

Inquiry Question

How do you know when a game of Tic Tac Toe has been won? Can you write a Python program to manage game state and check for victory?

Name: _____ **Date:** _____



General Instructions

Tic Tac Toe or Xs and Os is a classic paper and pencil game for two players. One player is X, and the other is O. Each player takes turns placing their letter on a 3x3 board. The player who is first able to place three of their letters in a horizontal, vertical, or diagonal row of 3 is the winner.

Using the Python skills you have learned in this course, can you write a computer version of the game Tic Tac Toe for 2 human players to play against one another? Your program must be able to detect when a player has won, or when the game has ended in a tie. How would you go about writing a function to detect victory?

Materials you'll need:

- Pencil
- Computer

Project submission:

Submit the completed pages of this project as well as the .py code file for your Tic Tac Toe program.

Design Specifications

- Output a tic tac toe board to the Shell using symbols (|, -).
- The user can place an X or O by entering a row (1 - 3) and a column (1 - 3)
- If the user does not enter a number between 1 and 3, continue to prompt them until they do.
- After each X or O placement, the player switches. For example, if a user places an X, then the next placement will be an O.
- After each placement, update the board and output it again.
- Do not allow placements if a tile is already occupied by an X or O.
- Detect when a player has won the game, and output who has won.

- Detect when the game has ended in a tie.

- Use at least 3 functions and one loop.

Bonus Options

- Add the ability to play against the computer, rather than another human player.
- Add the ability to play multiple games without exiting and restarting. Keep an overall score.
- [HARD] Use the [Tkinter](#) Python library to build a GUI for your Tic Tac Toe game.

Hints and Resources

Here is a short example of how your program might look when you run it in the console.

```
Welcome to Tic Tac Toe! X goes first...
```

```
| |  
-----  
| |  
-----  
| |
```

```
It is X's turn  
Select a row (1 - 3): 1  
Select a column (1 - 3): 1
```

```
X| |  
-----  
| |  
-----  
| |
```

```
It is O's turn  
Select a row (1 - 3): 2  
Select a column (1 - 3): 1
```

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

```
It is X's turn
Select a row (1 - 3): 2
Select a column (1 - 3): 2
```

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

```
It is O's turn
Select a row (1 - 3): 3
Select a column (1 - 3): 2
```

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

```
It is X's turn
Select a row (1 - 3): 3
Select a column (1 - 3): 3
'X' HAS WON, GAME OVER!!
```

When checking if a user has won, you must check:

- Check each row and see if all of the letters ("X" or "O") in it are the same.
- Check each column and see if all of the letters in it are the same.
- Check each of the two diagonals and see if the 3 elements are the same.

To check if the game has been tied:

- Check that the game has not been won.
- Check if the board is completely full of letters.

When outputting the board, get creative! See how nice you can make it look using just symbols and letters. If you are stuck, you can use “|” and “-”.

Spend some time to decide how you will store the board state in a variable. Write some pseudocode and make sure it will work before you start writing code.

Questions

Using pseudocode, write a function that accepts a list variable called “board”, and determines if a player has won the game.

How would you go about designing an AI (computer player) to play Tic Tac Toe?

What are the different ways you could store the game state (board) variable?

What do you think is the best way to store the game state (board) in a variable? Why?