Problem Set 6

Assigned: April 3
Due: April 10

Please note: Everyone is required to do this assignment, regardless of your grade on the mid-term.
Since this assignment involves drawing a picture of a tree, you may submit it in hard copy. The grader will be Marianna: mariannaco.ds@gmail.com

Problem 1

Show the preorder, postorder, and breadth-first order of the following tree.

Problem 2

Suppose that you have a binary tree with numerical labels on the nodes. Write an algorithm in pseudo-code to test whether this is a correctly formed binary search tree. Hint: Use in-order search.
Problem 3

Carry out the following operations in sequence on the binary search tree shown below. Show the final state of the tree when all the operations have been executed.

Add(18)
Add(35)
Delete(7)
Delete(20)

Problem 4

A. Two trees are equal if they have the same shape and have the same label in corresponding nodes. Write a recursive algorithm in pseudo-code to test whether two trees are equal.

B. Using your solution to (A) as a subroutine, write an algorithm in pseudo-code to test whether tree $U$ is equal to a subtree of tree $V$.

Honors Problem

Suppose that you have an array $A$ of numerical values in increasing order. You wish to construct a binary search tree $T$ containing the elements of $A$ such that the height of $T$ is no more than $\lceil \log_2(|A|) \rceil$. Write a recursive algorithm makeBinaryTree($A$, $L$, $U$) that creates such a binary tree for the elements of $A$ with indices between $L$ and $U$.

Hint: The structure of the algorithm will be quite similar to the recursive algorithm for binary search in a sorted array.