Problem Set 5

Assigned: Oct. 24
Due: Oct. 31

For problem 3 below, I prefer that you use line drawing software, but, as in problem set 4, you are allowed to draw the answers to problem 3 by hand, take a photo, and upload that as a separate file, or files. Problems 1, 2, and 4 should be typeset, as usual.

Problem 1

Show the pre-order, post-order, in-order, and breadth-first search order of the tree below.

```
        C
       / \
      B   E
     /     \
    G     A  F
          /   \
         D     
```

Problem 2

Suppose that you have two different binary search trees, A and B, and you somehow know that the largest element in A is less than the smallest element in B. Suppose also that height(A) < height(B). Give an algorithm for destructively creating a binary search tree that will contain all the elements in A ∪ B and that runs in time O(height(A)).
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 of the operations have been executed.

Add(3)
Add(18)
Delete(19)
Delete(13)

Problem 4

A. Two trees are equal if they have the same shape and the same label in corresponding nodes. Write a recursive algorithm in pseudo-code to test whether two trees are equal. (Do NOT write Java code.)

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