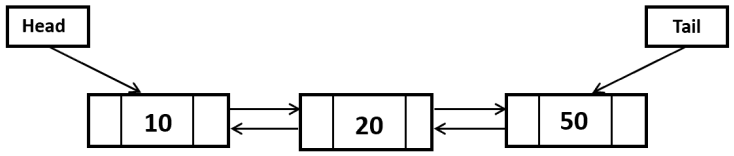
Assignment 1 of ELEC 278

Due: Oct 10, 2022, 11:59PM

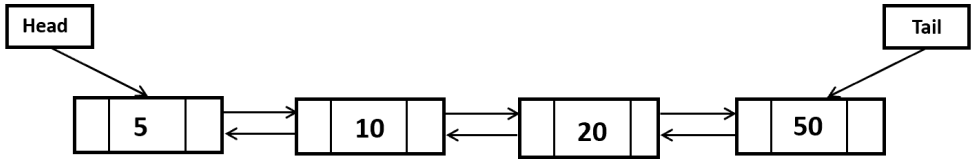
Q1: Define data structure of a doubly linked list and write functions following the instructions in a-e. The man function *main()* should be added to call the functions and display (print) the results (use the nodes in LList A to LList E to test the program and display the results). You can define the display function *display()* for simplifying the code).

a. Write a function *void create()* to create a doubly linked list, LList A, and display the LList A.



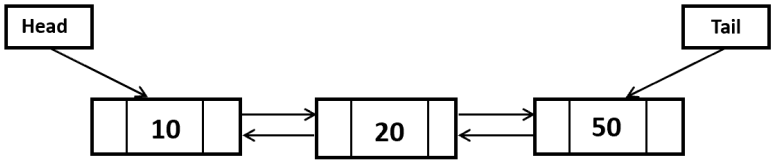
LList A

b. Write a function *void insertfirst()* to insert a new node 5 in the beginning of LList A and display the LList B.



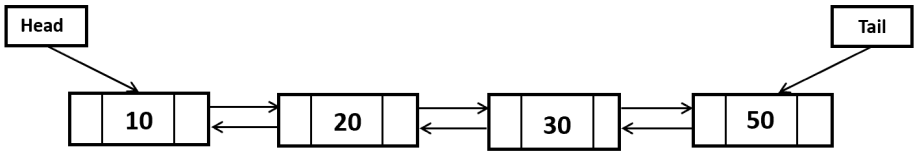
LList B

c. Write a function *void deletefirst()* to delete the first node 5 in the LList B and display the LList C.



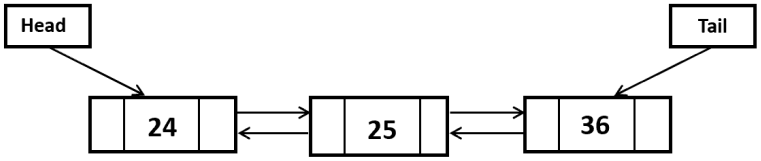
LList C

d. Write a function *void insertpos()* to insert a node 30 in the right position and display the LList D, which is a sorted linked list.



LList D

e. Write a function *void merge()* to merge LList D and LList E in a sorted way (the nodes are in ascending order) and display the merged doubly linked list.



LList E

Q2: Create a stack to solve the problem: Given a string containing opening and closing braces, check if it represents a balanced expression or not.

For example,

- {[{}{}]}[()], {{}{}}, []{}() are balanced expressions.
- {()}[), {(} are not balanced.

Write the functions pop(), push(), and main() to test your program and show your results (if the input expression is balanced, output 1; otherwise, output 0).

Q3: Given an integer k and a queue of integers, the task is to reverse the order of the first k elements of the queue, leaving the other elements in the same relative order.

Examples:

Input: Q = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100], k = 5

Output: Q = [50, 40, 30, 20, 10, 60, 70, 80, 90, 100]

Input: Q = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100], k = 4

Output: Q = [40, 30, 20, 10, 50, 60, 70, 80, 90, 100]

Deliverables: Submit the source code of three programs (Q1.c, Q2.c, Q3.c) and a word document to keep the screenshot of the test results (use the given examples to test the programs).