Handwriting Assignment #2

1. Consider a hash table of size m = 12 that uses collision-resolution by open addressing and the quadratic probing hash function
$h(k,i) = ((k \bmod m) + i + i^2) \bmod m$.   Show the hash table resulting from inserting the keys 10, 22, 34 and 16, in this order.

2. Mention the advantages of hashing over binary search trees in implementing symbol tables.

3. a) Insert the integers in L = {7, 8, 16, 15, 2, 6, 5} in order into the hash table using linear probing and the provided hash function.

```
int hash(int x) {

   return (2*x + 2) % 9;

}
```
   b) What is the load factor of the hash map after inserting the integers in L?

4. Given input <4371, 1323, 6173, 4199, 4344, 9679, 1989> and a hash function
  $h(x) = x \bmod 10$, show the resulting :

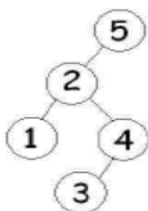a) Separate chaining hash table

b) Hash table using linear probing

c) Hash table using quadratic probing

d) Hash table with second hash function $h2(x) = 7 - (x \bmod 7)$
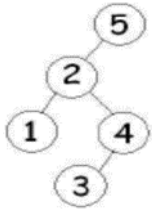
5. a) Insert the following sequence of elements into a Binary-Search-Tree (BST), starting with an empty tree.

   Insert: 70, 35, 40, 90, 20, 50, 45, 60, 80, 95, 85
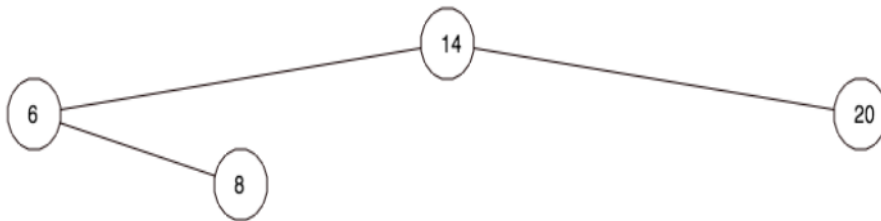   b) Delete sequentially 1, 2 in the following tree.

c) Delete sequentially 2, 1 in the following tree

d) Is the operation of deletion "commutative" in the sense that deleting x and then y from a binary search tree leaves the same tree as deleting y and then x?

6. If 10 is inserted into the following AVL tree, draw the resulting tree.

7. If 12 is inserted into the following AVL tree, draw the resulting tree.