Class CMPS 261
Section 001
Problem Programming Assignment #4
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I. Requirements Documentation

I.1 Description of the Problem

Name: Minimal Spanning Tree using Kruskal's Algorithm
Problem Statement: Implement Kruskal's Algorithm for generating the Minimal Spanning Tree for a graph. The implementations should input a graph and output the set of edges from the graph that make up the MST.
Problem Specification: The implementation must utilize a templated minHeap class to hold the edges that will be processed from smallest to largest, by weight. The graph should be stored internally using an Adjacency List Class. The implementation must also utilize a UnionFind class to assist in determining when an edge will cause a cycle.

I.2 Input Information

I.2.1 Input Streams

Name: cin
Description: Standard input stream
Format: text
Size: N/A
Sample: N/A

I.2.2 Input Items

Description: Input for number of edges in a graph, number of vertices in a graph, and all the edges of a graph.
Type: int
Range of acceptable values: Numbers greater than or equal to "1"

I.3 Output Information

I.3.1 Output Streams

Name: cout
Description: Used to output the Minimal Spanning Tree of a graph.
Format: Vertex 1, Vertex 2, EdgeWeight
Size: Depends on the size of the graph: Number of Vertices – 1 lines
Sample:
From vertex 1 to 4, at a cost of 2.

I.3.2 Output Items

Description: An edge in the MST
Type: Text
Range of acceptable values: From vertex [numbers greater than “1”] to [numbers greater than “1”], at a cost of [numbers greater than “1”].

I.4 User Interface Information

I.4.1 Description

The program will not have a menu, it will prompt the user for the number of edges in the graph, the number of vertices in the graph, and then for the information of each edge in the graph represented by a first vertex, a second vertex, and a weight between the edges. The program will then calculate the minimal spanning tree of the graph using Kruskal’s Algorithm, outputting each edge of the mst as it is added to the tree.