CS 100 Lab Seven – Fall 2018

Create a directory called **lab7**. Download **main.c** and **matrix.h** from Blackboard to **lab7**. Under **lab7**, create **matrix.c**, and implement the following functions to deal with a matrix of integers.

- **int **allocateMatrix(int numRows, int numCols);** Given the number of rows and columns, allocates space for the matrix, and return the pointer to the matrix.
- **void freeMatrix(int **matrix, int numRows, int numCols);** Free the space allocated for the matrix.
- **void readMatrix(FILE *fp, int **matrix, int numRows, int numCols);** Populate the matrix using the data read from the specified file.
- **void printMatrix(int **matrix, int numRows, int numCols);** Print out the matrix on standard output.
- **int findRange(int **matrix, int numRows, int numCols);** Compute the range of all the elements in the matrix. Recall the range is the maximum minus the minimum.
- **double findAverage(int **matrix, int numRows, int numCols);** Compute the average (a double) of all the elements in the matrix.
- **void printCorners(int **matrix, int numRows, int numCols);** Print the four values at the corners of the matrix in the following format.

```
top-left     top-right
bottom-left  bottom-right
```

After completing the above functions, use the following command to compile the program.

```
gcc -Wall -std=c99 main.c matrix.c
```

Assume the file **data.txt** contains the following data.

```
3 4
24 20 11 12
28 19 18 13
21 16 25 23
```

The following shows a sample execution of the program.

```
./a.out data.txt
numRows=3
numCols=4
  24   20   11   12
  28   19   18   13
  21   16   25   23
The range of the matrix is 17
The average of the matrix is 19.1667
24 12
21 23
```

Submit your lab

First, on your machine, compress your **lab7** directory into a single (compressed) file, i.e. **lab7.zip**. **Please make sure lab7.zip contains the lab7 directory as well as matrix.c under it.** **main.c** and **matrix.h** are not required.

Second, once you have a compressed file named **lab7.zip**, submit that file to Blackboard.