

AV121 – Data Structures and algorithms

Assignment 2

Due 9th June 2023

Part 1

Answers to this section can be hand-written and scanned or typed in.

- 1.1 A list of vertices is provided below, and the table contains a set of edges and the corresponding edge weights. Draw the undirected graph represented by the information provided.

Vertices, $V = \{ A, B, C, D, E, F, G, H, I \}$

Edges, $E =$

Edge	Weight
(A, B)	10
(B, C)	20
(C, D)	30
(D, E)	10
(E, F)	20
(F, A)	30
(A, D)	15
(B, E)	5
(C, F)	1
(G, H)	100
(H, I)	150
(I, G)	200

- 1.2 Answer the following questions about the graph you constructed in question 1.1.
- Is the graph connected or not? Why?
 - How many connected components are there in the graph?
- 1.3 Construct a minimum spanning forest of the graph you constructed in question 1.1. Use Kruskal's algorithm and show the steps you followed in constructing the MST.
- 1.4 Perform a breadth-first search on the graph you constructed in question 1.1. List the order in which vertices are visited and draw the BFS Forest.
- 1.5 Perform a depth-first search on the graph you constructed in question 1.1. List the order in which vertices are visited and draw the DFS Forest.

Part 2

Answers to this section can be hand-written and scanned or typed in.

In the folder **Graph-Code**, an implementation of a *Graph* data structure and associated search algorithms are provided. Go through the code and answer the questions in this section.

2.1 List the data structures used in the code provided to you.

2.2 List all the Graph algorithms that you can find from the code.

2.3 Explain the functionality of the member function *Graph::BFS*

Group Work Policy

You may discuss possible solutions among your peers. However, each submission must be done independently and completely by each student.

Submission Format

- Answers may be written down and scanned or typed in.
- If your answer is in multiple files, they shall be compressed to a **single zip/tar/7z file** and submitted.
- **The name of the submitted file shall start with your student ID.**