

Indian Institute of Engineering Science and Technology, Shibpur
Department of Information Technology
Algorithms Lab

6th Semester, 2019
Assignment 4- The Graph

1. Strongly Connected Component:

Given a graph $G = (V, E)$, a strongly connected component in G is a maximal set of vertices $C \subseteq V$ such that for every pair of vertices u and v in C , u and v are reachable from each other. Write a program to find strongly connected component in an arbitrary graph. Use Adjacency List to represent a graph.

2. Travelling Salesman Problem:

Given a set of cities and distance between every pair of cities, the problem is to find the shortest possible route that visits every city exactly once and returns to the starting point. That is, given an undirected and connected graph G , the problem is to find a Hamiltonian cycle having total weight as the minimum.

(a) Write a program to find such a cycle for an arbitrary graph. You may use Branch-and-Bound technique to solve this problem. Comment on the time requirement of your scheme.

(b) Can you improve your scheme if you are allowed to give approximate answer? If so, develop an approximation algorithm, and then implement it. Comment on the improvement with respect to time requirement.