CS 254 Design and Analysis of Algorithms Lab
Spring Semester, 2023-24, IIT Indore

Instructions: This introductory lab assignment is crafted to reignite your interest in the design and analysis of algorithm course. It includes several questions designed to assess your mathematical comprehension and optimization, intuitive understanding of data structures, and proficiency in programming skills.

Assignment 1

Note. Each of the codes needs to be tested for a large number (e.g., 10 M) of input data.

1. You are given an array of integers, and your task is to find the maximum possible sum of two elements in the array.

   Example:

   Input: [3, 1, 4, 6, 8, 2, 5]; Output: 14

2. You are given a set of items, each with a weight and a value. Your goal is to determine the maximum value that can be obtained by selecting a subset of these items such that the total weight does not exceed a given limit.

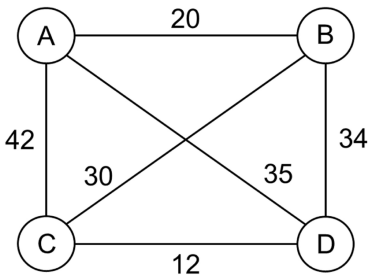
   Example:

   Input: weights = [2, 5, 7, 3, 1]; values = [10, 20, 15, 7, 5]; maxWeight = 10

   Output: 37

3. The Traveling Salesman Problem is a classic optimization problem where a salesman is given a list of cities and the distances between each pair of cities. The task is to find the shortest possible route that visits each city exactly once and returns to the original city.

   Example:



   Here, A, B, and C, D represent the different cities and each edge shows the distance between the two cities.