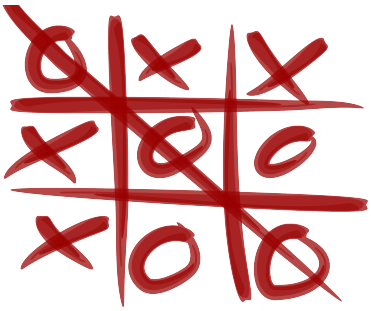
CSc 110 Assignment 6:

TIC TAC TOE



How to hand it in:

Submit file **TicTacToe.java** through the
Assignment 6 link on the CSC110 conneX site.

Learning Outcomes:

When you have completed this assignment, you should understand:

- How to create and work with two-dimensional arrays
- How to design code that is tolerant of error cases

Assignment Requirements:

You are to create a game of TicTacToe: http://en.wikipedia.org/wiki/Tic-tac-toe

Your game will take input from the two users through the console, where the users will take turns placing their token (either an 'X' or an 'O') in an empty cell until either someone wins or the game board is full.

In order for your assignment to be graded, we **require** you to include the following lines of code in your main method.

```
char[][] gameBoard = new char[SIZE][SIZE];
Scanner s = new Scanner(System.in);
Random r = new Random(System.currentTimeMillis())
playGame(gameBoard, s, r);
```

And subsequently provide the implementation of the supporting method.

```
/*
  PURPOSE: to play a game of TicTacToe taking input from 2 players
  INPUT:   char[][] board, a matrix holding tokens:
                ? indicates a blank space
                O indicates a space claimed by X player
                X indicates a space claimed by O player
           Scanner s, to provide command line input from the 2 players
           Random r, a random number generator to decide who goes first
  OUTPUT:  the board will be printed initially with all cells
           containing '?' characters. It will be reprinted
           to the console with each move a player makes.
*/
public static void playGame(char[][] board, Scanner s, Random r)
```

You **must** use the 'X' 'O' and '?' characters in your game but you are free to be creative with how your grid output to the console looks.

You **must** decompose your program into multiple methods, but you are free to choose what the rest of those methods look like. Remember, if a method you are writing needs a Scanner,

Random or the game board, you can pass the ones you have in your play method to that next method just as you did in your ChuckALuck game.

Extended Requirements:

Your program must

- Randomly select which player (X or O) gets to go first
- Print the board after each turn
    - You can add your own creative flair here
- Display who wins (X or O or no one wins)
    - Some creativity here too ☺
- If the user enters a space already taken OR a space out of bounds you must re-prompt them for a valid entry
- Add the option to increase the size of the game board!
    - As a command line argument the user can specify how big they want the game board to be. ie. java TicTacToe 9
      would specify they want to play with a 9 * 9 game board
    - You must ensure that the dimensions they enter are valid for the game (ie. must be a multiple of 3). You can choose what to do if they enter something invalid
    - Your game must scale with the increase in the size of the board

IMPORTANT NOTES:

- Ensure your file and class are named EXACTLY as specified
- Ensure your main method and your play method meet specifications EXACTLY
- Ensure your game board only holds the characters '?', 'O' and 'X' EXACTLY
- Use your creativity and imagination to add you own flair to the game in any other place.

  Sample Runs are provided on the next few pages as a GUIDELINE. You are free to make some design choices on your own as long as you follow the requirements described above and the game follows that correct rules of TicTacToe

Grading:

