

Design a Tic-tac-toe game, where you have 2 players who place their chosen character (X or O) anywhere in a 3X3 matrix. When the matrix has same values in a row, column or a diagonal, the respective user wins. If the matrix is filled without having any winner, the game terminates with a tie.

Class name: Board

Main class: LabOne

Instance variable: a 3 by 3 character grid

Initially all positions of the matrix are marked as '-' (character)

Class Game calls an object of class Board to fill values with following details:

1. **Public void put(int x ,int y ,char val):** x, y denotes the coordinates whereas val specifies the value to be written(O or X). User will specify only coordinates x and y whereas implement logic to choose O or X alternatively.
In case invalid coordinates are entered Print an error message "Invalid coordinates" and enter coordinates again.
2. **Public char[][] get() :** Returns the state of matrix .
3. **Public void print() :** Prints the state of the matrix
4. **Public void checkState():** Checks the state of matrix and print a message describing a win or tie.

The question has 3 parts which execute based on choice:

1. Game between user and user (where player1 and player2 specify coordinates manually). **[3 marks]**
2. Game between user and computer (where player1 specifies coordinates manually and coordinates for player 2 are randomly generated). **[3 marks]**
3. Game between computer and AI user. (Player 1 generates random coordinates and write an Artificial intelligence code for player 2 which finds a suitable move according to the current state and player 1's move) **[4 marks]**
4. Game between AI CPU and user. **Bonus [2 marks]**

Output 1

Userchoice: 1

0 0 **Input**

O - -

- - -

- - -

1 1 **Input**

O - -

- X -

- - -

2 0 **Input**

O - -

- X -

O - -

0 0 **Input**

Invalid coordinates. Please enter again

2 1 **Input**

O - -

- X -

O X -

1 0 **Input**

O - -

O X -

O X -

O Wins

Output 2

User choice: 1

0 1 **Input**

- O -

- - -

- - -

0 2 **Input**

- O X

- - -

- - -

0 4 **Input**

Invalid coordinates. Please enter again

1 2 **Input**

- O X
- - O
- - -

2 2 **Input**

- O X
- - O
- - X

2 0 **Input**

- O X
- - O
O - X

1 1 **Input**

- O X
- X O
O - X

0 0 **Input**

O O X
- X O
O - X

1 0 **Input**

O O X
X X O
O - X

2 1 **Input**

O O X
X X O
O O X

Tie

Output 3

User choice: 2

Computer:

```
- - -  
- O -  
- - -
```

You:

0 1

```
- - X  
- O -  
- - -
```

Computer:

```
- - X  
- O -  
- - O
```

You:

0 0

```
X - X  
- O -  
- - O
```

Computer:

```
X - X  
- O -  
O - O
```

You:

0 1

```
X X X  
- O -  
O - O
```

You Win!