

# Experiment No.:-5

## Design n-Queens matrix having first Queen placed. Use backtracking to place remaining Queens to generate the final n-queen's matrix.

Source Code:-

```
In [1]: class Queen:
        def __init__(self,
N):
        self.N = N
        self.board = [[0]*N for _ in range(N)]
        def
disp_board(self):
        for
row in self.board:
        print()
        for col in row:
        if col == 1:
                print(u"\U0001F451", end=' ') # Queen emoji
        else:
                print(u"\u274C", end=' ') # Cross mark
        print(end='\n')
        def is_attack(self, i, j):
        for k in range(0, self.N):
                if self.board[i][k] == 1 or self.board[k][j] == 1:
                        return True
        for k in range(0, self.N):
                for l in range(0, self.N):
                        if
(k + 1 == i + j) or (k - 1 == i - j):
        if self.board[k][l] == 1:
                        return True
        return False

        def N_queen(self, n):
        if n == 0:
        return True

        for i in range(0, self.N):
                for j in range(0, self.N):
        if (not self.is_attack(i, j)) and (self.board[i][j] != 1):
                self.board[i][j] = 1
        if self.N_queen(n-1):
        return True
        self.board[i][j] = 0
```

```

        return False
    def
queen_positions(self):
    positions = []
    for i in
    range(self.N):
        for j in
        range(self.N):
            if
            self.board[i][j] == 1:
                positions.append((i, j))
            return
    positions

# Input number of queens
N = int(input("Enter the number of queens: ")) Q
= Queen(N)

print('Initial State:')
Q.disp_board()

Q.N_queen(N)

print('\nFinal State:')
Q.disp_board()

positions = Q.queen_positions()
print('\nPositions of the queens:') for
idx, pos in enumerate(positions):
    print(f"Queen {idx + 1}: Row {pos[0] + 1}, Column {pos[1] + 1}")

```

Enter the number of queens: 8  
Initial State:

```

X X X X X X X X X
X X X X X X X
X X X X X X X X
X X X X X X X X
X X X X X X X X X
X X X X X X X
X X X X X X X X
X X X X X X X X

```

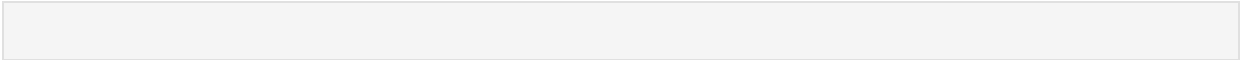
Final State:

```

♔ X X X X X X X
X X X X ♔ X X X X
X X X X X ♔
X X X X ♔ X X
X X ♔ X X X X X
X X X X X ♔ X X
♔ X X X X X X
X X X ♔ X X X X

```

Positions of the queens:  
Queen 1: Row 1, Column 1  
Queen 2: Row 2, Column 5  
Queen 3: Row 3, Column 8  
Queen 4: Row 4, Column 6  
Queen 5: Row 5, Column 3  
Queen 6: Row 6, Column 7  
Queen 7: Row 7, Column 2



Queen 8: Row 8, Column 4

In [ ]: