CS35, Spring 2010, Practice Quiz 3

1. Draw the binary search tree that would result from inserting the following keys in the given order: 15, 6, 14, 18, 13, 7, 20. What is the height of this tree?

2. Suppose that we have numbers between 1 and 1000 stored in a binary search tree and we want to search for the number 259. Which of the following sequences could **not** be the sequence of keys examined? Explain why.

   (a) 500, 300, 167, 290, 175, 259
   (b) 999, 112, 602, 253, 411, 110, 259
   (c) 19, 800, 310, 21, 176, 257, 258, 259

3. What is the maximum height of a binary tree with 16 elements? What is the minimum height of a binary tree with 16 elements? Explain why height is such a significant feature of trees.

4. Recall that the predecessor of a key k is the largest key value p in a set of keys with $p < k$. For example, the predecessor of 15 in the above sequence of keys is 14. The predecessor of 18 is 15. The predecessor of 12 is 7, even though 12 does not appear in the sequence of keys. Given a set of integer keys, every integer n greater than the smallest key in the set has unique predecessor, even if n is not in the set. Write pseudocode for finding the predecessor of a given key in a binary search tree. Your solution can be iterative or recursive.

5. For the sequence of keys 15, 6, 14, 18, 13, 7, 20, show a 2-3-4 tree that could result from the insertion of the keys in the above order.