

# PRINCIPLES OF ARTIFICIAL INTELLIGENCE

## LABORATORY PROGRAMS

### 8 QUEENS PROBLEM:

#### SOURCE CODE:

```
N = 8
def solveNQueens(board, col):
    if col == N:
        print(board)
        return True
    for i in range(N):
        if isSafe(board, i, col):
            board[i][col] = 1
            if solveNQueens(board, col + 1):
                return True
            board[i][col] = 0
    return False

def isSafe(board, row, col):
    for x in range(col):
        if board[row][x] == 1:
            return False
    for x, y in zip(range(row, -1, -1), range(col, -1, -1)):
        if board[x][y] == 1:
            return False
    for x, y in zip(range(row, N, 1), range(col, -1, -1)):
        if board[x][y] == 1:
            return False
    return True

board = [[0 for x in range(N)] for y in range(N)]
if not solveNQueens(board, 0):
    print("No solution found")
```

## OUTPUT:

The image shows a screenshot of an IDE with two windows. The left window displays a Python script for solving the N-Queens problem. The script defines a function `solveNQueens` and a helper function `isSafe`. It sets `N = 8` and attempts to find a solution starting from column 0. The right window shows the execution output, which includes the Python version, a restart message, and the final solution board as a list of lists.

```
*28-02-2024 231501147 POA 001 8QUEENS.py - C:\Users\ur mom\Documents\PRINCIPLES OF AI
File Edit Format Run Options Window Help

N = 8
def solveNQueens(board, col):
    if col == N:
        print(board)
        return True
    for i in range(N):
        if isSafe(board, i, col):
            board[i][col] = 1
            if solveNQueens(board, col + 1):
                return True
            board[i][col] = 0
    return False

def isSafe(board, row, col):
    for x in range(col):
        if board[row][x] == 1:
            return False
    for x, y in zip(range(row, -1, -1), range(col, -1, -1)):
        if board[x][y] == 1:
            return False
    for x, y in zip(range(row, N, 1), range(col, -1, -1)):
        if board[x][y] == 1:
            return False
    return True

board = [[0 for x in range(N)] for y in range(N)]
if not solveNQueens(board, 0):
    print("No solution found")

IDLE Shell 3.9.10
Python 3.9.10 (tags/v3.9.10:f2f3f53, Jan 17 2022, 15:14:21) [MSC v.1929 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:\Users\ur mom\Documents\PRINCIPLES OF AI\SANTHOSHKUMAR S 231501147\28-02-2024 231501147 POA 001 8QUEENS.py
[[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]]
>>>
```