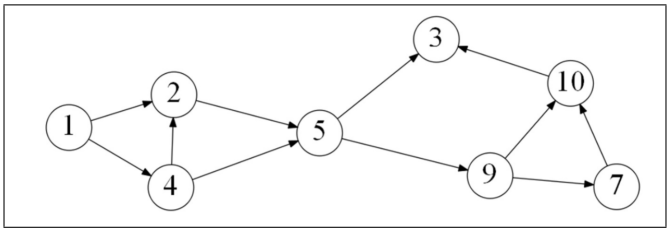
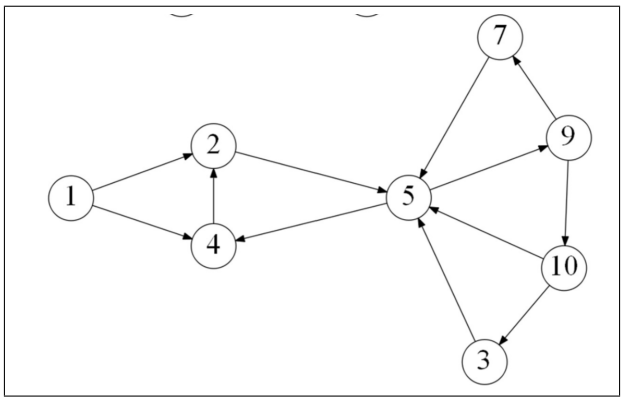
CS/CPE590: Algorithms
Spring 2023
Assignment4

Graph Algorithms

1. (30+30=60 Points) Implement a C++ class for Graph and then implement the BFS and DFS for traversing the graph. Please consider the following graph as input to your program. Your program should work for both directed and undirected graphs. Follow the provided template.



2. (a) [**15 points**] Explain how one can use BFS to determine if an undirected graph contains a cycle.
(b) On undirected graphs, do either of the two traversals, DFS or BFS, always find a cycle faster than the other? If yes, indicate which of them is better and explain why it is the case; if not, draw two graphs supporting your answer and explain the graphs. [**15 points**]



(c) Explain why a topological sort is not possible on this graph. [**10 points**]

Remarks:

- The assignment has to be completed individually. No collaboration is allowed between students. No code from online resources is allowed to be used. Any sign of collaboration or use of online materials will result in a 0 and be reported to the Graduate Academic Integrity Board. You have to strictly follow the provided template. The late submission policy is applicable to the assignment as specified in the course syllabus.
- You have to submit a report containing your solutions to problem-2 as a pdf file.
- For problem-1, you have to maintain the provided template strictly!
- You have to make sure your program works as expected in the following online compiler: https://www.onlinegdb.com/online_c++_compiler.
- **Submit a zip file containing your report(.pdf) file and code(.cpp) file**.