

Due: March 26 (Saturday) at 11:59 PM

**Objective:** To gain a better understanding of the BST and writing BST methods using recursion and possibly iteration.

**To start the project:** Copy **your** Lab 8 folder as your starting point for this project. (original at: <http://www.cs.uni.edu/~fienup/cs052s11/labs/index.htm>)

**The Assignment:** (This is a combination of Projects 1 to 6 of Chapter 18 on pages 777-778)

1. Complete the implementation of the BinaryTree (not sure if there is anything to do here) and BST classes discussed in this chapter and test them with tester programs.
2. Add a method to the BST class to write the data in the binary search tree to a text file. The method expects an opened text file object as an argument and outputs the tree's data to the file in such a manner that the original shape of the tree is restored when the data are input. (Hint: One of the traversals accomplishes this.)
3. Add an optional argument to the \_\_init\_\_ method of BST. This argument is another collection. Its default value is None. If the argument is not None, add the data from the argument to the new tree.
4. Add the methods height and leaves to the BinaryTree ADT. The height method returns the number of levels in the tree. The leaves method returns a list of the leaves in the tree.

**EXTRA CREDIT features: (you can choose to do none to all)**

1. Add the methods successor and predecessor to the BST class. Each method expects an item as an argument and returns an item or None. A successor is the smallest item in the tree that is greater than the given item. A predecessor is the largest item in the tree that is less than the given item. Note that the successor may exist even if the given item is not present in the tree.
2. Add a method rangeFind to the BST class. This method expects two items as arguments that specify the bounds of a range of items to be found in the tree. The method traverses the tree and builds and returns a list of the items found within the specified range.

**Implement AND fully test the above methods.**

**Submit ALL necessary files to run your BinaryTree and BST classes as a single zipped file (called hw5.zip) electronically at**

[https://www.cs.uni.edu/~schafer/submit/which\\_course.cgi](https://www.cs.uni.edu/~schafer/submit/which_course.cgi)