UCS415 Design and Analysis of Algorithms

Lab Assignment 4 (Backtracking)

Write a program to implement the following using backtracking approach:

1. Given an integer n, the task is to find the solution to the n-queens problem, where n queens are placed on an n*n chessboard such that no two queens can attack each other. The N Queen is the problem of placing N chess queens on an N×N chessboard so that no two queens attack each other.

   Input: 4

   Output: [2, 4, 1, 3]

   Explanation: [2, 4, 1, 3] and [3, 1, 4, 2] are the two possible solutions.

2. Given an incomplete Sudoku in the form of matrix mat[][] of order 9*9, the task is to complete the Sudoku.

Input:

3	0	6	5	7	8	4	0	0
5	2	0	0	0	0	0	0	0
0	8	7	0	0	0	0	3	1
0	0	3	0	1	0	0	8	0
9	0	0	8	6	3	0	0	5
0	5	0	0	9	0	6	0	0
1	3	0	0	0	0	2	5	0
0	0	0	0	0	0	0	7	4
0	0	5	2	8	6	3	0	0

Output:

3	1	6	5	7	8	4	9	2
5	2	9	1	3	4	7	6	8
4	8	7	6	2	9	5	3	1
2	6	3	4	1	5	9	8	7
9	7	4	8	6	3	1	2	5
8	5	1	7	9	2	6	4	3
1	3	8	9	4	7	2	5	6
6	9	2	3	5	1	8	7	4
7	4	5	2	8	6	3	1	9

3. Input: Output: Given an undirected graph and a number m, the task is to color the given graph with at most m colors such that no two adjacent vertices of the graph are colored with the same color.

   Input: graph = {0, 1, 1, 1},

   {1, 0, 1, 0},

{1, 1, 0, 1},

{1, 0, 1, 0}

Output: Solution Exists: Following are the assigned colors: 1 2 3 2

Input: graph = {1, 1, 1, 1},

{1, 1, 1, 1},

{1, 1, 1, 1},

{1, 1, 1, 1}

Output: Solution does not exist

Additional Questions:

1. https://coderanch.com/t/689386/java/solving-knapsack-backtracking
2. https://www.geeksforgeeks.org/printing-solutions-n-queen-problem/
3. https://www.geeksforgeeks.org/partition-set-k-subsets-equal-sum
4. https://www.geeksforgeeks.org/travelling-salesman-problem-implementation-using-backtracking/
5. https://www.geeksforgeeks.org/print-palindromic-partitions-string/