

## Practical No.1

Aim: Write a program to implement tic-tac-toe game.

### Theory:

Tic-Tac-Toe is a classical paper-and-pencil game for two players, traditionally called Player X and Player O (XO game).

In this version, you & the human play as X, and the AI plays as O. The game is played on 3x3 grid, and the goal is to place three of your marks (X or O) in a row, column or diagonal before your opponent does.

### Game Concept in this Program:

In this python-based version:

- The human player enters their name and plays as X.
- The AI always plays the best possible move and uses Minimax algorithm.
- The game is played via a console (command-line), and the grid is displayed after each move.

# Rules and Regulations of the game :

Rule No.	Description
1. Turn Order	The human player always goes first as X. The AI plays second as O.
2. Valid Moves	Players take turns placing their mark in an empty cell numbered 1-9. A move is only valid if the chosen cell is not already occupied.
3. Win Condition	The first player to align three of their symbols in a horizontal, vertical, or diagonal line wins.
4. Draw Condition	If all 9 cells are filled and no one has won, the game ends in a draw.
5. Game Over	Once a player wins or the board is full (draw), the game stops and displays the result.
6. Input Format	The user is prompted to enter a number (1 to 9) to mark a cell. Inputting anything invalid will show an error and re-prompt.

## Grid Number Mapping

1	2	3
4	5	6
7	8	9

choose a Square (1 to 9) :

## AI Intelligence

- AI never guesses randomly. It uses minimax logic and pruning.
- This means:
  - It will block your winning move.
  - It will take its winning move if available
  - It will always force a win or draw, never a loss.

ARISE & SHINE

## Win / Loss Message :

- If you win, it congratulates you using your name.
- If AI win, it gives a respectful message
- If it's a draw, it says so clearly.

## Program Code for Tic-Tac-Toe

```
def print_board(b):
    for i, row in enumerate(b):
        print(" | ".join(c or str(3*i+j+1) for j, c in enumerate(row))) if i < 2:
            print(" ---+---+---")
```

  

```
def winner(b):
    lines = [[(i, j) for j in range(3)] for i in range(3)] + \
            [[(j, i) for j in range(3)] for i in range(3)] + \
            [[(i, i) for i in range(3)], [(i, 2-i) for i in range(3)]] for line in lines:
        marks = {b[r][c] for r, c in line}
        if len(marks) == 1 and "" not in marks:
            return marks.pop()
    return None
```

  

```
def moves(b):
    return [(r, c) for r in range(3) for c in range(3) if b[r][c] == ""]
```

```

def minimax(b, is_ai):
    if (w := Winner(b)):
        return (1 if w == "O" else -1, None)
    if not moves(b):
        return (0, None)
    best = (-2, None) if is_ai else (2, None)
    for r, c in moves(b):
        b[r][c] = "O" if is_ai else "X"
        score, _ = minimax(b, not is_ai)
        b[r][c] = ""
        score = -score
        if (is_ai and score > best[0]) or (not is_ai and score < best[0]):
            best = (score, (r, c))
    return best

```

```

def main():
    name = input("Welcome! What's your Name?").strip()
    print(f"\nHi {name}! You are X, the AI is O.\nGood Luck!\n")
    board = [[[" "]*3 for _ in range(3)]]

```

while True:

print(board(board))

if winner(board) or not moves(board):  
break

# ----- Human Turn -----

if sum(cell == "" for row in board for cell in row) % 2 == 0:

while True:

try:

pos = int(input("Your move(1-9):")) - 1

r, c = divmod(pos, 3)

if board[r][c] == "":

board[r][c] = "X"

break

print("That square is occupied!")

except:

print("Invalid input, try again.")

# ----- AI Turn -----

else:

print("AI is thinking...")

, (r, c) = minimax(board, True)

board[r][c] = "O"

print(f"AI choose square {3\*r+c+1}")

# ----- gameOver -----

print\_board(board)

w = winner(board)

if w == "X":

    print(f"Congratulations, {name}! You win!")

elif w == "O":

    print("The AI wins. Better luck next time!")

else:

    print("It's a draw!")

if \_\_name\_\_ == "\_\_main\_\_":

    main()

Conclusion:

Tic-Tac-Toe is a fun and simple game that tests your thinking skills. This version lets you play against a smart AI, making it both challenging and enjoyable.