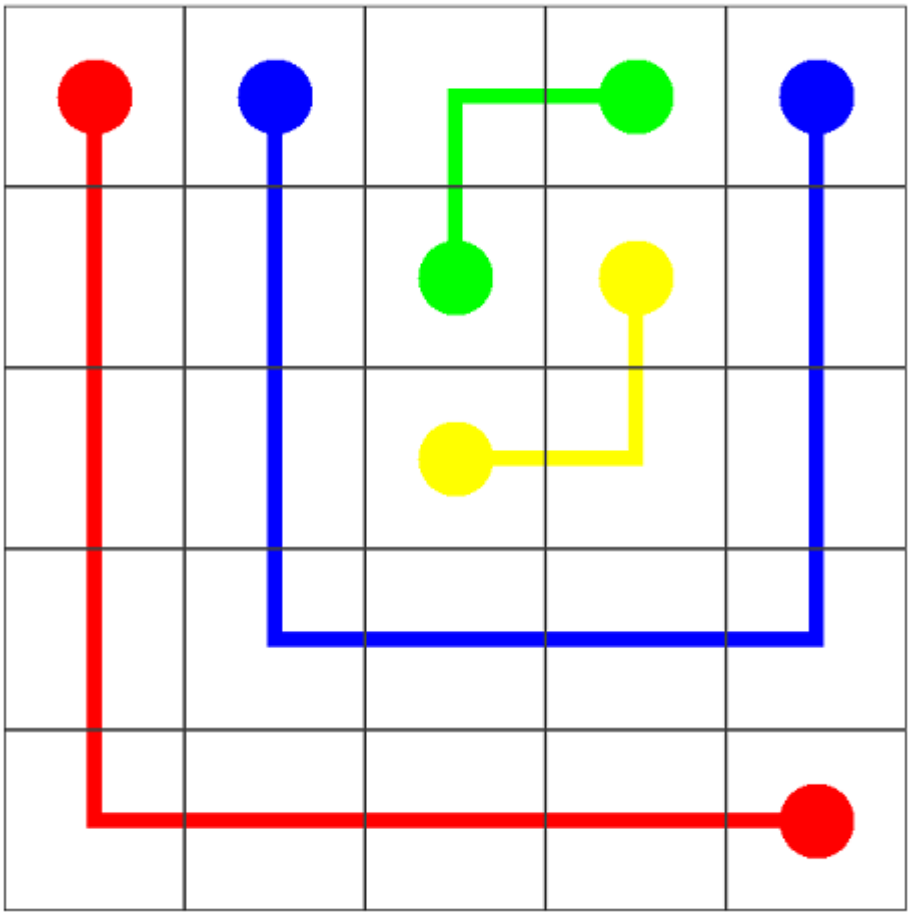
Problem Statement

The objective of the game of Pipes is to connect pairs of coins of the same colour on a square board containing **mxm** cells using connected vertical and horizontal lines such that

1. All the pairs of coins of the same colour are connected via continuous paths
2. All the paths are mutually non intersecting
3. None of the cells on the board are left empty (Each cell in the board should be traversed by exactly one path)

The following is a solved layout for a 5x5 board with 4 pairs of coins.



This problem is about writing a program that is able to find a solution to a layout of coins on a **mxm** board. The dimension of the board (the value of **m**) and the layout of coins on the board will be provided as inputs to the program. The value of **m** can vary from 5 to 8, inclusive of 5 & 8.

It can be assumed that the layout of the board provided as input to the program has at least one valid solution. A layout may however have multiple valid solutions, in which case the program may find any one valid solution. There will always be exactly 2 coins of the same colour on the board. Moving diagonally across cells is not allowed.

The input to the program will be provided via a text file of the following format.

m
c_1:i_1,j_1
c_1:i_2,j_2
c_2:$i_3$$j_3$
c_2:i_4,j_4
……
……
……
c_n:i_n,j_n

Where ***m*** is the dimension of the board (the board has ***m*** rows and ***m*** columns), ***C*** is an alphabet representing the colour of the coin. Each colour will occur exactly twice in the input. The values (i_n,j_n) represent the position of the cell of the board containing the coin, where ***i*** is the row index and ***j*** is the column index. Both ***i*** and ***j*** are zero based. The row and column positions are counted starting at the top left most corner cell of the board. The top left most corner cell on the board is indexed (0,0).

Thus for the board shown above the input file would be

5
R:0,0
B:0,1
G:0,3
B:0,4
G:1,2
Y:1,3
R:4,4
Y:2,2

The output from the program should list out the row and column indices of the cells in the sequence that they appear along the path traced between the pairs of coins of the same colour. For example the output from the program for the board shown above can be represented as follows.

B: (0,1) (1,1) (2,1) (3,1) (3,2) (3,3) (3,4) (2,4) (1,4) (0,4)
Y: (2,2) (2,3) (1,3)
G: (1,2) (0,2) (0,3)
R: (4,4) (4,3) (4,2) (4,1) (4,0) (3,0) (2,0) (1,0) (0,0)

The output can list the coins in any order. The direction of the path in the output is also not important as long as the board cells are listed in the sequence in which they appear along the path in any one of the two possible directions.

The following are examples of a few more solved boards