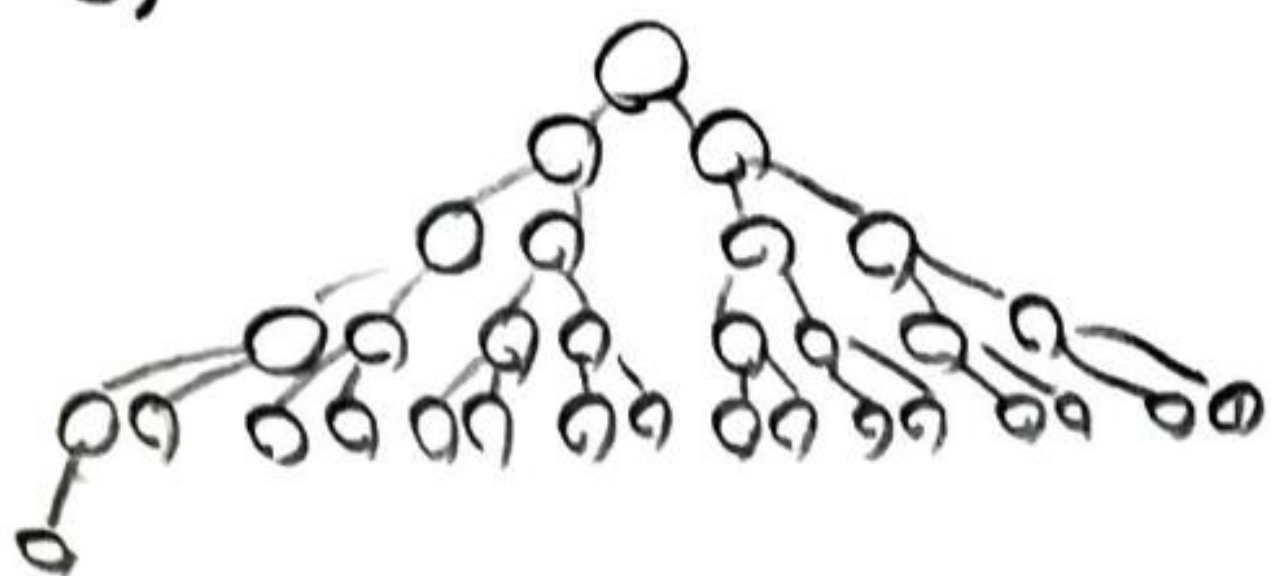I hereby pledge on my honor that I will strictly adhere to academic integrity codes and the work done on this examination is solely my own and I will not recieve/give any help from/to anybody or source during this examination.
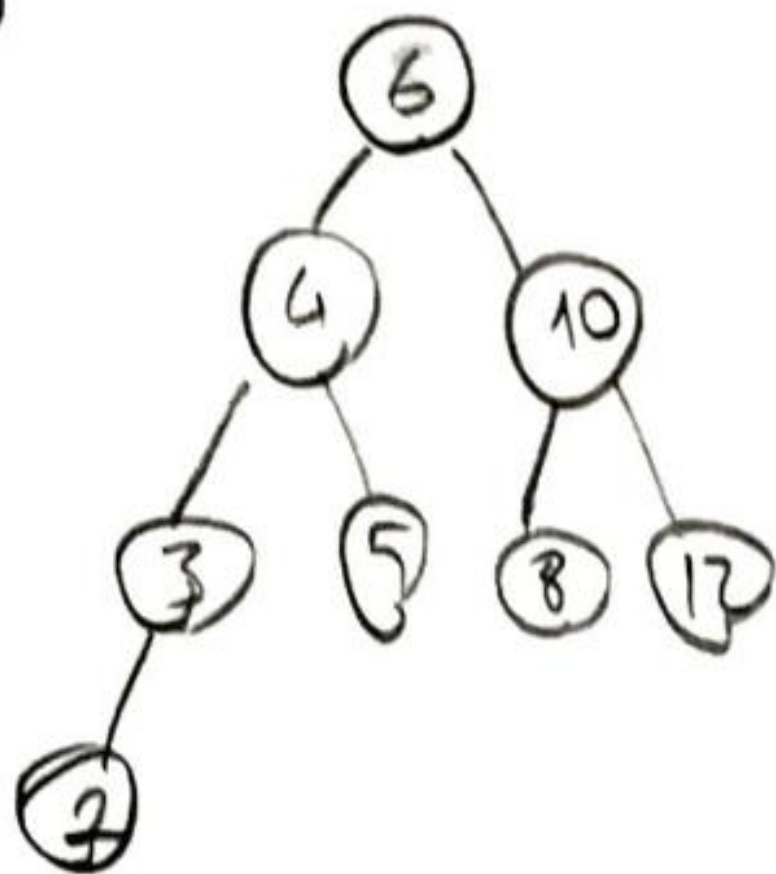
Berke Belgin
17104065
BB

1- a) ①→③→⑤→⑥→⑨→⑩→⑬→⑭

(In theory, if node level doesn't have a max limit, then it can be infinity but I considered there is a max level lim.)

b)

c)

2-

a) • Table size can be increased. If the table size larger than all key values, theprobablerty of collisions may be __almost__ zero, depending on the hashing algorithm.

• Table size may be a prime number.

b) While Open addressing prevents us removing elements from an array, forces us to leave null nodes in the array which means longer time for gets in average, chaining prevents this problems but in chaining, worst case is $O(n)$ when all elements in the hash table is in the same Linked List

```java
3-
   public class HashSet <T> {
      private int size;
      private int length;
      private LinkedList <T> deleteds;
      private T[] arr;

   public HashSet() {
      size = 0;
      deleteds = new LinkedList<T>();
      length = 97;
      arr = (T[])Object[];
   }

      public int size() {
         return size;
      }
      public boolean isEmpty() {
         return size == 0;
      }
      public boolean add(T obj) {
         int index = obj.hashCode() % length;
         while (arr[index] != null) {
            if(index >= length) index = 0;
            if(arr[index] == null) {
               arr[index] = obj;
               return true;
            } index += 7;
         }
         return false;
      }
   }
}
```