PROGRAM-2

8 QUEENS PROBLEM

AIM:-

To write and execute the python program for the 8 queens program.

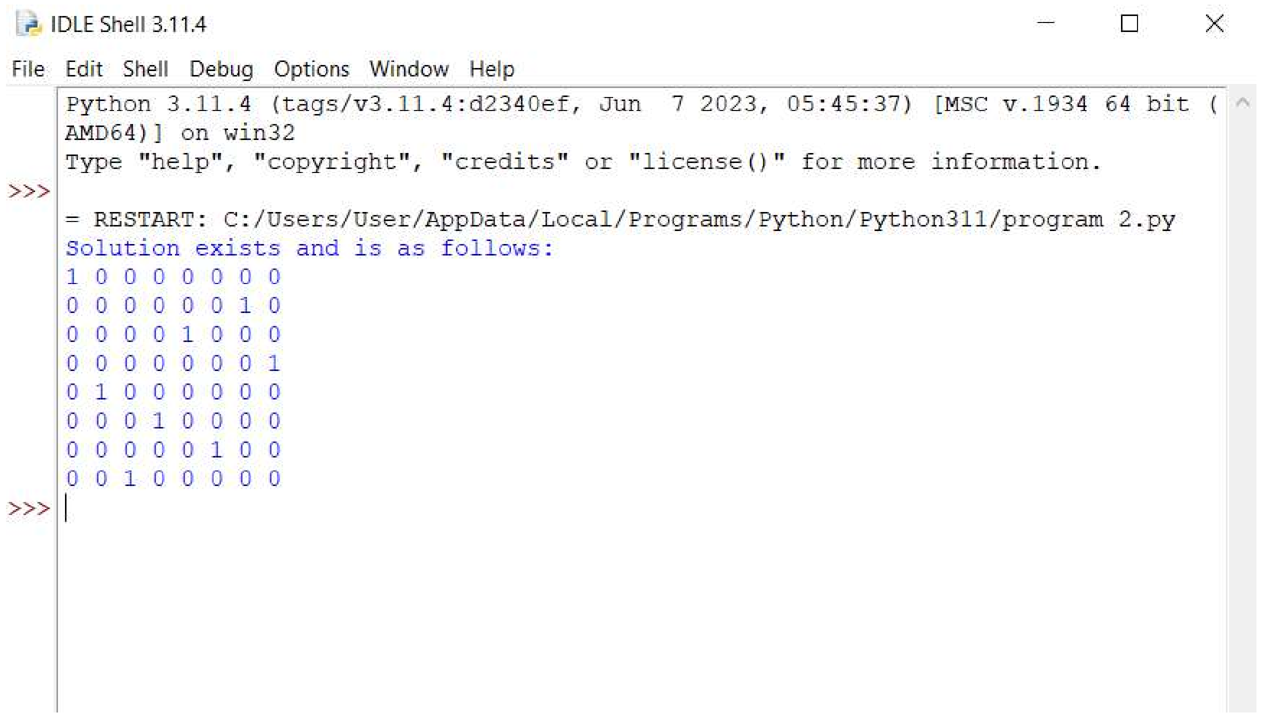
PROCEDURE:-

- **Check Safety**:
    - The is_safe function checks whether placing a queen at a specific position on the board is safe. It checks for conflicts with queens placed in previous columns and diagonals.
- **Backtracking Algorithm**:
    - The solve_n_queens_util function implements a backtracking algorithm to find a solution to the N-Queens problem. It recursively explores all possible configurations of queens on the board, ensuring that each placement is safe.
- **Main Function**:
    - The solve_n_queens function initializes the chessboard and calls the solve_n_queens_util function to find a solution. If a solution exists, it prints the board; otherwise, it prints "Solution does not exist."
- **Print Board Function**:
    - The print_board function prints the chessboard configuration with queens represented as '1's and empty squares represented as '0's.
- **Example Usage**:
    - Call the solve_n_queens function with the desired board size (N) to find a solution for the N-Queens problem.

CODING:-

```
def is_safe(board, row, col, N):

    for i in range(col):

        if board[row][i] == 1:

            return False
    for i, j in zip(range(row, -1, -1), range(col, -1, -1)):
        if board[i][j] == 1:
            return False
    for i, j in zip(range(row, N, 1), range(col, -1, -1)):
        if board[i][j] == 1:
            return False
    return True
def solve_n_queens_util(board, col, N):
    if col >= N:
        return True

    for i in range(N):
        if is_safe(board, i, col, N):
            board[i][col] = 1

            if solve_n_queens_util(board, col + 1, N):
                return True
            board[i][col] = 0
    return False
def solve_n_queens(N):
    board = [[0] * N for _ in range(N)]
    if not solve_n_queens_util(board, 0, N):

        print("Solution does not exist")

        return False



    print("Solution exists and is as follows:")

    print_board(board)

    return True



def print_board(board):

    for row in board:

        print(" ".join(map(str, row)))

solve_n_queens(8)
```

OUTPUT:-



```
Python 3.11.4 (tags/v3.11.4:d2340ef, Jun  7 2023, 05:45:37) [MSC v.1934 64 bit (
AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/User/AppData/Local/Programs/Python/Python311/program 2.py
Solution exists and is as follows:
1 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0
0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 1
0 1 0 0 0 0 0 0
0 0 0 1 0 0 0 0
0 0 0 0 0 1 0 0
0 0 1 0 0 0 0 0
>>>
```

RESULT:-

Hence the program has been successfully executed and verified.