Section Week 5 Worksheet Solutions

1) Hash Tables. Consider a hash table of size 7 where hashing function is h(key)%7. Insert the following in order, according to the type of hash table below: 14, 10, 17, 4, 12, 13, 24

a. Show a chaining hash table

b. Show a hash table using open addressing with linear probing.

c. Show a hash table using open addressing with quadratic probing.

SOLUTIONS:

0	14
1	
2	
3	24=>17=>10
4	4
5	12
6	13

5. b)

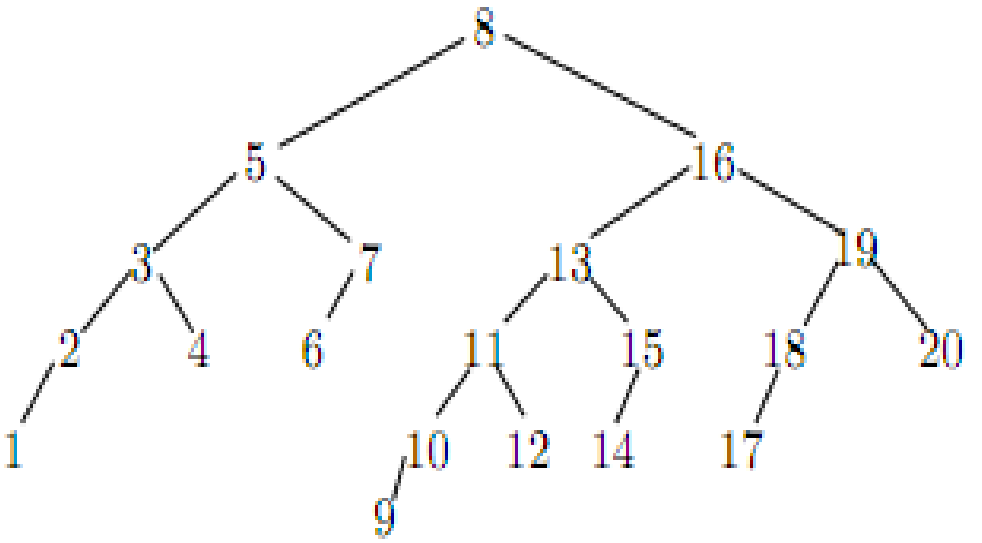
0	14
1	13
2	24
3	10
4	17
5	4
6	12

5. c) 14, 10, 17, 4, 12, 13, 24

0	14
1	13
2	
3	10
4	17
5	4
6	12

We can never place the 24 because the index loops between 4,0,5,5,0,4,3 and never hits 2.

2) AVL Trees
Find one key that we can delete so that the rebalancing phase requires two separate rebalancing acts (either a single- or double-rotation)? Note that a double-rotation counts as one, not two, rebalancing acts.



Solution: We can delete any one of the keys 4, 5, 6, 7 or 20. Even keys 3 and 9 might work, but that depends on the convention for replacing a deleted key with 2 children by its predecessor, not predecessor.

(This wonderful example came from http://cs.nyu.edu/~yap/classes/funAlgo/05f/hw/mid/mid.pdf)

3) (See B-Tree solution from Week 4's worksheet solutions)