

CSC 226 SUMMER 2023
ALGORITHMS AND DATA STRUCTURES II
ASSIGNMENT 4
UNIVERSITY OF VICTORIA

1. Show how to compute the shortest paths between all pairs of vertices in the graph attached using the Floyd-Warshall algorithm. It is enough to give the D matrix at the end of each iteration.
2. Show how to use the Edmonds-Karp algorithm to find a max flow on the graph in slide 3 of Lecture 19 slides. Show for each step of the algorithm: the residual graph, the augmenting path chosen, and the additional flow.
3. Given a flow f for a graph G , give an algorithm for proving that the flow is maximal which runs in time $O(m)$. The edges are stored in adjacency list form, and with each edge is its capacity and flow across the edge. Give a running time analysis of your algorithm.
4. The edge-connectivity of an undirected graph is the minimum number k of edges that must be removed to disconnect the graph. i.e., 1 for a tree, 2 for a cycle. Give an algorithm for determining the edge connectivity of an undirected graph $G = (V, E)$ which runs a max flow algorithm on $|V| - 1$ different flow networks, each with $|V|$ nodes and $|E|$ edges. What is its running time?