Homework Assignment- 4

Due date - September 7, 2016

September 1, 2016

Problem 1:

Implement Sparse Matrix ADT using Linked List and perform the following operations over the Sparse Matrix ADT:

1. Addition of two Sparse Matrices
2. Subtraction of two Sparse Matrices and
3. Multiply a matrix and a vector

Input Description: Assuming the above numbering to be option numbers for corresponding operations, your program must take **option** as first input and depending on operation, further input description is as follows:

Option 1 & 2: First line will contain two space separated integers **m** and **n** where m corresponds to the number of rows and n to the number of columns.

Next **2m** lines contain n space separated integers each with first m lines corresponding to the elements of the first matrix and rest m to the elements of the second matrix
Option 3: Everything same as option 1 & 2 except the instead of 2m lines there will be (m+n) line where first m lines correspond to the rows of the first matrix($m \times n$) and last n lines correspond to the elements of $n \times 1$ vector
Note: Your program must terminate if user enters -1

Output Description: There must be as many number of lines as the number of rows containing at least one element in the resulting matrix with each line containing space-separated elements of the row
Note: Most of the elements of sparse matrices are **0**s and considered to be redundant, and hence must not be stored to save space, if non-zero matrix entries hold importance in representing certain relationships between rows and columns as you will see while studying graph algorithms

Example: Refer to **testcases/q1.in** and **solutions/q1.ans** for I/O format

Question 2

In this Question, you're supposed to implement operations on **Circular Linked List**. These type of lists have a property that the last node of the list points to first node and thus forms a cyclic-list

Implement functions declared in **CList.h** in **CList.c** and if implemented successfully running the script must pass all the testcases. Driver program, named **q2.c**, has been included in **Code** directory

Question 3

As part of this question, you're supposed to implement functions to perform operations on **Doubly-Linked-List**. These type of lists are used in applications which requires traversal in both directions from the current node. For Example- in lift simulators where movements in both directions happen, browser history where users can switch back and forth between pages and so.

implement functions declared in **DList.h** in **DList.c** and use the driver program **q3.c** to check your implementation as you did in Lab.