

COMP251 - Lab5

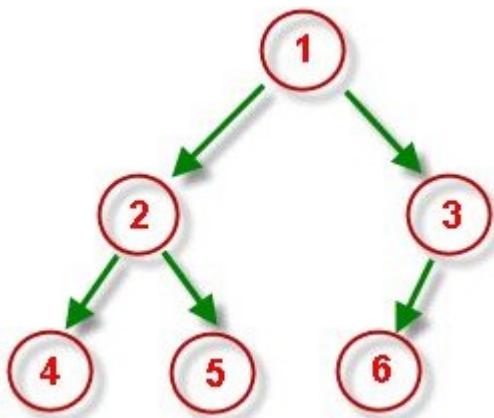
Goal: This lab will give you practice with binary trees.

Getting Started

You can have a partner for this lab, but submit individually. You can read the lectures to answer the question.

Download the files for this lab from blackboard (Week 8). Classes BinaryTree and BinaryNode implement a binary tree. Create an empty project in Eclipse and call it ‘BinaryTree’. Add classes: BinaryTree, BinaryNode. The main() method of BinaryTree includes test code. Read BinaryTree.java and BinaryNode.java to find out what methods are available.

The test1() method in BinaryTree creates a tree like this:



1. Write a function test2() that generates a tree with 7 nodes (including root) minimum height.
2. Write a function test3() that generates a tree with 7 nodes (including root) maximum height.
3. Implement printPostOrder() for BinaryTree (you need to define the helper function in BinaryNode)
4. Implement printPreOrder() for BinaryTree (you need to define the helper function in BinaryNode)

Optional (for more practice only)

5. Implement height() for BinaryTree (you need to define the helper function in BinaryNode).
6. Write a method for BianryTree class to check if the tree is perfect or not.

This is the signature of the method that you should add:

```
public Boolean isPerfect();
```

Hint: the recursive definition of perfect trees is useful to implement this method.

7. A binary tree is said to be "**balanced**" if both of its subtrees are balanced and the height of its left subtree differs from the height of its right subtree by at most 1. Write a method for BinaryTree class to determine whether the binary tree is balanced. This is the signature of the method that you should add:

```
public Boolean isBalanced();
```

Note that the definition of being balanced is recursive like many other definitions in binary trees.

8. Given the in-order and pre-order traversals of a tree (following), draw the tree.

Pre-order: A B C D E F G H I J K M

In-order: D C B F E G A J I K H M

Submission

In addition to submission of the files for question 1-4, you need to record a video and explain your answer.

Submit the link to your video clip (roughly about 4min, not more than 5min) that **explains clearly your approach, run your code, and demonstrate your solution**. You could provide the link to your video (on Youtube/Vimeo/...) in the body of your submission.