**Name:**

**Advanced Programming in C++**

**Lab Exercise 4/18/2025**

**Application of Trees**

In this exercise you will explore several aspects of trees. For questions 4 – 6, use the main.cpp file found in the following location:

<https://www.github.com/nmessa> or classroom server

1. Define the following terms:
   1. root
   2. child
   3. leaf
   4. parent
   5. depth
2. What is the smallest number of levels required to store 100,000 nodes in a binary tree?
3. What is the smallest and largest possible number of leaves in a binary tree containing exactly six non-leaf nodes?
4. Using the IntBinaryTree class that you worked on previously, write a private function

isLeaf that has a TreeNode pointer as a parameter and returns true if node is a leaf. This function should be called by the private displayInOrder, displayPreOrder, and displayPostOrder functions.

1. Using the IntBinaryTree class that you worked on previously, write a public function:

sumTree that has a TreeNode pointer as a parameter and returns the sum of the values contained in the nodes.

1. Using the IntBinaryTree class that you worked on previously, write a public function:

treeCount that has a TreeNode pointer as a parameter and returns the number of nodes found in the tree.

When you have completed these functions, run main to make sure it works turn a screenshot of your program output.