Homework Set #7

1. Chapter 10: problem 10-1, page 217. (30 points)

2. Chapter 11: Consider inserting keys 3,4,2,5,1 in the order given into a hash table of length m = 5 using hash function $h(k) = k^2 \bmod m$. (20 points)

a) Using $h(k)$ as the primary hash function, illustrate the result of inserting these keys using open addressing with linear probing.

b) Using $h(k)$ as the primary hash function, illustrate the result of inserting these keys using open addressing with quadratic probing, where c_1=1 and c_2=2.

c) Using $h(k)$ as the hash function, illustrate the result of inserting these keys using chaining. Compute the load factor α for the hash table resulting from the insertions.

d) What different values can the hash function $h(k) = k^2 \bmod m$ produce when m = 11? Carefully justify your answer in detail.

3. Chapter 12: Using the definitions on p. 1088 of our textbook for *depth* of a tree node and *height* of a tree, consider the set of keys **K** = < 14, 76, 2, 35, 89, 27, 43 > and the different possible insertion orders for the keys in **K**. Based on the different possible insertion orders and their resulting Binary Search Trees, answer the following questions.

a) What is the minimum height of a Binary Search Tree constructed from **K**? Show an insertion order for the keys in **K** that generates a Binary Search Tree of minimum height. Draw the corresponding Binary Search Tree. (10 points)

b) What is the maximum height of a Binary Search Tree constructed from **K**? Show an insertion order for the keys in **K** that generates a Binary Search Tree of maximum height. Draw the corresponding Binary Search Tree. (10 points)

c) For each height in between the minimum and maximum height found in (a) and (b), show an insertion order for the keys in **K** that generates a Binary Search Tree of that height. Draw the corresponding Binary Search Tree. (10 points)

4. Problem 12.2-2 (10 points)

5. Problem 12.2-3 (10 points)