Computer Science Olympiad
Pennsylvania State University
Hazleton Campus
First Round, Spring 2012

Deadline: February 28, 2012

Problem 1. You a given two positions X and Y on a chessboard (an eight-by-eight grid) and there is a bishop ♗ on position X. If the positions X and Y have the same colors move the bishop from position X to position Y with minimum numbers of moves.
Note: A bishop has no restrictions in distance for each move, but is limited to diagonal movement.

Write a program that finds all solutions of problem.

Input
The coordinates of the position X on the first line and the coordinates of the position Y on the second line.

Output
List of positions (coordinates) of all moves of the bishop from position X to position Y.

Sample Input 1 (*See the chessboard on the figure*)
   c7   // Coordinates of the position X
   e1   // Coordinates of the position Y

Output for the Sample Input 1
   c7, **g3**, **e1**
   c7, **a5**, **e1**

Sample Input 2
   b2   // Coordinates of the position X
   d7   // Coordinates of the position Y

Output for the Sample Input 2
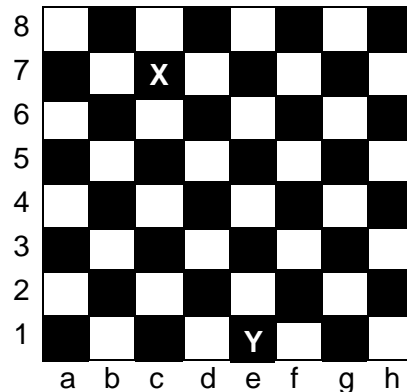   No solution

Sample Input 3
   c1   // Coordinates of the position X
   c7   // Coordinates of the position Y

Output for the Sample Input 3
   c1, **f4**, **c7**

Problem 2. There is a colored bean on every cell of an M-by-M grid. The numbers of colors used is N, N ≤ 8. The colors are named with the first letters of the alphabet: *a*, *b*, *c* … Find a line containing the largest number of beans with the same color. A line could be a row, column, diagonal, or parallel to a diagonal.

Write a program to solve the problem.
Input
  M - The size of the grid
  N - The numbers of colors
  The next M lines contain the bean colors on every row

Output
  The coordinates of the first and last cell of the line on which there are a largest numbers of beans with the same colors.

Sample Input
  5   // The grid size
  3   // The number of colors (a, b, abd c)
  c b c b a
  b a   c a
  c a b   a
  c c b a
  b a c c c

Output for the Sample Input
  [1, 2]   // Coordinates of the first cell
  [4, 5]   // Coordinates of the last cell

Sample Input
  7   // The grid size
  4   // The number of colors (a, b, c, and d)
  c b c b a d b
  b d b c a a
  c a b d a   a
  d c b c   b a
  c d c   b b d
  c a   c d b a
  b   b d c a b

Output for the Sample Input
  [7, 2]   // Coordinates of the first cell
  [2, 7]   // Coordinates of the last cell