# DAA LAB-4

# Report

Priyansh Bakhtani

PRN-20190802079

- **Aim:** To implement a backtracking algorithm for solving N queen problem, to solve a sudoku problem and to find all unique combinations in candidates where the candidates numbers sums to target.
- **Theory:**
  - **N Queen problem:** The N Queen is the problem of placing N chess queens on an N×N chessboard so that no two queens attack each other. A queen can attack horizontally, vertically, or diagonally. The solution to this problem is also attempted in a similar way. We first place the first queen anywhere arbitrarily and then place the next queen in any of the safe places. We continue this process until the number of unplaced queens becomes zero (a solution is found) or no safe place is left. If no safe place is left, then we change the position of the previously placed queen.

  - **Sudoku problem:** Sudoku is a 9x9 matrix filled with numbers 1 to 9 in such a way that every row, column and sub-matrix (3x3) has each of the digits from 1 to 9. We are provided with a partially filled 9x9 matrix and have to fill every remaining cell in it.

- **Observation**: On solving N queen problem we found no solution for N= 2 and 3 , Two solutions for N=4, ten solutions for N=5, four solutions for N=6,40 solutions for N=7 ,92 solutions for N=8 ,352 solutions for N=9.

- As it was not possible to submit the output of all the solution of N=2-9 (more than 400 solutions as a whole) only output for N=6 has been shown others can be calculated from the code.

- There are 579 backtracks for sudoku problem.

- **Outputs of the given problems are submitted individually in the Drive.**

- **Conclusion:** All the given problems are solved using backtracking and the number of backtracks are computed.