## CS 133 A

# Project 3: "AVL Tree"

Name: _____

**AVL** Trees, as explained in class, are a roughly-balanced form of binary trees. The version you need to write and test should be publicly inherited from The **BST<T>** class as presented in class.

You may (*and should*) use the starting files provided on Canvas. These files include the necessary binary search tree definition along with the start of the **AVL<T>** class. You will need to write your own test driver.

You may want to test your program using the **AVL** simulation available on the web

In general, you will need to override the definitions of a number of the inherited **BST<T>** methods. You should also add in the following protected or private methods (as described in class):

- node<T>* rotateRight(node<T> *nodeN);
- node<T>* rotateLeft(node<T> *nodeN);
- node<T>* rotateRightLeft(node<T> *nodeN);
- node<T>* rotateLeftRight(node<T> *nodeN);
- node<T>* rebalance(node<T> *&nodeN);
- int getHeightDifference(const node<T> *const nodeN)const;

**Note:** Since this **BST<T>** base class allows duplicates, the resulting **AVL<T>** class will have the odd behavior of allowing duplicate entries to be either to the left **or** the right. You have your choice in dealing with this: (a) Do not worry about it (b) Change **BST<T>** so that it does not allow duplicates (c) Some other choice that you speak to the instructor about first.

**Possible: 100 points**

# Deliverables:

## Physical:

The Project should be turned in inside a clear plastic file folder. This folder should have a simple flap to hold paper in place--NO buttons, strings, Velcro, etc. Pages should be in order, not stapled.

- Assignment Sheet (printed pdf from the web), with your name written on it, as a cover sheet.
- Printed Source Code with Comments *(including heading blocks -- a file header for each file plus a function header for each function. Describe parameters, any input or output, etc., no line wrapping). Print in portrait mode, 10 - 12 point font.*

## Electronic:

- All .h, .cpp, .exe(Release Version) zipped together. Do not use rar or any archive format other than zip. Rename the file: "<YourName>_p3zip".
- Sample Output (as .rtf -- run the program, copy the window using <*Alt*|*PrtScn*>, paste into Paint, invert colors *(<Ctrl*|*Shift*|*I*>), copy, open Wordpad, save.)
- A simple test plan including explanations of any discrepancies and reasons for each test. Show actual input and ALL values output as well as ALL expected output. Test each possible action. Save as .xls, xlsx, .doc or .docx file

Submit this single zip file by going to canvas, select this class, select the Assignment tab on the left, select Assignment 3, select the submission tab at the top right, find the file, and Submit.

**Due:** Tuesday, June 7, 2016 9:30 a.m. *(beginning of class)*