CPS 501 **Assignment 9**

Assigned: 04/16/2020. Due: 04/24/2020, 11 pm (on Isidore).

Instructor: Tamisra H. Sanyal

We implemented a Java class for a dictionary for keeping the information of the counties in the Ohio state. In this assignment, we are going to keep the information as a binary search tree such that we consider the FIPS as keys, since they are unique.

We will reuse the class for County, however define a new class for the tree node:

class TreeNode

{

County county\_info; // the reference to the information of the county

TreeNode left; // reference to the left child

TreeNode right; // reference to the right child

...

}

Then the tree class should be defined as

class BST

{

TreeNode root; // reference to the tree root

...

}

*Please add the appropriate constructors and auxiliary methods to the above classes if necessary.* Besides, you are required to implement the **insertion** and **deletion** operations.

Please test your code by doing the following steps.

1. Consecutively inserting the following counties to an empty tree.

1. **Name:** Franklin. **FIPS:** 049. **Seat:** Columbus. **Population:** 1,264,518. **Area:** 539.87.
2. **Name:** Hamilton. **FIPS:** 061. **Seat:** Cincinnati. **Population:** 802,374. **Area:** 407.36.
3. **Name:** Butler. **FIPS:** 017. **Seat:** Hamilton. **Population:** 368,130. **Area:** 467.27.
4. **Name:** Montgomery. **FIPS:** 113. **Seat:** Dayton. **Population:** 535,153. **Area:** 461.68.
5. **Name:** Clinton. **FIPS:** 027. **Seat:** Wilmington. **Population:** 42,040. **Area:** 410.88.

You may use the integer that is represented by an FIPS as the key, i.e., "049" -> 49.

1. Display the tree content using a pre-order traversal.
2. Display the tree content using an in-order traversal.
3. Inserting the following new county:

**Name:** Cuyahoga. **FIPS:** 035. **Seat:** Cleveland. **Population:** 1,249,352. **Area:** 458.49.

and check the correctness of the operation. *You need to add an explanation to your test code. For example, to display some texts to show why the new county is inserted in the right place.*

1. Deleting the Franklin county in the tree and checking the correctness of your operation. Again, you need to add an explanation to your test code.