CIS 1.5 Fall 2008 Lab 5

Instructions

- This is the fifth homework/lab assignment for CIS 1.5.
- The assignment will be worth 13 points and will be distributed and worked on in class on Monday November 17th.
- **It is due on Sunday November 30th** and must be submitted by email (as below).
- **Follow these emailing instructions:**
  1. Create a mail message addressed to *parsons@sci.brooklyn.cuny.edu* with the subject line **CIS 1.5 HW5**.
  2. Attach ONLY the **.cpp** files for each part, as outlined below.
     DO NOT ATTACH THE **.cbp** (CodeBlocks Project) files!
  3. Failure to follow these instructions will result in points being taken away from your grade. The number of points will be in proportion to the extent to which you did not follow instructions... (which can make it a lot harder for me to grade your work — grrrr!)

A program to play tic-tac-toe

Overall this homework will have you write a program that allows two players to play tic-tac-toe. Each part of the program that you write will gain partial credit, and completing a program will get you full credit.
Follow each step carefully to get the maximum points.

1 Initialising

Write a program that declares a 3 by 3 array of characters called `board` and sets every element of `board` to contain a period.
(1 point)

2 Displaying the board

Write a function `displayBoard` to print out the contents of the array `board` to show the state of the game.

1. The function should take the array as a parameter and return `void`.
2. The function should use two nested `for` loops to print the characters in the array.
3. The function should also print `|` and `-` characters to draw the usual lines.
4. When the array just holds periods, `displayBoard` should print:

```
.|.|.
-----
.|.|.
-----
.|.|.
```

Use the function to print out the board once it is initialised.
(2 points)

3 Making a move

Write a function `moveX` that allows the player playing X to make a move

1. The function should take the array `board` as a parameter and return `void`.
2. The function should prompt the user to enter the location at which to place a X.
   You will need to enter two integers, one for the row, and one for the column.
3. The function should insert the character X into `board` at this location.
   Remember that when you pass an array to a function, it is passed as a reference parameter.
4. Use `displayBoard` to print out the board after this move is made.

(2 points)

4 Making another move

Write a function `moveO` that allows the player playing O to make a move, and then displays the board.
(1 point)

5 Allowing alternating moves

Write a loop in `main` that alternately calls `moveX` and `moveO` to allow a game to be played.
(1 point)

6 Looking for a winning row

Write a function `inARow` which tests to see if one of the players has a winning row.

1. The function should take the array `board` as a parameter along with the character c which we are looking for a row of.
2. The function should return `true` if there is a row of c.
   Note that you will have to look at the first row, second row and third row to check this.

(2 points)

7 Looking for a winning column and diagonal

1. Write a function `inAColumn` which tests to see if one of the players has a winning column.
2. Write a function `inADiagonal` which tests to see if one of the players has a winning diagonal.

(2 points)

8 Checking for a winner

1. Write a function `winner` which tests to see if one of the players has won.
2. The function should call `inARow`, `inAColumn` and `inADiagonal` and return `true` if any of them return `true`.
3. Use `winner` to end the program as soon as either the `X` player or the `O` player has won.

(2 points)

9 Extra credit

One flaw in the current program is that it allows a player to place a `X` or a `O` in a position that is already occupied.

Correct this problem — write a function `checkOccupancy` which checks if the position a player selects is valid, and asks then to choose again if it is not.
(1 point)

10 Now hand it in

Save the (working) program that you have written as **hw5.cpp** and send it to me.