CS 3358 Section 001 – Assignment 5
Due Date: December 1, 2021

In this assignment, you are asked to implement several functions in a Binary Search Tree (BST) class called `MyBST` in `bst.cpp`. The places you need to fill out in the code are marked by `// TODO`.

- (30 points) Implement the function `FindHelper()`. This function should be a recursive function.

- (40 points) Implement the function `InsertHelper()`. This function should be a recursive function. If the input value turns out to be an existing one, your function should print out the following message without adding the duplicate value into the BST, where `<value>` should be the duplicate value (see Test Case).

  `<value> already exits. No new node has been inserted.`

  * If you want to implement the function without passing a pointer by reference, you need to use the following `Insert()` function instead of the given one. Note that it is the 'commented out' function in `bst.cpp`.

  ```
  void MyBST::Insert(int x) {
      if (root != NULL) {
          InsertHelper(root, x);
      } else {
          root = new TreeNode;
          root->value = x;
          root->right = NULL;
          root->left = NULL;
      }
  }
  ```

- (30 points) Implement the functions `Preorder()`, `Postorder()`, and `Inorder()`, which are used in the functions `PreorderTraversal()`, `PostorderTraversal()`, and `InorderTraversal()`, respectively. They should be recursive functions.

Submission:
You should submit your work via Canvas. You should pack `bst.cpp` into a single `.zip` file to upload to Canvas. You can also include an optional README file in the `.zip` file. The `.zip` file should be named as `a5_yourNetID.zip`, such as `a5_d_n155.zip`.

```
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: 36
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: 20
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: 57
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: 18
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: 44
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: 76
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: 93
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: 120
Invalid input value (120) !
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: 44
44 already exits. No new node has been inserted.
Inserting a new node....
Please enter an integer between 0 and 99 as a value to insert, or enter -1 to
stop inserting and see the resulting tree: -1
Preorder Traversal: 36   20   18   57   44   76   93
Postorder Traversal: 18   20   44   93   76   57   36
Inorder Traversal: 18   20   36   44   57   76   93
Searching a value....
Please enter an integer between 0 and 99 as a value to search, or enter -1 to
stop searching: 57
57 is in this BST.
Searching a value....
Please enter an integer between 0 and 99 as a value to search, or enter -1 to
stop searching: 20
20 is in this BST.
Searching a value....
```

Please enter an integer between 0 and 99 as a value to search, or enter -1 to stop searching: 76
76 is in this BST.
Searching a value....
Please enter an integer between 0 and 99 as a value to search, or enter -1 to stop searching: 55
55 is not in this BST.
Searching a value....
Please enter an integer between 0 and 99 as a value to search, or enter -1 to stop searching: 25
25 is not in this BST.
Searching a value....
Please enter an integer between 0 and 99 as a value to search, or enter -1 to stop searching: -1