

# CSE 373, Assignment 4 Solutions

November 13, 2008

1. (8 points)

Fewest Possible:  $2 \lceil \frac{M}{2} \rceil^3 \lceil \frac{L}{2} \rceil = 2048$ .

Greatest Possible:  $M^4 L = 202500$ .

2. (8 points)

```
boolean areSimilar(Node root1, Node root2){
    if((root1 == null) && (root2 == null))
        return true;
    else if((root1 == null) && (root2 != null))
        return false;
    else if ((root1 != null) && (root2 == null))
        return false;
    else{
        boolean left = areSimilar(root1.left, root2.left);
        boolean right = areSimilar(root1.right, root2.right);
        return (left && right);
    }
}
```

If the two trees have  $m$  and  $n$  nodes, the running time is  $O(m + n)$ .

3. (8 points)

There are several solutions possible. One good choice is to interpret the DNA sequence as a number in base 4. Assuming  $f$  is a one-one function from  $\{A, C, G, T\}$  to  $\{0, 1, 2, 3\}$ , the hash value of a sequence

$S = s_0s_1 \dots s_n$  is given by:

$$h(S) = \left( \sum_{i=0}^n f(s_i)4^i \right) \bmod \text{TableSize}$$

4. (8 points)

Load Factor =  $100/256 = 0.391$ .

Inserting an element takes  $O(1)$  time since we can insert at the front of the list for any bin.

Finding an element takes  $O(n)$  time if the element hashes to the occupied bin, otherwise it takes  $O(1)$  time.

5. (6 points)

Index	Data
0	799
1	841
2	673
3	409
4	804
5	
6	
7	553
8	
9	239

6. (6 points)

Linear Probing:  $h(x) = 0, 1, 2$  or  $10$ .

Quadratic Probing:  $h(x) = 1$  or  $2$ .

7. (6 points)

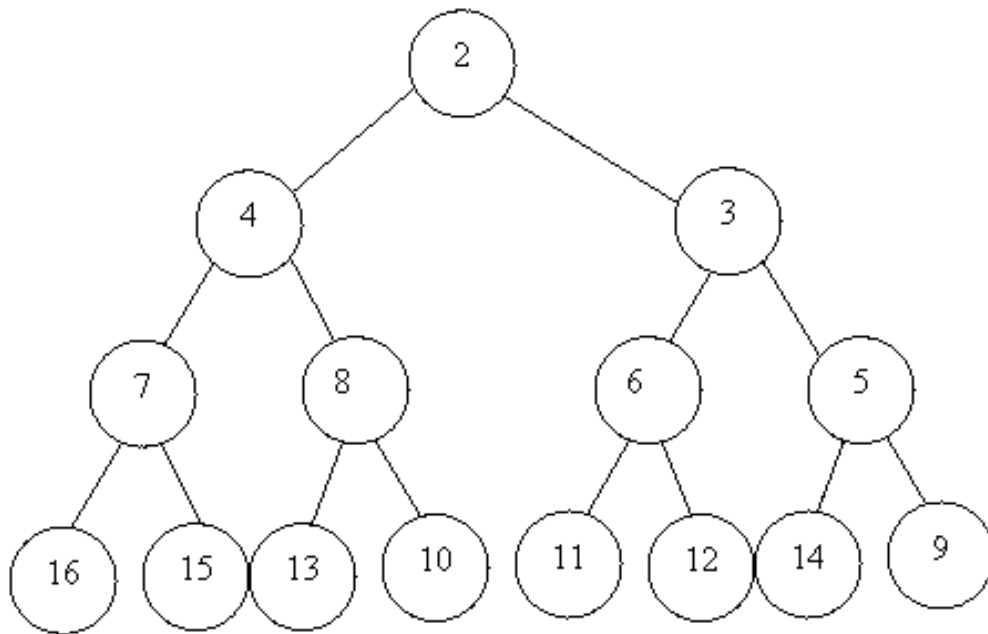


Figure 1: Problem 7