

Assignment : 2

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#Code :

```
import itertools
```

```
def check_winner(board):
```

```
    win_conditions = [  
        [0, 1, 2], [3, 4, 5], [6, 7, 8],  
        [0, 3, 6], [1, 4, 7], [2, 5, 8],  
        [0, 4, 8], [2, 4, 6]  
    ]
```

```
    for condition in win_conditions:  
        if board[condition[0]] == board[condition[1]] == board[condition[2]] and  
board[condition[0]] != '':  
            return board[condition[0]]  
    return None
```

```
def heuristic(board, player):
```

```
    opponent = 'O' if player == 'X' else 'X'  
    score = 0
```

```
    for condition in [[0, 1, 2], [3, 4, 5], [6, 7, 8], [0, 3, 6], [1, 4, 7], [2, 5, 8], [0, 4, 8], [2, 4, 6]]:  
        values = [board[i] for i in condition]  
        if values.count(player) == 2 and values.count(' ') == 1:  
            score += 10  
        elif values.count(opponent) == 2 and values.count(' ') == 1:  
            score -= 10
```

```
    return score
```

```
def get_available_moves(board):
```

```
    return [i for i, cell in enumerate(board) if cell == '']
```

```
def a_star_search(board, player):
```

```
    open_set = [(board, 0)]  
    best_move = None  
    max_score = float('-inf')
```

```
    for move in get_available_moves(board):  
        new_board = board[:]  
        new_board[move] = player  
        score = heuristic(new_board, player)  
        if score > max_score:
```

```

        max_score = score
        best_move = move

    return best_move

def tic_tac_toe():
    board = [' '] * 9
    players = itertools.cycle(['X', 'O'])

    while True:
        player = next(players)
        if player == 'X':
            move = a_star_search(board, player)
            if move is not None:
                board[move] = player
        else:
            move = int(input("Enter your move (0-8): "))
            if board[move] == ' ':
                board[move] = player
            else:
                print("Invalid move, try again.")
                continue

        print_board(board)
        winner = check_winner(board)
        if winner:
            print(f"{winner} wins!")
            break
        elif ' ' not in board:
            print("It's a draw!")
            break

def print_board(board):
    print("\n")
    for i in range(0, 9, 3):
        print(f"{board[i]} | {board[i+1]} | {board[i+2]}")
        if i < 6:
            print("-----")
    print("\n")

if __name__ == "__main__":
    tic_tac_toe()

```

#Output :

shivrajchaudar@Shivrajs-Macbook-Pro LP-II % python -u "/Users/Shivrajchaudar/Desktop/LP-II/A2.py"

X		

Enter your move (0-8): 1

X		O	

X		O	

X			

Enter your move (0-8): 6

X		O	

X			

O			

X		O	

X		X	

O			

Enter your move (0-8): 5

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

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

Enter your move (0-8): 8

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

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

It's a draw!
shivrajchaudar@Shivrajs-Macbook-Pro LP-II %