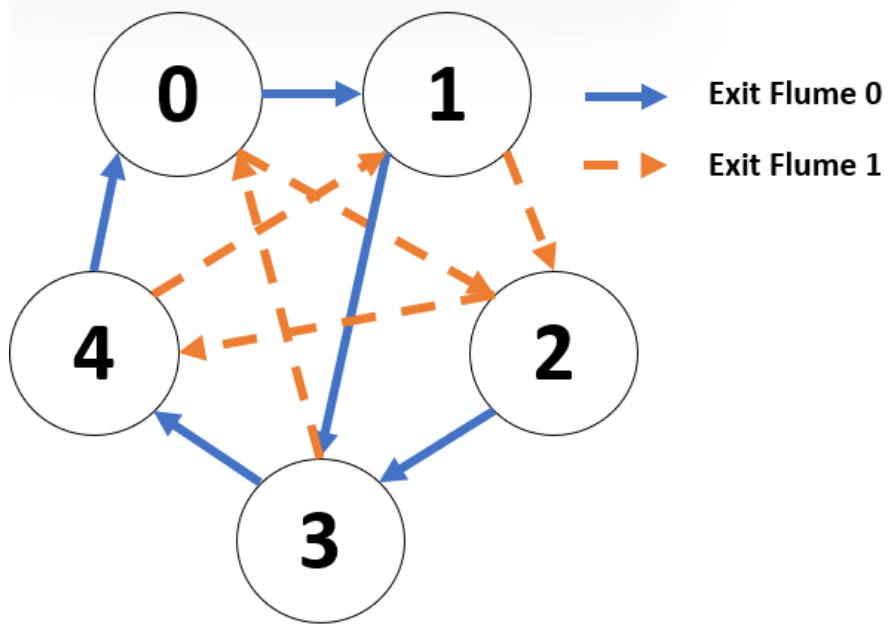
**INPUT** You will be given integers  $n$  and  $e$ , denoting the number of bathing pools and the number of exit flumes they each have, respectively. This will be followed by  $n$  lines of  $e$  integers. The  $j$ th integer on the  $i$ th line, is the bathing pool into which the  $j$ th exit flume from the  $i$ th pool empties.

$$\begin{aligned} 3 &\leq n \leq 20 \\ 1 &\leq e \leq 10 \end{aligned}$$

**OUTPUT** On separate lines, output a string of  $f$  numbers, indicating your chosen sequence of flumes, and the bathing pool you will all end up in.  $f$  should be minimum.

If it is not possible to meet up in the same pool, simply output IMPOSSIBLE.

**SAMPLE** For example, consider the first sample input. This layout for Wally's Waterworld is shown below. Starting in any bathing pool, the sequence of flumes 010011 always ends in bathing pool 2. This sequence is minimum length.



## INPUT

5 2  
1 2  
3 2  
3 4  
4 0  
0 1

3 1  
1  
2  
0

6 3  
1 2 3  
5 0 2  
2 4 4  
1 3 4  
0 1 5  
3 2 4

## OUTPUT

010011  
2

IMPOSSIBLE

2200  
1