Department of Computer Science
COMP2421 (Second Semester – Spring 2022/2023)
Project#1 Due Date: 19 May 2023 (before midnight-by 23:59)

This project is an application to Linked Lists, in which you will implement a large integer calculator. Performing arithmetic on very large numbers (i.e., numbers with a large number of digits) is an inherit problem in computers as float point representations are subject to overflow. Here, you will build an application that should be able to perform arithmetic on very large integers using linked lists.

Your program should perform addition, subtraction, multiplication, and division on arbitrarily large integers. Each integer is represented as a list of its digits. For some of the operations, moving backward through the list is useful; hence **double linked lists** are more appropriate to use than normal linked lists.

Implement the multiplication as a standard multiplication where the first multiplicand is multiplied with each digit of the second multiplicand and then added. As for division, you have to implement it as a long division. You might need to implement additional function to determine if the dividend is larger than the divisor in absolute value.

Your program should read a file containing **at least** two numbers to perform the operations above. The user should be able to select the operations (s)he wants to perform through a proper menu with the options necessary to run the functionalities of the program (i.e., read the input file, add, subtract, multiply, divide, print the results to an output file, and exit).

Grading policy:

1. Your application should have all functionalities working properly.

2. Make sure that your application is running properly on your laptop before the discussion.
3. Project discussions will take place in the lecture room and at the office of the lecturers as per announcement when the deadlines are approaching.
4. Part of the grade will be on the code style and code convention as follows:
    a. There has to be adequate documentation and comments in the code (i.e., functions, loops, etc.);
    b. Your code should follow the code convention (i.e., spaces, indentations, etc.); and
    c. Your application should contain a menu to allow the user to select which option (s) he would like to run.

Notes and submission instructions:

1. **This is individual work**. It should represent your own efforts. It is fine to discuss your work and to ask your colleagues, but you are not allowed to copy/paste the work of others or give your work to anyone else. You are not allowed to post/copy from other websites and/or social media and this will be considered as cheating.
2. Any **plagiarized** code will not be marked.
3. **Document format**. Please submit only the code file (**c** file) containing the code of your project. Please rename it as follows:
   "**P1_YourStudentID_FirstNameLastName_SectionNo.c**".
4. **Input/output file name**. Make sure that the input/output file names are the same as in the specifications.
5. Include your full name, student ID, and section number in the beginning of your file.
6. Please do not compress the file, only the C-file is needed.
7. Files not following the naming convention in point 3 will not be marked.