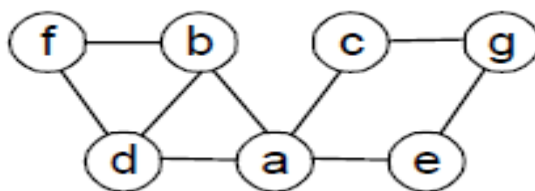


Homework -3

Part-A

- (20 points) Traverse the graph below using Breadth-First Search and construct the corresponding BFS forest including the tree edges and other types of edges. Start the traversal at vertex a and resolve ties by the vertex alphabetical order.



- (20 points) Apply the DFS-based algorithm to solve the *topological sorting problem* for the digraph in Figure-1. Start the traversal at vertex 'a' and resolve ties by alphabetical ordering. You are required to:
 - Draw the traversal stack
 - Draw the DFS forest including tree edges and other types of edges
 - Give the order of the vertices visited (both push-in & pop-off order)
 - Does a topological sorting solution exist for this graph? If yes, write the topological sorting order; if not, explain why?

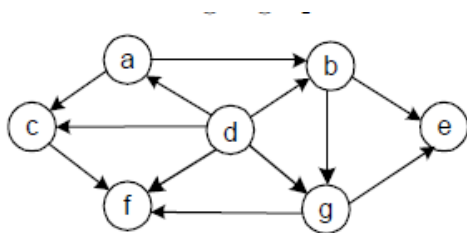


Figure-1

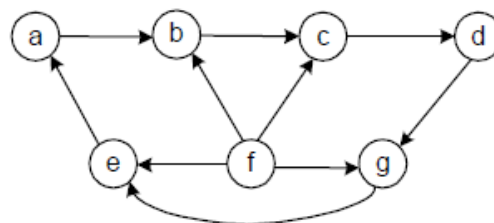


Figure-2

- (20 points) Apply the Source Removal algorithm to solve the *topological sorting problem* for the digraph in Figure-2. You are required to:
 - Redraw the graph after each source is eliminated
 - Does a topological sorting solution exist for this graph? If yes, write the topological sorting order; if not, explain why?

Part-B

4. (40 points) Write a C++ program to implement a *Binary Search Tree*. Your program must allow the user to perform the following tasks:
- Accept values from the user to insert into the binary search tree
 - The first node entered by the user becomes the root node
 - Allow the user to delete nodes from the binary search tree
 - Allow the user to search for a node within the binary search tree:
 - If the search key is found, it returns all the nodes visited(path traversed) to reach the search key.
 - If search key is not found, returns the path traversed to locate the search key and indicates a failed search.
 - File Naming Convention: `BinarySearchTree_YourLastName_YourFirstName.cpp`
 - Compile your C++ program using the following command:
`g++ -Wall -std=c++11 BinarySearchTree_YourLastName_YourFirstName.cpp`
 - Submit only one C++ source file.
 - You must only submit your original work. Inclusion of any code from web-related searches for this program is strongly discouraged.

Reading Assignment:

- Chapter- 3, 4

Submission Requirements:

- Your solution has two parts:
 1. Use the submission link: `Homework03:Part-A` to
 - Upload one PDF document for Part-A (questions-1, 2, 3)
 2. Use the submission link: `Homework03:Part-B` to
 - Upload one C++ source file for Part-B (question-4)