CENG218 Labwork 3

Using (and by modifying/enhancing as necessary) the linked list code presented in the lecture;

1. Design a C++ program which reads any number of integers in a linked list until "-1" is entered. Then your program must display all numbers between the smallest and largest numbers in this list.

   ```
   Enter your list: 14 33 28 7 16 22 38 10 39 40 36 -1
   Result: 7->16->22->38->10->39->40

   Enter your list: 30 34 4 29 27 19 2 21 23 33 3 4 7 21 24 14 5 -1
   Result: 34->4->29->27->19->2->21->23->33->3
   ```

2. Design a C++ program which reads any number of integers in sorted order in two seperate linked lists until "-1"'s are entered. Your program must then construct and print a new, merged, sorted list out of the seperate lists.

   ```
   Enter first list: 10 30 36 42 56 66 98 -1
   Enter second list: 9 13 15 23 32 33 41 45 52 -1
   Merged list: 9->10->13->15->23->30->32->33->36->41->42->45->52->56->66->98->NULL
   ```

3. *"The Collatz conjecture is a conjecture in mathematics that concerns sequences defined as follows: start with any positive integer n. Then each term is obtained from the previous term as follows: if the previous term is even, the next term is one half of the previous term. If the previous term is odd, the next term is 3 times the previous term plus 1. The conjecture is that no matter what value of n, the sequence will always reach 1."* - Wikipedia (`https://en.wikipedia.org/wiki/Collatz_conjecture`)

   Extra information: `https://www.youtube.com/watch?v=094y1Z2wpJg`

   Using the rules described above, design a C++ program which reads an integer from the user and populates a Collatz linked list until either 1 is observed, or 100 integers have been generated. Then your program must ask the user to enter an integer and search for this integer in the list. If it has been found, it must display the position of this number and a list of all numbers prior to the entered number.

   ```
   Enter starting number: 7
   List has been generated (17 integers):
   7->22->11->34->17->52->26->13->40->20->10->5->16->8->4->2->1->NULL
   Enter search term: 13
   13 is found in node 8. Numbers leading to 13 in the list are:
   7->22->11->34->17->52->26->13

   Enter starting number: 9
   List has been generated (20 integers):
   9->28->14->7->22->11->34->17->52->26->13->40->20->10->5->16->8->4->2->1->NULL
   Enter search term: 12
   12 is not in the list.
   ```

4. Write a program in which 29 seperate linked lists (one for each Turkish alphabet letter) are created and populated using the provinces.txt file from last week. Display each linked list and their lengths at the end.

   P.S. Province populations are irrevelant for this question, you can simply ignore that information in the file.