

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 $\mathbf{K} = \langle 14, 76, 2, 35, 89, 27, 43 \rangle$ and the different possible insertion orders for the keys in \mathbf{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 \mathbf{K} ? Show an insertion order for the keys in \mathbf{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 \mathbf{K} ? Show an insertion order for the keys in \mathbf{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 \mathbf{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)