

# Pipe Rotation

## Problem ID: piperotation

There's a grid with  $R$  and  $C$  columns  $1 \leq R, C \leq 100$ ). The cell in row  $r$  and column  $c$  contains one of 4 things (identified by a letter  $G_{r,c}$  between "A" and "D"), and can be rotated by any multiple of 90 degrees:

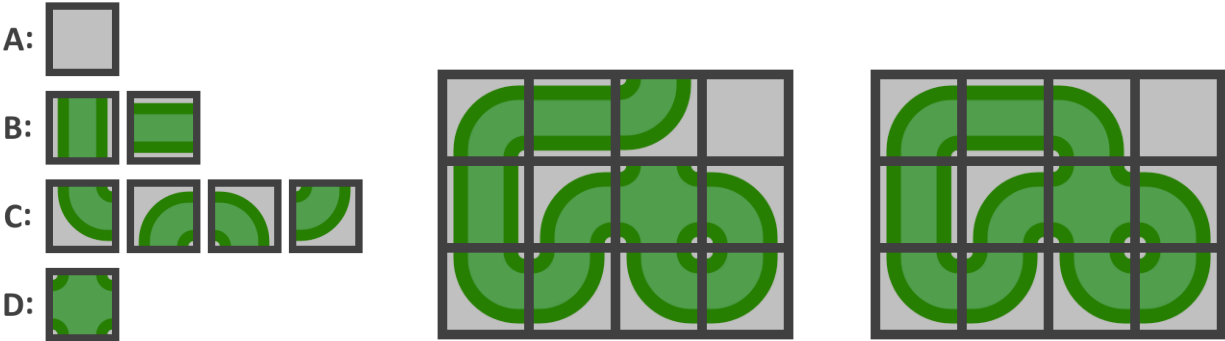


Figure 1: left: sample pipes, middle: invalid grid, right: valid grid

- A: Nothing
- B: A straight pipe (with pipes leaving through 2 opposite edges)
- C: An elbow-shaped pipe (with pipes leaving through 2 adjacent edges)
- D: A four-way pipe (with pipes leaving through all 4 edges)

Determine whether or not it's possible to rotate the cells such that the pipes all line up with one another. In particular, for each edge shared by a pair of adjacent cells, there must either be a pipe on both sides of that edge, or on neither side. And for each each of the  $2 \cdot (R + C)$  outer edges of the grid, there must be no pipe leaving through that edge.

### Input

Line 1: 2 integers,  $R$  and  $C$   
 Next  $R$  lines:  $C$  characters,  $G_{i,1..C}$ , for  $i=1..R$

### Output

A string, either "Possible" if it's possible to produce a valid grid, or "Impossible" otherwise

Sample Input 1	Sample Output 1
2 2 CC CC	Possible
Sample Input 2	Sample Output 2
2 2 CC CB	Impossible

**Sample Input 3**

3 3  
CCC  
CCC  
CCC

**Sample Output 3**

Impossible

**Sample Input 4**

3 4  
CBCA  
BCDC  
CCCC

**Sample Output 4**

Possible

**Sample Input 5**

5 2  
CC  
CC  
AA  
CC  
CC

**Sample Output 5**

Possible