1. The ideal characteristics of a hash function for an efficient hash table are that equal keys must give that same answer (if a % b = c; the next a % b should also give c); the hash function itself must be quick; and it should uniformly distribute the keys.

2. For Separate Chaining: the insert() function is O(1) because it is always inserted at the hash index where there is a linked list; for find() it is O(1), for the initial element, because it is always found at the hash index but then it takes an addition O(M) for M elements of that linked list.

3. O(log N)

4. O(N)

5. Priority Queue

6. In an Undirected Graph you can go in either direction on an edge between 2 vertices (ie on edge E from Vertex A to B, you can travel A to B, or B to A). In a Directed Graph you can only go in the direction that is set (i.e. on edge E from Vertex A to B, you can travel A to B but not from B to A). To find the shortest path it really wouldn’t matter which you use unless certain edges only go in 1 direction. In essence, an undirected Graph is a bi-directional directed graph.

7. Traveling Salesman Problem (TSP) is a well-known graph solving problem. In it the user would use a graph to find the shortest path from one vertex to another vertex. Typically it is used to find the shortest traveling distance between cities.

8. Recursion is recognized by the characteristic of when a method or function is calling itself.

9. FIFO – First In, First Out

LIFO – Last In, First Out

FIFO – Queue

LIFO – Stack

10. A SortedArray data structure does not need a sort method because it is already in order. As an element is inserted into a SortedArray, it is inputted into order. For example in an integer array sorted low to high: if you already have { 1, 3, 5, 6} and you insert 2; the insert function should insert it between 1 and 3 so the array becomes: ( 1, 2, 3, 4, 5}. This would mean that unless the program wants to resort it there is no need for a sort method.

11. Linked List vs Binary Tree

Similarities:

They both have “children” or “nodes”

Differences:

Link Lists have 1 “node”, whereas Binary Tree “children” have 0-2 “leaves”

Finding an element in a Binary Tree is easy as it is sorted.

At worst case for a Binary Tree (where the elements entered are already sorted) it becomes a linked list

12. O(n2) or O(n^2)