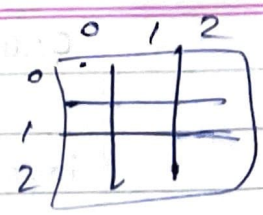
LAB - 01 24/09/24

1. Tic Tac Toe (User vls Computer)



→ Algorithm:

Step 1: Randomize who starts first.
if ~~comp:them~~ Computer then
randomize first move. & assign ← X.
else
user picks a space to mark ← X.

Step 2: Second player get 'O'.

Step 3: Construct a play mat of 3x3 matrix (9 spaces)

Step 4: First player (depending on user or computer) marks a space onthe board.

Step 5: Every turn alternatively switches until one player gets a horizontal, diagonal or verticle rows/columns filled with the same symbol X || Y.

Step 6: Conditions in a tic tac toe that can occur to determine best move:
i) Get three in a row - Win
ii) Block an almost complete sequence - Block
iii) Opportunity to win in two ways - Twin win

Step 7: The game ends when either of the player wins or all the empty spaces are filled resulting in a Tie.

Code:-

~~import random~~

~~def print_board(board):~~
~~""" Print the Tic-Tac-Toe~~
~~row1 = None~~

```
import random

def print_board(board):
    for row in board:
        print(" | ".join(row))
        print("-" * 9)

def check_winner(board):
    for i in range(3):
        if board[i][0] == board[i][1] == board[i][2] != " ":
            return board[i][0]
        if board[0][i] == board[1][i] == board[2][i] != " ":
            return board[0][i]
    if board[0][0] == board[1][1] == board[2][2] != " ":
        return board[0][0]
    if board[0][2] == board[1][1] == board[2][0] != " ":
        return board[0][2]
    return None:

def is_board_full(board):
    return all(cell != " " for row in board for cell in row)
```

```
def ai_move(board):
    for i in range(3):
        for j in range(3):
            if board[i][j] == " ":
                board[i][j] = "O"
                if check_winner(board) == "O":
                    return
                board[i][j] = " "

    for i in range(3):
        for j in range(3):
            if board[i][j] == " ":
                board[i][j] = "X"
                if check_winner(board) == "X":
                    board[i][j] = "O"
                    return
                board[i][j] = " "

    if board[1][1] == " ":
        board[1][1] = "O"
        return

    corners = [(0,0), (0,2), (2,0), (2,2)]
    random.shuffle(corners)
    for corner in corners:
        if board[corner[0]][corner[1]] == " ":
            board[corner[0]][corner[1]] = "O"
            return
```

```
    sides = [(0,1),(1,0),(2,2),(2,1)]
    random.shuffle(sides)
    for side in sides:
        if board[side[0]][side[1]] == " ":
            board[side[0]][side[1]] = "O"
            return

def play_game():
    board = [[" " for _ in range(3)] for _ in range(3)]
    print("Welcome to Tic Tac Toe game")

    choice = int(input("Enter 1 for Heads & 0 for Tails"))
    x = random.randint(0,1)
    if choice == x:
        print("You have won the toss!")
        player_first = True
    else:
        print("AI won the toss! AI goes first")
        player_first = False

    print_board(board)

    while True:
        if player_first:
            while True:
                try:
                    row = int(input("Enter row(1-3): "))-1
                column = int(input("Enter column(1-3): "))-1
                    if board[row][column]==" ":
                        board[row][col] == "X"
                        break
                    else:
```

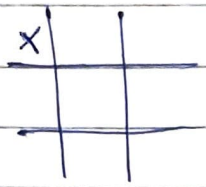
```
            print("All already taken, choose another.")
        except (ValueError, IndexError):
            print("Invalid input. Please enter between 1 and 3")

        print_board(board)

        if check_winner(board) == "X":
            print("You Win!")
            break
        if is_board_full(board):
            print("It's a draw!")
            break
        player_first = False
    else:
        #AI move
        print("AI's turn...")
        ai_move(board)
        print_board(board)

        if check_winner(board) == "O":
            print("AI wins!")
            break
        if is_board_full(board):
            print("It's a draw")
            break

        player_first = True

if __name__ == "__main__":
    play_game()
```

Output:

Select 1 or 0 :

1

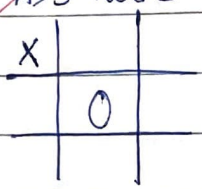
You shall won the toss!



