Exercises on Trees

1. Pre-order traversal of a binary tree gives A B C D E F G H I and the in-order traversal gives C D E B F A I H G. Draw the tree.

2. In a Binary Search Tree (BST), show that if a node has two children, then its successor has no left child and its predecessor has no right child.

3. Suppose we have numbers from 1 to 1000 in a BST and want to search for 363. Which of the following sequences, if any, could NOT be the sequence of nodes examined?
   a. 2, 252, 401, 398, 330, 344, 397, 363
   b. 925, 202, 911, 240, 912, 245, 363
   c. 935, 278, 347, 621, 299, 392, 358, 363

4. Prove that if the right subtree of a node x in a BST is empty and x has a successor y, then y is the lowest ancestor of x whose left child is also an ancestor of x.

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      Successor of x
     /     /
   /       /
  /         /
 x         .
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5. Let B represent a BST. Write an algorithm Tree_MAX(x) that returns the node with maximum value.

6. Let B represent a BST. Write an algorithm Tree_MIN(x) that returns the node with minimum value.

7. Let B represent a BST and x a given node in B. Write an algorithm to find the successor (node following x in an in-order traversal) of x. (See question 4.)

8. Let B represent a BST and x a given node in B. Write an algorithm to find the predecessor of x.