

## Data Structure Assignment 4

### Programming Homework

(textbook p. 186)

6. We want to implement a complete linked list system to perform arithmetic on sparse matrices using our linked list representation. Create a system that performs the following operations. (The matrix names are used only for illustrative purposes. The functions are specified as templates to which you must add the appropriate parameters.)

- (a) *mread*. Read in a sparse matrix.
- (b) *mwrite*. Write out the contents of a sparse matrix.
- (c) *mmult*. Create the sparse matrix  $d = a * b$ .
- (d) *mtranspose*. Create the sparse matrix  $b = a^T$ .

*Use mread to read in two sparse matrices, a and b. Use mtranspose to create  $b^T$ , then use mmult to create  $d = a * b^T$ . Use mwrite to write out  $b^T$  and d.*

*Bonus: Implement your system as a menu-driven system with user-friendly interface. Your program need not follow the above program flow if you implement this feature. You must include description of each menu option in your readme file.*

### General Information:

- Deadline : 2018/11/16 23:55.
- Upload your assignment to Moodle system.
- Upload file format : "student-ID\_Name.rar" or "student-ID\_Name.zip"  
Ex. "F12345678\_王小明.rar"
- Your file should consist of the following items : Source Code & Readme file(Program description)
- Late homework will not be accepted.
- Any copies will be scored as zero. Do not plagiarize.

**Input:**

(input first matrix)

3 4 3 (number of rows, number of columns, number of nonzero terms)

0 2 2 (row number, column number, value)

1 1 3

2 3 4

(input second matrix)

2 4 4

0 0 1

0 2 3

1 2 2

1 3 1

**Output:**

b transpose:

numRows = 4, numCols = 2

The matrix by row, column and value:

0 0 1

2 0 3

2 1 2

3 1 1

a \* b transpose:

numRows = 3, numCols = 2

The matrix by row, column and value:

0 0 6

0 1 4

2 1 4