CMSC132 Fall 2022 Hashing, Lists, Sets Worksheet

1. Is a hashCode method that returns 0 valid? Discuss.

2. Describe the code you will need to implement open addressing with linear probing.

3. What is the relationship that exists between a search key, a hash code, and a hash index?


5. Implement the methods below based on the following Java class definitions.

   ```java
   public class LinkedList<T extends Comparable<T>> {
       private class Node {
           private T data;
           private Node next;

           private Node(T data) {
               this.data = data;
               next = null;
           }
       }

       private Node head;

       public LinkedList() {
           head = null;
       }

       public Set<T> removeInRange(boolean ordered, T lowerBound, T upperBound) {
           // YOU MUST IMPLEMENT
       }

       private Node removeInRangeAux(Node headAux, T lowerBound, T upperBound, Set<T> newSet) {
           // YOU MUST IMPLEMENT
       }
   }
   ```

Implement the methods `removeInRange` and `removeInRangeAux` that will remove elements from the list that are in the range defined by `lowerBound` and `upperBound`. The elements that have been removed (if any) will be placed in a set. If the `ordered` parameter is true, the returned set will allow us to access the values in the order they were added to the set; otherwise the most efficient set type will be returned. To satisfy the recursive requirement, `removeInRange` calls the method `removeInRangeAux` (head = removeInRangeAux(...) will appear in `removeInRange`).