**CSCE 4133**

**Algorithms**

**Programming Assignment 4 Report**

Name:

Clayton Warstler – 010971514 – cjwarstl@uark.edu

Date:

11 November 2023

**Academic Integrity Statement:** I pledge that I have neither given nor received unauthorized help on this programming assignment.

**Problem Statement:**

For this project, I was tasked with implementing a Minimum Spanning Tree as if the university wanted to install cables between every building on campus. To implement this, we were to use the algorithm known as Kruskal’s algorithm. This algorithm allows us to choose a set of connections, or edges, and the cost of each connection, or the weight of the edge. The only thing we had to implement was the sorting algorithms, quicksort, mergesort, and heapsort.

**Implementation:**

I started by downloading the homework file provided on Blackboard. The pseudocode provided was not as filled out compared to the last assignment, instead, it was all on our notes. I needed to add a couple extra functions for my implementations of the three sorting algorithms. I added a swap function, a partition function, a merge function, and a heapify function, all of which are shown in more detail below.

template<class T>

void swap(T &a, T &b);

template<class T>

int partition(std::vector<T> &array, int l, int r);

template<class T>

void merge(std::vector<T> &array, int l, int m, int r);

template<class T>

void heapify(std::vector<T> &array, int n, int i);

**Testing:**

All the makefile instructions as well as the compilation commands were given to us in the review and instructions. We also were given the required test cases to test all the functions. This means that the only testing I had to do was run the program with the given commands. This streamlined the testing process, meaning that I could “test” the program in seconds. I am extremely grateful for this.

The results of running the makefile are below:

**Conclusions:**

Overall, everything worked as expected. The program creates a map of the campus and then outlines the shortest path