

## Problem G Game Design

Carol enjoys playing with wooden games. The objective of the game that fascinates her the most is to tilt a maze, made out of 1 cm-by-1 cm blocks, in any of the four cardinal directions to move a ball to a hole in the centre at  $(0, 0)$ . As shown in Figure G.1, once the 1 cm wide ball starts moving, it keeps going until either it runs into a wooden block, or it falls into the hole—whichever comes first.

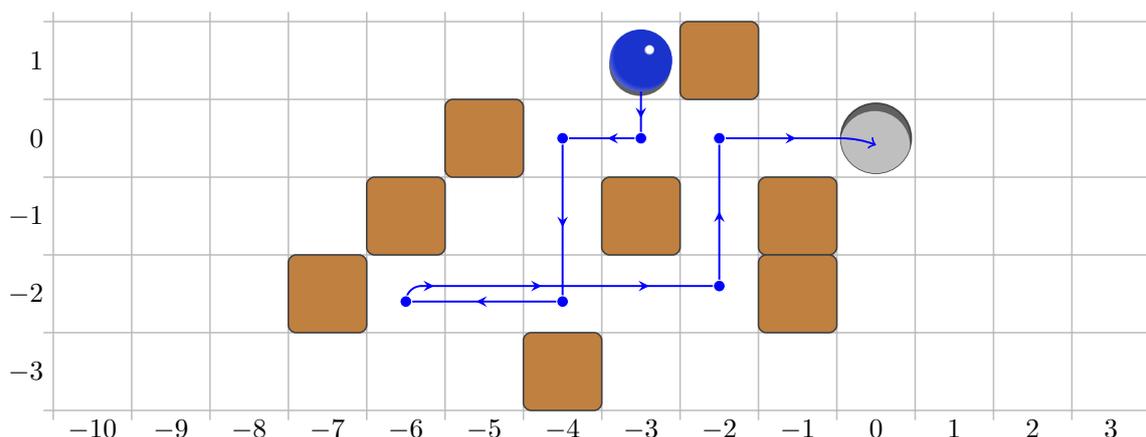


Figure G.1: Illustration of Sample Output 1.

Carol is interested in designing a maze of her own, and like any good game designer she already has a fixed solution in mind. This is given as a sequence of tilt moves which must all be followed in order. If any move causes nothing to happen, for example because the ball is up against a block in that direction or already in the hole, the solution does not count.

The ball can be placed anywhere to start. Carol will take care of adding a square border of blocks covering the rows and columns  $10^9 + 1$  cells away from the centre in each direction.

Design a board which can be won by applying her sequence of moves.

### Input

The input consists of:

- One line with a string  $s$  consisting of only the characters “LRUD” ( $1 \leq |s| \leq 20$ ), the sequence of moves. These characters correspond to the directions  $-x$ ,  $+x$ ,  $+y$ ,  $-y$  respectively. No two consecutive characters in  $s$  are the same.

### Output

If it is possible to create a maze with the given solution, first output  $x$  and  $y$ , the integer coordinates for the ball to start at. Then on the next line, output  $n$ , the number of blocks to use. On each of the remaining  $n$  lines, output  $s$  and  $t$ , the integer coordinates of a block.

Otherwise, output “impossible”.

You may use at most  $n \leq 10^4$  blocks. All coordinates used must be at most  $10^9$  in absolute value. No coordinate pair may be the same as the centre or any other coordinate pair. If there are multiple valid solutions, you may output any one of them.

# NWERC 2018

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## Sample Input 1

DLDLRUR

## Sample Output 1

-3 1  
8  
-1 -1  
-1 -2  
-2 1  
-3 -1  
-5 0  
-6 -1  
-7 -2  
-4 -3

## Sample Input 2

LRLRLRLRULD

## Sample Output 2

1 1  
5  
2 1  
2 0  
-1 1  
-1 0  
-1 1000000000

## Sample Input 3

LRLR

## Sample Output 3

impossible