

# CS608 Programming Assignment 5

## Binary Trees

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This assignment has two parts: Part 5A and Part 5B. If you successfully complete both, you will receive 15 points. If you successfully complete only one (either one), you will receive 10 points.

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### Programming Assignment 5A:

This assignment is similar to the example in my notes on pages 24-26. I have written two Java classes: **TreeNode.java** and **Lab5AMethods.java**.

The **TreeNode.java** class is exactly same as on page 25. The **Lab5AMethods.java** class is similar to **BTMethods.java**. **Lab5AMethods.java** contains the same methods as in **BTMethods.java**. Only change is **Lab5AMethods.java** generates a different binary tree using the method **void createBinaryTree()**.

I have compiled these two Java classes and I have made the class files (NOT source files) available to you on Black Board (this week's folder). Download these two class files and save them on your computer in a folder where you will be saving your Java main method.

### Now the assignment 5A:

Write a Java main method (see my example on 26) to incorporate the following ideas:

1. Create an instance of **Lab5AMethods** class
2. Generate a binary tree (use the method **createBinaryTree()**)
3. Traverse the in preorder
4. Print the height of the tree
5. Print the level order of the tree
6. Print the number of nodes in the tree
7. Print the largest element in the tree

Items 1 – 6 are done in my example. Follow the example for these.

In addition, to do #7, write a method, **largest()** to find largest element in the tree.

Include the method after **numberOfNodes()** in my example.

### Programming Assignment 5B:

The part 5B is an extension of Assignment 5A. Do everything in 5A and add three more methods:

**(a) SumOfElements()**

Returns the sum of all the elements in the tree

**(b) SearchFor(n)**

Searches the tree for n. Prints true or false. Search for 50.

**(c) levelWithLargestNumNodes()**

Returns the level number with largest number of nodes in the tree

The output now contains all the items in 5A and result from these three new methods.

#### General instructions:

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- If your program has several classes, include all of them in the same file and name your Java file  
CS6085Axxxxx.java (Assignment 5A) and CS6085Bxxxxx.java (assignment 5B), where xxxxx is your last name. **Example:** If your name is John Smith, name the file CS6085Asmith.java and CS6085Bsmith.java. **DO NOT SEND ZIP files.**
- Output must include: **Your name, course number and date (use Date class).** If any of the above items are missing, you will not receive full credit.
- Send your Java file as email attachment to [CS608Assignment@gmail.com](mailto:CS608Assignment@gmail.com). Include your name and assignment number in the email subject.

**Note: I will run your programs and grade them. If your programs do not compile (that is, show syntax errors, you will receive 0 for the programming assignment).**

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