

## IT251 Lab 4 Problems -- 29 Jan 2020

### Instructions:

1. Do the below problems in the order given.
2. For each of the problems below, test your code on different input graphs.
3. Use the adjacency list format in *input.txt* of the previous lab to read in graphs.
4. **All your programs should run in  $O(V+E)$  time.**

### Problem 1: Depth First Search

Write a program to implement DFS on a undirected graph. Read in a graph from a file and a source vertex from the user. (You can use the code in 'graph-input.py' to read in a graph from a file.) Print the start and finish time of every vertex in the graph. Also print the tree edges and the back edges of the DFS tree.

### Problem 2: Two Edge Connectivity

Write a program to check if an undirected graph is Two-Edge connected. Read in the graph from a file as in Problem 1.

### Problem 4: Detecting cycles

Write a program to check if an input **directed** graph has a cycle.

### Problem 3: Non-recursive DFS

Write a non-recursive program to perform a DFS on an input undirected graph.