"""
This is the project I did at the end of the PCEP – Python Certified Entry-Level Programmer certification. Below was the guideline to complete the project.

Your task is to write a python program which pretends to play tic-tac-toe with the user. To make it all easier for you, we've decided to simplify the game. Here are our assumptions:
- the computer (i.e., your program) should play the game using 'X's;
- the user (e.g., you) should play the game using 'O's;
- the first move belongs to the computer - it always puts its first 'X' in the middle of the board;
- all the squares are numbered row by row starting with 1
- the user inputs their move by entering the number of the square they choose - the number must be valid, i.e., it must be an integer, it must be greater than 0 and less than 10, and it cannot point to a field which is already occupied;
- the program checks if the game is over - there are four possible verdicts: the game should continue, or the game ends with a tie, your win, or the computer's win;
- the computer responds with its move and the check is repeated;

"""

```
# Start
from random import randrange

def DisplayBoard(board):
#
# the function accepts one parameter containing the board's current status
# and prints it out to the console
#
    print("+", "-"*7, "+", "-"*7, "+", "-"*7, "+", sep='')

    print("|", " "*7, "|", " "*7, "|", " "*7, "|", sep='')
    print("|", " "*3, board[0][0], " "*3, "|", " "*3, board[0][1], " "*3, "|", " "*3, board[0][2], " "*3, "|", sep='')
    print("|", " "*7, "|", " "*7, "|", " "*7, "|", sep='')

    print("+", "-"*7, "+", "-"*7, "+", "-"*7, "+", sep='')

    print("|", " "*7, "|", " "*7, "|", " "*7, "|", sep='')
    print("|", " "*3, board[1][0], " "*3, "|", " "*3, board[1][1], " "*3, "|", " "*3, board[1][2], " "*3, "|", sep='')
    print("|", " "*7, "|", " "*7, "|", " "*7, "|", sep='')

    print("+", "-"*7, "+", "-"*7, "+", "-"*7, "+", sep='')

    print("|", " "*7, "|", " "*7, "|", " "*7, "|", sep='')
    print("|", " "*3, board[2][0], " "*3, "|", " "*3, board[2][1], " "*3, "|", " "*3, board[2][2], " "*3, "|", sep='')
    print("|", " "*7, "|", " "*7, "|", " "*7, "|", sep='')

    print("+", "-"*7, "+", "-"*7, "+", "-"*7, "+", sep='')

def MoveToBoardPos(n):
#
# the function interprets a valid move to a tuple containing row, column values
#
    if n == 1:
        return (0, 0)
    elif n == 2:
        return (0, 1)
```

```
    elif n == 3:
        return (0, 2)
    elif n == 4:
        return (1, 0)
    elif n == 5:
        return (1, 1)
    elif n == 6:
        return (1, 2)
    elif n == 7:
        return (2, 0)
    elif n == 8:
        return (2, 1)
    else:
        return (2, 2)

def EnterMove(board):
#
# the function accepts the board current status, asks the user about their move,
# checks the input and updates the board according to the user's decision
#
    while True:
        try:
            x = int(input("Enter your move 'O' : "))
            if (x >= 1 and x <= 9):
                pos = MoveToBoardPos(x)
                f = MakeListOfFreeFields(board)
                r = pos[0]
                c = pos[1]
                if pos in f:
                    board[r][c] = "O"
                    break
                else:
                    print("Square is already occupied.")
                    continue
            else:
                print("The value was not >= 1 and <= 9.")
        except ValueError:
            print("The input was not a valid integer.")

