Birla Institute of Technology and Science-Pilani, Hyderabad Campus
First Semester 2020-2021
Lab Sheet-9
CS G526: Advanced Algorithms and Complexity
Date: 23/12/20

General Instructions: Argue logically. Write it in a manner that explains your logic very clearly. Do not miss steps in between.

Problem-1: [**60 pts**] Given a stream of edges of a simple undirected graph, write a program to maintain the following: (1) global triangle count (2) per edge triangle count - how many triangles are incident to a particular edge (3) global clustering coefficient which is defined as the ratio of "number of closed triplets" to the "number of all triplets - both open and closed". The open triplets are paths of length two and the closed triplets are the triangles. Once a new edge is inserted, your program should update the values and report it. You should be storing the result in a file each line for a new edge addition. For this implementation, consider only the addition of edges.

For the simplicity, you can assume that the edges of the graph are presented in a file and you create your edge stream by reading one edge at a time from the file which you can do as each iteration of a loop.

Problem-2: [**40 pts**] Can you use triangle counting implementation as a subroutine and develop an algorithm for maintaining the count of complete subgraph of size four? What is the time complexity of your algorithm?