COSC 6320
Spring 2018
Homework 4

All work submitted should be done by you alone. You are not allowed to search the Internet for solutions. You are not allowed to copy the solutions from any source. Collaboration between students is not allowed. On problems selected from the textbook, use the definitions from the book. Definitions from different books may be slightly different. For all questions, if you are asked to write a program or algorithm, it means the best program or algorithm you can come up with.

If you want to take up the challenge that I mentioned in class, here is a link to it: http://www.scmsa.eu/archives/SCM_FFJM_Competitive_Game_2018_2019.pdf.

[1] (Directed Graph, Programming) Write a C++ program to compute the longest path of a dag. As always, we are looking for the most efficient way. Please state the complexity of your algorithm.

[2] (Undirected graph, Programming) Write a C++ program to find all the connected components of an undirected graph G.

[3] (Undirected Graph, Non-programming) (a) Describe an algorithm to enumerate all simple cycles of an undirected graph G. (b) How many such cycles can there be? (c) What is the complexity of your algorithm? To answer part (c), you may have to describe the data structure that you are using. Justification is needed to show why your algorithm works.

[4] (Directed Graph, Non-programming) Describe a mathematical model for the following scheduling problem. Given tasks T_1, $T_2, \ldots, T_n$, which require times $t_1, t_2, \ldots, t_n$ to complete, and a set of constraints, each of the form "T_i must be completed prior to the start of T_j," find the minimum time necessary to complete all tasks. Justification is needed to show why your algorithm works.