def MakeListOfFreeFields(board):
#
# the function browses the board and builds a list of all the free squares;
# the list consists of tuples, while each tuple is a pair of row and column numbers
#
    free = [1, 2, 3, 4, 5, 6, 7, 8, 9]
    freeList =[]
    for i in range(3):
        for j in range(3):
            if board[i][j] in free:
                freeList.append((i, j))
    return freeList

def VictoryFor(board, sign, player):
#
# the function analyzes the board status in order to check if
# the player using 'O's or 'X's has won the game
#
```

```
    # check horizontal
    # check vertical
    # check diagonal
    h1 = (board[0][0] == sign) and (board[0][1] == sign) and (board[0][2] == sign)
    h2 = (board[1][0] == sign) and (board[1][1] == sign) and (board[1][2] == sign)
    h3 = (board[2][0] == sign) and (board[2][1] == sign) and (board[2][2] == sign)

    v1 = (board[0][0] == sign) and (board[1][0] == sign) and (board[2][0] == sign)
    v2 = (board[0][1] == sign) and (board[1][1] == sign) and (board[2][1] == sign)
    v3 = (board[0][2] == sign) and (board[1][2] == sign) and (board[2][2] == sign)

    d1 = (board[0][0] == sign) and (board[1][1] == sign) and (board[2][2] == sign)
    d2 = (board[0][2] == sign) and (board[1][1] == sign) and (board[2][0] == sign)

    # if meets any check condition
    #     declare winner
    if h1 or h2 or h3 or v1 or v2 or v3 or d1 or d2:
        if sign == "X":
            print("Computer won!")
            return True
        elif sign == "O":
            print(player, " won!")
            return True
        else:
            return False

def DrawMove(board):
#
# the function draws the computer's move and updates the board
#
    while True:
        y = randrange(8)+1
        pos = MoveToBoardPos(y)
        f = MakeListOfFreeFields(board)
        r = pos[0]
        c = pos[1]
        if pos in f:
            board[r][c] = "X"
            break
        else:
            continue

# main program
rows, cols = (3, 3)
board = [[1, 2, 3], [4, 5, 6], [7, 8, 9]] # initialise the board

rounds = 0
print("Play tic-tac-toe game by M. Asif Khan.  ")
player = input("Please enter your name:  ")
print("Computer 'X' is playing vs ", player, " 'O'.\nLet the begin begins! ")
while True:
    DrawMove(board)
    DisplayBoard(board)
    won = VictoryFor(board, "X", player)
    if (won == True):
        break
    rounds += 1
```

```
    if rounds == 9:
        print("No winner.")
        break
    EnterMove(board)
    DisplayBoard(board)
    won = VictoryFor(board, "O", player)
    if (won == True):
        break
    rounds += 1
# End
```

```
Python 3.9.0 (tags/v3.9.0:9cf6752, Oct  5 2020, 15:34:40) [MSC v.1927 64 bit (AMD64)]
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/Loulou/AppData/Local/Programs/Python/Python39/tic_toc_Akhan.py
Play tic-tac-toe game by M. Asif Khan.
Please enter your name:  Khan
Computer 'X' is playing vs  Khan  'O'.
Let the begin begins!
+-------+-------+-------+
|       |       |       |
|   1   |   2   |   3   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   4   |   X   |   6   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   7   |   8   |   9   |
|       |       |       |
+-------+-------+-------+
Enter your move 'O' : 7
+-------+-------+-------+
|       |       |       |
|   1   |   2   |   3   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   4   |   X   |   6   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   O   |   8   |   9   |
|       |       |       |
+-------+-------+-------+
+-------+-------+-------+
|       |       |       |
|   1   |   2   |   X   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   4   |   X   |   6   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   O   |   8   |   9   |
|       |       |       |
+-------+-------+-------+
Enter your move 'O' : 9
Enter your move 'O' : 9
+-------+-------+-------+
|       |       |       |
|   1   |   2   |   X   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   4   |   X   |   6   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   O   |   8   |   O   |
|       |       |       |
+-------+-------+-------+
+-------+-------+-------+
|       |       |       |
|   1   |   2   |   X   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   4   |   X   |   X   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   O   |   8   |   O   |
|       |       |       |
+-------+-------+-------+
Enter your move 'O' : 8
+-------+-------+-------+
|       |       |       |
|   1   |   2   |   X   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   4   |   X   |   X   |
|       |       |       |
+-------+-------+-------+
|       |       |       |
|   O   |   O   |   O   |
|       |       |       |
+-------+-------+-------+
Khan  won!
```