# Data Structures and Algorithms

# INFO 6205

# Homework 10

# Due: November 24, 2019

Put all your java, compiled class files and documentation files into a zip file named Homework10.zip and submit it via the Drop Box on the blackboard before the END of due date. Put your name on all .java files. There will be a short Quiz on this homework.

1. A MinHeap is a complete binary tree where the minimum-valued element is stored at the root node and every node is less than or equal to both of its child nodes.

**Note**: Java code is provided for MaxHeap algorithm in attached file.

a) compile and test MaxHeap code.

b) modify MaxHeap code to MinHeap, and then compile and test the code.

2. Consider the following Text and Pattern

Text: ABCADCBABABCDABCDABDE

Pattern: BCD

a) Apply Brute-Force substring search algorithm to scan Pattern in

Text string. Show step-by-step of the algorithm. Write Java code

for the algorithm for input data. What is time complexity?

b) Apply Robin-Karp substring search algorithm to scan pattern in the

text string. Show step-by-step of algorithm. Write Java code

for the algorithm for input data. What is time complexity?

c) What is the difference between the two time complexity?

3. Consider this undirected graph:

a) What is Minimum Spanning Tree Pim’s method for this graph,

Use required Data Structures, show **step-by-step** algorithm

b) What is the space and time complexity of this algorithm?

c) Write Java code, compile and test.

4. Consider Knapsack problem in this article:

<https://www.radford.edu/~nokie/classes/360/dp-knapsack.html>

a) Find solutions for m=21

b) How does it uses Dynamic Programming?