Enter row (1-3): 1

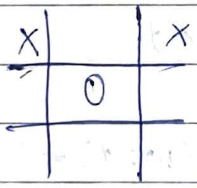
Enter col (1-3): 1

AI's Turn

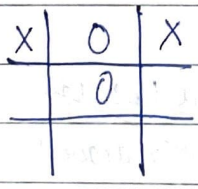


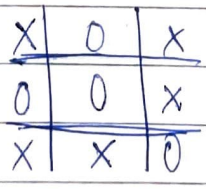
Enter row (1-3): 1

Enter col (1-3): 3

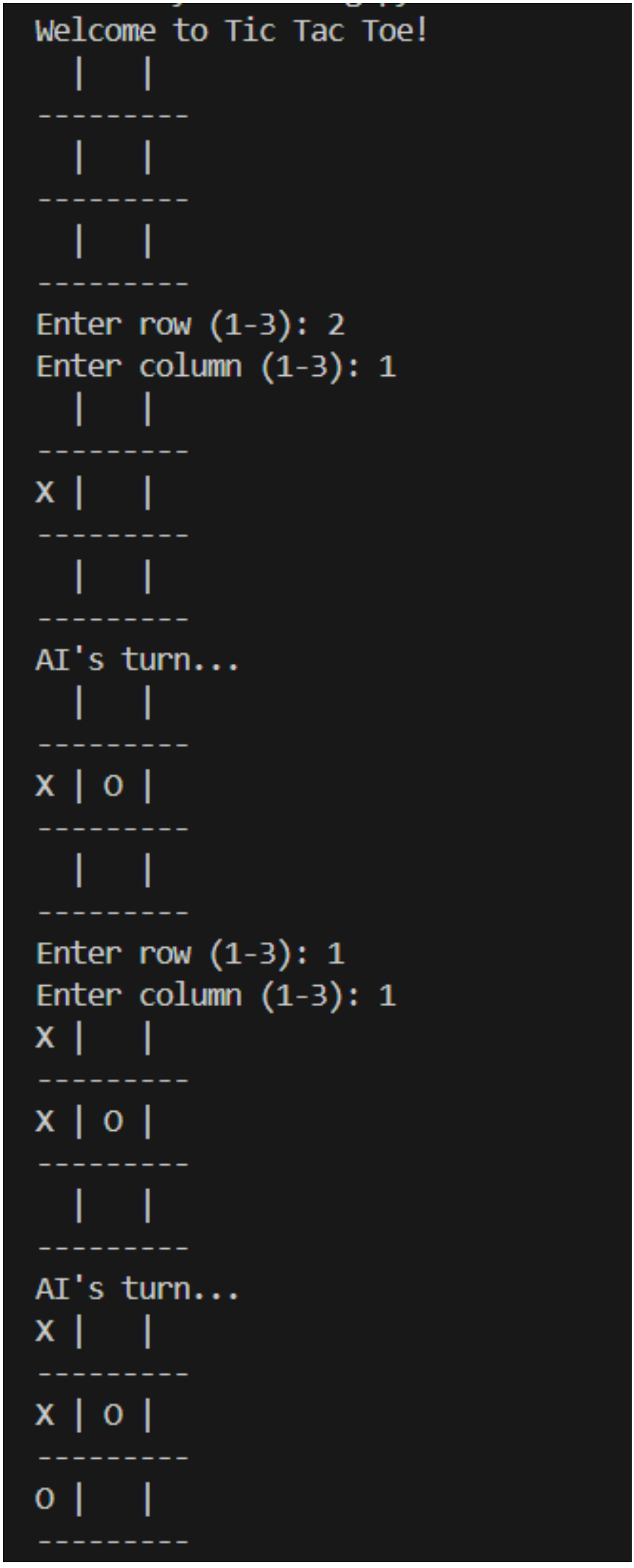


AI's turn





It's a draw!


