ÇANKAYA UNIVERSITY

SENG 201 Data and Game Structures

Lab Assignment 7

In this exercise you will practice on Linked Lists in terms of a single-digit number representation.

PROBLEM

Given a **single-digit number** K and a singly linked list whose nodes stores digits of a non-negative number, add K to the linked list.

For example, consider the linked list "`9 -> 9 -> 9 -> 4`" which represents the number `9994`. Adding a single-digit number `6` to it should result in the linked list "`1 -> 0 -> 0 -> 0 -> 0`" which corresponds to the number `10000`.

Use **recursion** in your solution.

TIPS

- Traverse the linked list recursively until the last node is reached. Add the value of K to the last node.
- Do not forget about the carry value.
- If there is a carry after the all additions are completed, create a new node with the carry value and make it point to the head of the linked list.
- Start with the template code given below where Node class and `printList` methods are given.

```java
public class Main {
    private static class Node {
        int data;
        Node next;

        public Node(int n){
            this.data = n;
            this.next = null;
        }
    }

    public static void main(String[] args) {
        // A sample test case. You can test different numbers for
        // additional testing

        Node head = new Node(9);
        head.next = new Node(9);
        head.next.next = new Node(9);
        head.next.next.next = new Node(9);

        head = add( head, 5 ); // you should implement the add method

        printList( head ); // should print 1->0->0->0->4
    }

    public static void printList(Node node){
        while (node != null) {
            System.out.print(node.data);
            if(node.next != null) System.out.print("->");
            node = node.next;
        }
    }
}
```

TESTING

Test your code with some examples:

10 + 4 should give `1->4`

199 + 9 should give `2->0->8`

999 + 4 should give `1->0->0->3`

You should submit one zip file name as **"YourNameSurname_Lab7.zip"** and it should contain the java file you created (Main.java)