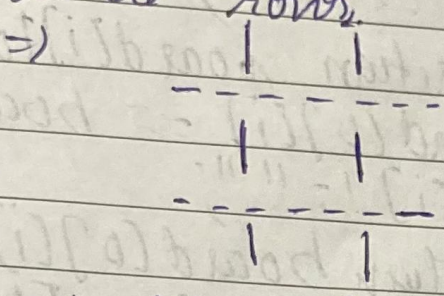
Tic - tac - toe Algorithm

step 1: Initialize a 2D array with 3 rows & 3 columns using '|' to differentiate columns & '-' to differentiate rows.

⇒



~~print board (board)~~

print ("|".join(row))
print ("-" * 7).

Step 2: In the main function give the human the first move always.

Let X be human & 'O' be the system

put

current_player as 'X' &
computer_player as 'O'.

Step 3: Check each if there is a winner after each move, if there is display winner & update the checker board and display it to take further inputs and also check if board is full & display it

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→ check winner

let 0-2 be the rows & columns.
check rows, columns & diagonals for the winner.

```
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.
```

→ check full board:

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

→ if no win ↓

```
row, col = int(input(f"player {current_player}, enter row (0-2): "))
```

if the entered space is empty update & check or display

→ for computer move:-

```
find winning move (board, player)
for i in range (3):
    for j in range (3):
        if board[i][j] == " ":
            board[i][j] = player
            if check_winner(board) == player:
                board[i][j] = " "
                return (i, j)
            board[i][j] = " "
return none.
```

python code:

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

def find_winning_move(board, player):
    for i in range(3):
        for j in range(3):
            if board[i][j] == " ":
                board[i][j] = player
                if check_winner(board) == player:
                    board[i][j] = " "
                    return (i, j)
                board[i][j] = " "
    return None

def get_computer_move(board):
    move = find_winning_move(board, "O")
    if move:
        return move
    move = find_winning_move(board, "X")
    if move:
        return move
```

```
    if board[1][1] == " ":
        return (1, 1)
    corners = [(0,0), (0,2), (2,0), (2,2)]
    for corner in corners:
        if board[corner[0]][corner[1]] == " ":
            return corner
    for i in range(3):
        for j in range(3):
            if board[i][j] == " ":
                return (i, j)

def tic-tac-toe():
    board = [[" " for _ in range(3)] for _
in range(3)]
    current_player = "X"
    computer_player = "O"

    print("Player X goes first.")

    while True:
        print_board(board)

        if current_player == "X":
            while True:
                try:
                    row = int(input("player X,
enter the row (0-2): "))
                    col = int(input("player X,
enter the column (0-2): "))
                    if board[row][col] == " ":
                        break
```

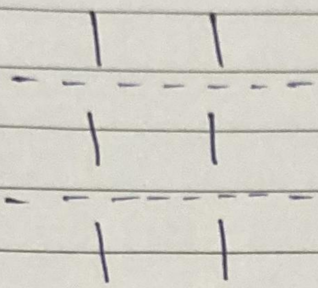
```
            else:
                print("cell is taken, try again")
        except (ValueError, IndexError):
            print("Invalid input!")
    else:
        print("computer's turn...")
        row, col = get_computer_move(board)
        print(f"computer chooses row {row}, column {col}")

    board[row][col] = current_player

    winner = check_winner(board)
    if winner:
        print_board(board)
        print(f"player {winner} wins!")
        break
    if is_full(board):
        print_board(board)
        print("It's a tie!")
        break
```

current_player = computer_player if current_player == "X" else "O"

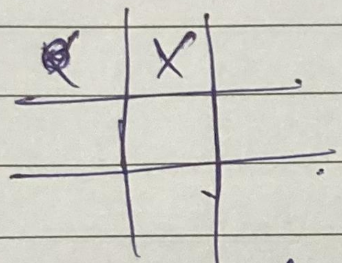
```
if __name__ == "__main__":
    tic_tac_toe()
```

output:

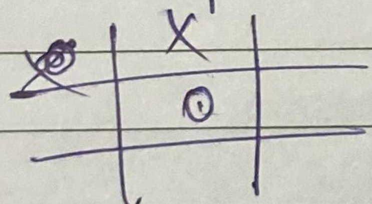
player x goes first



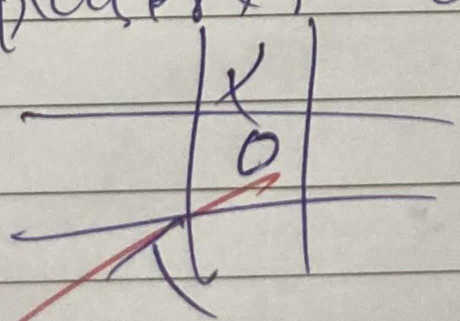
player x, row=0
player x col=0



computers turn



player X, enter row(0-2): 2
player X, enter col (0-2): 0



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```
Player X goes first.
  |   |
---------
  |   |
---------
  |   |
---------
Player X, enter the row (0-2): 0
Player X, enter the column (0-2): 1
  | X |
---------
  |   |
---------
  |   |
---------
Computer's turn...
Computer chooses row 1, column 1
  | X |
---------
  | O |
---------
  |   |
---------
Player X, enter the row (0-2): 2
Player X, enter the column (0-2): 0
  | X |
---------
  | O |
---------
X |   |
---------
Computer's turn...
Computer chooses row 0, column 0
O | X |
---------
  | O |
---------
X |   |
---------
Player X, enter the row (0-2): 2
Player X, enter the column (0-2): 2
O | X |
---------
  | O |
---------
X |   | X
---------
```

```
Computer's turn...
Computer chooses row 2, column 1
O | X |
---------
  | O |
---------
X | O | X
---------
Player X, enter the row (0-2): 0
Player X, enter the column (0-2): 2
O | X | X
---------
  | O |
---------
X | O | X
---------
Computer's turn...
Computer chooses row 1, column 2
O | X | X
---------
  | O | O
---------
X | O | X
---------
Player X, enter the row (0-2): 1
Player X, enter the column (0-2): 1
Cell is already taken! Try again.
Player X, enter the row (0-2): 1
Player X, enter the column (0-2): 0
O | X | X
---------
X | O | O
---------
X | O | X
---------
It's a tie!
```