Welcome to Tic Tac Toe!
| |

| |

| |

Enter row (1-3): 2
Enter column (1-3): 1
| |

X | |

| |

AI's turn...
| |

X | O |

| |

Enter row (1-3): 1
Enter column (1-3): 1
X | |

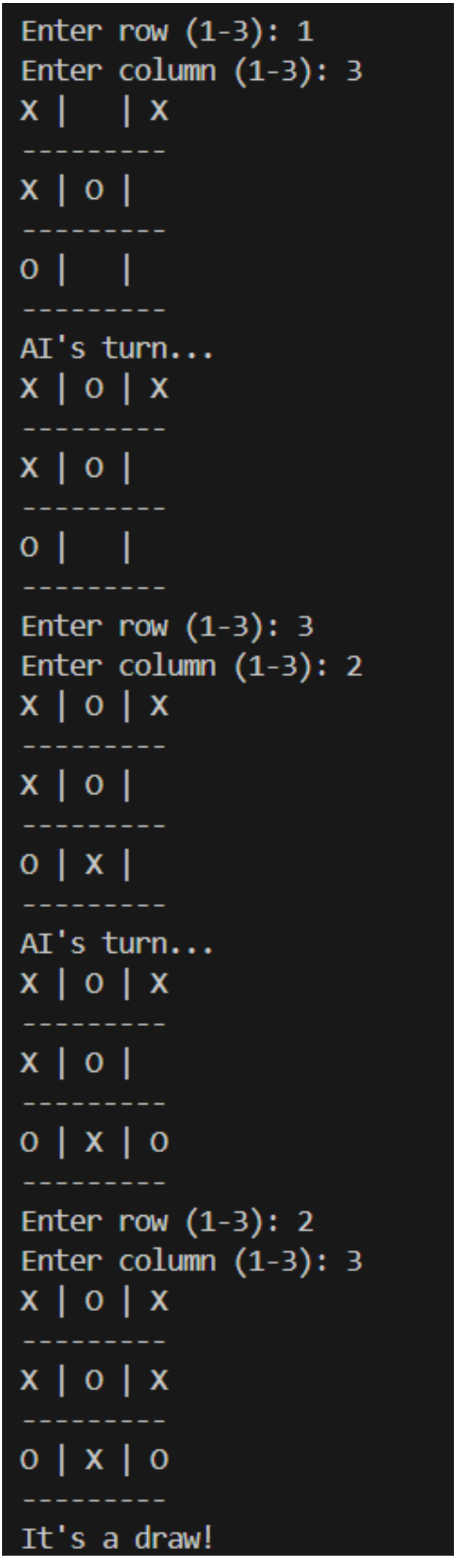
X | O |

| |

AI's turn...
X | |

X | O |

O | |


Enter row (1-3): 1
Enter column (1-3): 3
X | | X

X | O |

O | |

AI's turn...
X | O | X

X | O |

O | |

Enter row (1-3): 3
Enter column (1-3): 2
X | O | X

X | O |

O | X |

AI's turn...
X | O | X

X | O |

O | X | O

Enter row (1-3): 2
Enter column (1-3): 3
X | O | X

X | O | X

O | X | O

It's a draw!

```
---------
Enter row (1-3): 1
Enter column (1-3): 2
X | X |
---------
  | O |
---------
  |   |
---------
AI's turn...
X | X | O
---------
  | O |
---------
  |   |
---------
Enter row (1-3): 1
Enter column (1-3): 2
Cell already taken, choose another.
Enter row (1-3): 3
Enter column (1-3): 1
X | X | O
---------
  | O |
---------
X |   |
---------
AI's turn...
X | X | O
---------
O | O |
---------
X |   |
---------
Enter row (1-3): 3
Enter column (1-3): 2
X | X | O
---------
O | O |
---------
X | X |
---------
AI's turn...
X | X | O
---------
O | O | O
---------
X | X |
---------
AI wins!
```