



## Assignment 2: Binary Search Tree and AVL Tree

Due: 3:00 pm, Mon., 11/21/2022

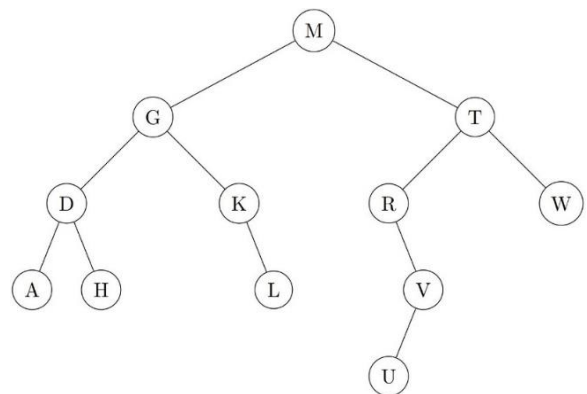
**Note – Cheating and Plagiarism:** Cheating and plagiarism are not permitted in any form and cause certain penalties. The instructor reserves the right to fail culprits.

**Deliverable:** All your responses to the assignment questions should be included in a single compressed file to be uploaded in the Gannon University (GU) – Blackboard Learn environment.

### Binary Search Tree

**Question 1 (30 pts.).** Use the following binary search tree to answer the questions below.

- (1.a) What is the pre-order traversal of this tree?
- (1.b) What is the in-order traversal of this tree?
- (1.c) What is the post-order traversal of this tree?

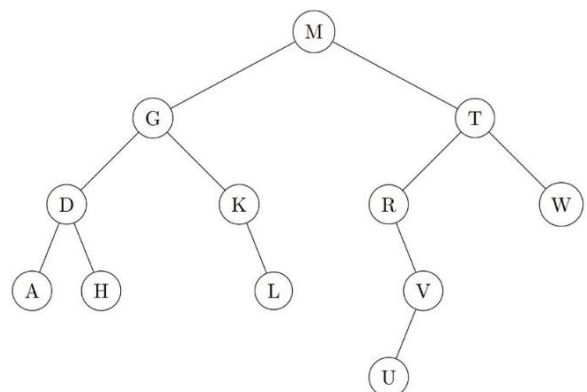


**Question 2 (20 pts.).** Execute the following computations and show them in figure format:

- (2.a) Create a binary search tree and insert the following items into it:  
{5, 48, 17, 1, 33, 20, 25, 12, 39}.
- (2.b) Delete the following items from it: {17, 39}.

**Question 3 (50 pts.).** Write a program in C++ programming language to:

- (3.a) Find the Smallest Node in a BST.
- (3.b) Determine the Height of a BST.
- (3.c) Determine the Number of Nodes.
- (3.d) Create the Mirror Image of a BST.
- (3.e) Delete a BST.



## AVL Tree

**Question 4 (20 pts.).** Create an empty AVL tree and insert the following items in the order given into it: {77, 51, 3, 24, 56, 27, 8, 93, 64}. Next, delete items “8” and “77” from the tree. You do not need to provide figure for every single step in this process separately, but you must draw the tree immediately before every rotation with provision of related explanations.

**Question 5 (40 pts.).** Write a program in C++ programming language to:

- (5.a) Search a value in an AVL Tree.
- (5.b) Insert a value in an AVL Tree.
- (5.c) Perform right and left rotations in an AVL Tree.
- (5.d) Delete a value from an AVL Tree.