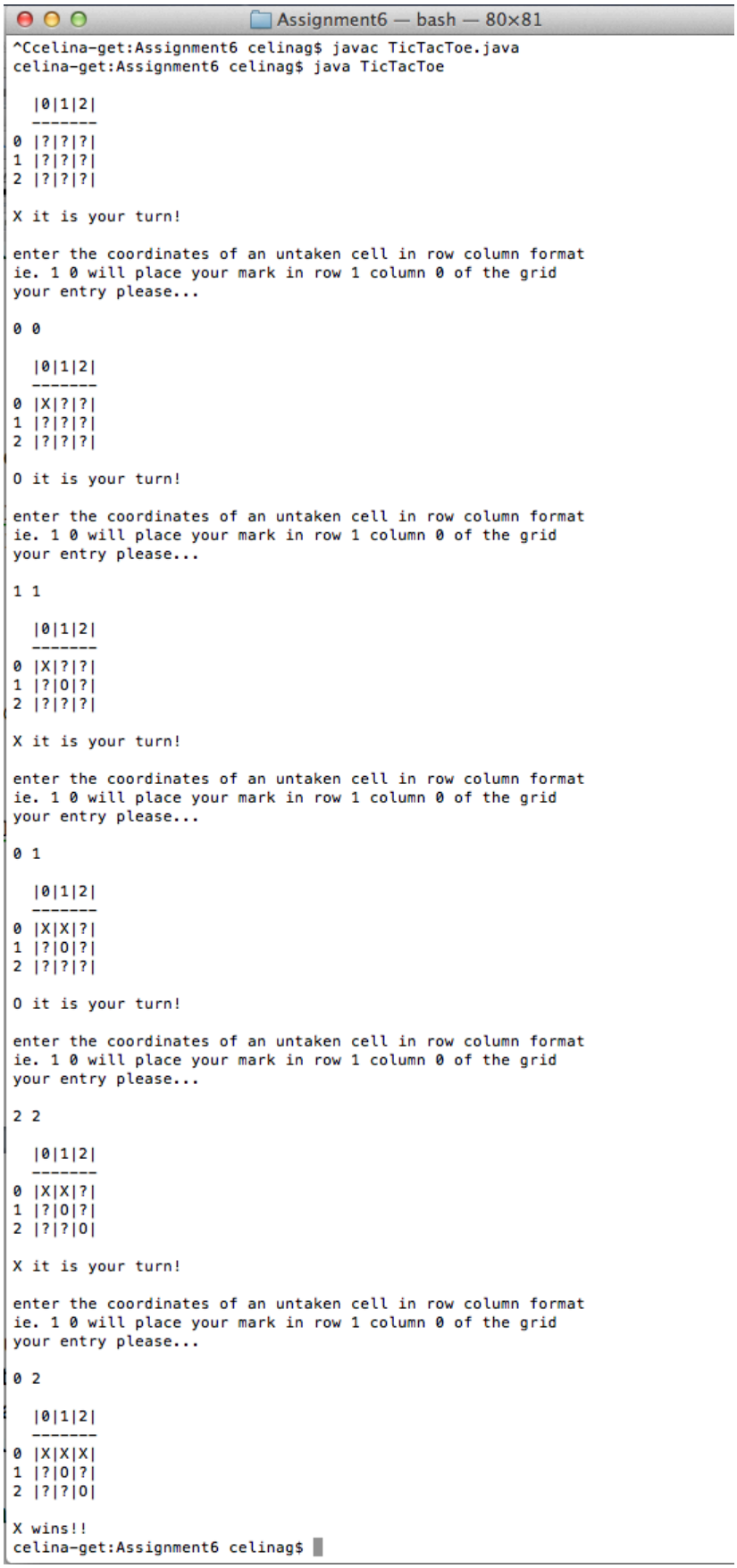
It is OK to talk about your assignment with your classmates, and you are encouraged to design solutions together, but each student must implement their own solution. We will be using plagiarism detection software on your assignment submissions.

Marks will be allocated for the following…

- Your code must compile and run.
- Your code must follow the requirements described above.
- Your code must be indented and documented appropriately. Please follow the guidelines in `Style_Guidelines.pdf`, available in the Resources folder on conneX.

Sample Runs:

A win…



A portion of “no one wins…”

```
X it is your turn!

enter the coordinates of an untaken cell in row column format
ie. 1 0 will place your mark in row 1 column 0 of the grid
your entry please...

2 1

  |0|1|2|
  -------
0 |O|O|X|
1 |X|X|O|
2 |O|X|?|

O it is your turn!

enter the coordinates of an untaken cell in row column format
ie. 1 0 will place your mark in row 1 column 0 of the grid
your entry please...

2 2

  |0|1|2|
  -------
0 |O|O|X|
1 |X|X|O|
2 |O|X|O|

it's a CATS game
celina-get:Assignment6 celinag$
```

A portion of invalid inputs…

```
  |0|1|2|
  -------
0 |?|?|?|
1 |?|?|?|
2 |?|?|?|

X it is your turn!

enter the coordinates of an untaken cell in row column format
ie. 1 0 will place your mark in row 1 column 0 of the grid
your entry please...

-1 3
bad cell coordinates
your entry please...

2 3
bad cell coordinates
your entry please...

0 0

  |0|1|2|
  -------
0 |X|?|?|
1 |?|?|?|
2 |?|?|?|

O it is your turn!

enter the coordinates of an untaken cell in row column format
ie. 1 0 will place your mark in row 1 column 0 of the grid
your entry please...

0 0
bad cell coordinates
your entry please...

1 1

  |0|1|2|
  -------
0 |X|?|?|
1 |?|O|?|
2 |?|?|?|

X it is your turn!
```

Bigger Gameboard valid board size…

```
^Ccelina-get:Assignment6 celinag$ java TicTacToe 9


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

X it is your turn!

enter the coordinates of an untaken cell in row column format
ie. 1 0 will place your mark in row 1 column 0 of the grid
your entry please...

0 0

  |0|1|2|3|4|5|6|7|8|
  -------------------
0 |X|?|?|?|?|?|?|?|?|
1 |?|?|?|?|?|?|?|?|?|
2 |?|?|?|?|?|?|?|?|?|
3 |?|?|?|?|?|?|?|?|?|
4 |?|?|?|?|?|?|?|?|?|
5 |?|?|?|?|?|?|?|?|?|
6 |?|?|?|?|?|?|?|?|?|
7 |?|?|?|?|?|?|?|?|?|
8 |?|?|?|?|?|?|?|?|?|

O it is your turn!

enter the coordinates of an untaken cell in row column format
ie. 1 0 will place your mark in row 1 column 0 of the grid
your entry please...
```

Bigger Gameboard invalid board size…

REMEMBER: You can decide what to do when this happens. What you see here is just one way to handle the problem…

```
celina-get:Assignment6 celinag$ java TicTacToe 11
not a valid boardsize -- setting board to 3 X 3


  |0|1|2|
  -------
0 |?|?|?|
1 |?|?|?|
2 |?|?|?|

X it is your turn!

enter the coordinates of an untaken cell in row column format
ie. 1 0 will place your mark in row 1 column 0 of the grid
your entry please...
```