

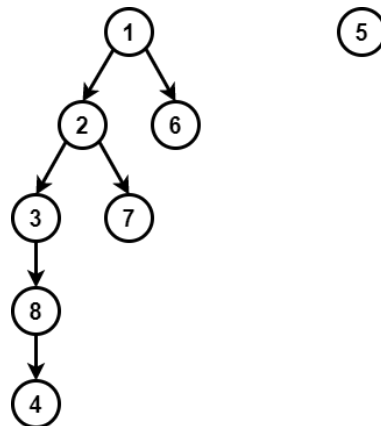
CSE 101
Fall 2020
Quiz 4

Solutions

1. (25 Points) Run DFS on the digraph G having the adjacency list representation below. Pseudo code for DFS can be found [here](#) or [here](#). Execute the main loop of DFS() and the for loop of Visit() by increasing vertex labels. Draw the DFS forest that results. Use this tree to classify all edges as one of tree, back, forward or cross. See the class notes from 11-10-20 or the text for an explanation of edge classification. State why the edge classification you found implies that G is acyclic. Determine the topological sort of V(G) given by decreasing finish times in your run of DFS. Determine all other topological sorts of V(G) by inspection.

```
1 : 2 6
2 : 3 7
3 : 8
4 :
5 : 1 6
6 : 2 8
7 :
8 : 4
```

Solution:
DFS Forest:



Edge Classification:

Tree: (1, 2), (1, 6), (2, 3), (2, 7), (3, 8), (8, 4)

Back:

Forward:

Cross: (6, 2), (6, 8), (5, 1), (5, 6)

Since there are no back edges, G is acyclic.

Topological sort given by DFS:

5 1 6 2 7 3 8 4

This digraph admits 3 other topological sorts:

5 1 6 2 3 7 8 4

5 1 6 2 3 8 7 4

5 1 6 2 3 8 4 7

2. (25 Points) Insert the following keys (in order) into an initially empty BST: 5 9 7 2 6 4 8 3 1. Determine the order in which keys are processed in the following tree traversals. The algorithm for BST insertion can be found [here](#). The algorithms for tree traversals can be found in Chapter 12 of the textbook.
- a. (5 Points) In-order tree walk.
 - b. (10 Points) Pre-order tree walk.
 - c. (10 Points) Post-order tree walk.

Solution:

- a. 1 2 3 4 5 6 7 8 9
- b. 5 2 1 4 3 9 7 6 8
- c. 1 3 4 2 6 8 7 9 5