University of Asia Pacific (UAP)
Department of Computer Science and Engineering (CSE)

Assignment
CSE 208 – Data Structures and Algorithms II Lab
Deadline: 27 April 2025, 11:59 PM
Total Marks: 20

Problem Statement 1: N-Queens Problem

The N-Queens Problem is a classic backtracking problem where you are tasked with placing N queens on an NxN chessboard so that no two queens threaten each other. This means that no two queens should be in the same row, column, or diagonal.

For example 4-Queens problem, we have two possible solutions as follows:

Solution 1   Solution 2
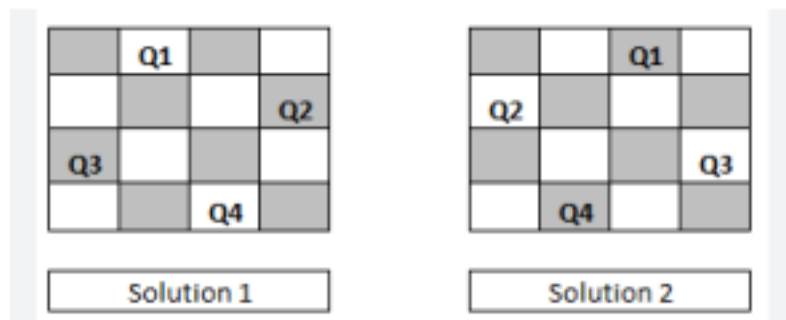
Tasks

a. Solve the 4-Queen Problem in detail.

b. Implement the N-Queens Solver

Write a program that generates all possible solutions to the N-Queens problem using backtracking. The program should print the total number of solutions and all possible solutions as a 2D matrix with dots(.) and Qs.

Example:

Input: 4

Output:

Total Solutions: 2

| Solution: 1	Solution2:
#1##	##1#
###2	2###
3###	###3
##4#	#4##

Problem Statement 2: Once upon a time there was a city that had no roads. Getting around the city was particularly difficult after rainstorms because the ground became very muddy cars got stuck in the mud and people got their boots dirty. The mayor of the city decided that some of the streets must be paved, but did not want to spend more money than necessary because the city also wanted to build a swimming pool. The mayor therefore specified two conditions.

1. Enough streets must be paved so that it is possible for everyone to travel from their house to anyone else's house only along paved roads

2. The paving should cost as little as possible.

Here is the layout of the city. The number of paving stones between each house represents the cost of paving that route.

Solution: the graph (for another muddy city) and the paving.
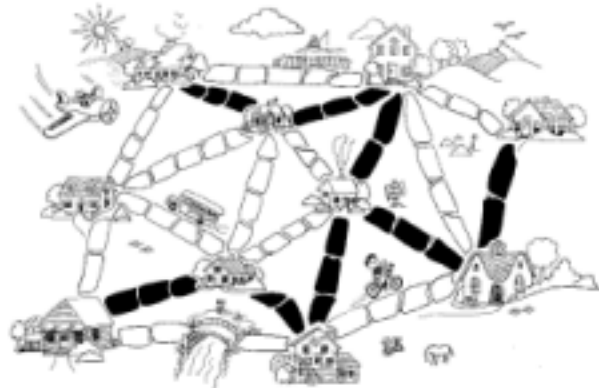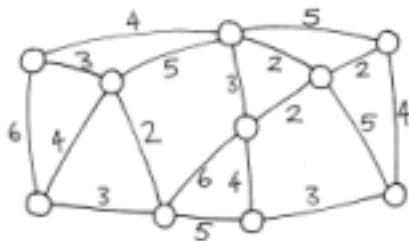
Tasks:

Find the best route that connects all the houses using **Prim's Algorithm**, but uses as few counters (paving stones) as possible.

Submission Guidelines:

● Submit a program (in any language) that implements the Algorithm.

● Include comments in your code to explain the logic and any significant steps. ● Submit the simulation and analysis of Problem statement 1.a in handwritten. ● File name must be studentID_filename.ext (File includes 2 codes and one simulation of 4-Queen).