CS 260
Programming Assignment 8

This lab is worth a total of 100 points; 10 points are the self-evaluation, 60 points for the basic lab and 30 points for the advanced lab.

This lab should follow the course coding requirements and be split into multiple files as per your chosen language. There is a driver provided for this lab; test the code as it is developed.

Basic Lab

Create a directed graph class named DGraph. It needs to have the following methods: addNode, addEdge, listNodes, displayAdjacency, displayMatrix, breadthFirst and depthFirst. These methods are all provided as pseudo-code in the Introduction to Graphs document except for breadthFirst and depthFirst; they are described as algorithms in the Connectivity and Graph Traversals document. Each one should list the nodes in the order they are reached.

Use the provided driver to test the DGraph class and verify that the output matches the expected output.

Advanced Lab

For the advanced lab, add the following two methods to the DGraph class and test them with the provided driver.

Minimum Spanning Tree

Add a method to DGraph named minTree that accepts a starting node as a parameter and returns a string showing a minimum spanning tree with the starting node as root. This algorithm should use the depthFirst traversal. The output should appear as shown below, example only.

A: A-B B-C C-D B-E B-F F-G

The starting node is before the colon and the edges traversed are in order after it.

Connectivity Table

Add another method to DGraph named connectTable that returns a string. To solve this, remember that a breadth first traversal will report all nodes that can be reached from a given starting node. Using this, consider how to show the connectivity starting from each node in the graph.

The output should appear as shown below.

A: C D E
B: D
C:
D: A E
E: B

The first letter output indicates the starting node and the letters after the colon show the nodes which can be reached from that starting node. This is example output only, the driver will show what the proper output is for the graph implemented there.