IMPORTANT NOTE:
Go to the next step to test and submit your program to Stepik as well.

For this homework, your task is to design, write, and test a program in C for Matrix multiplication.

(If necessary, please learn matrix multiplication and addition from the internet first)

Do accomplish this task, please do the following:

1. Create a header file for your library called mymatrix.h.
In your header file, declare two functions to perform matrix multiplication and addition for any two valid matrices. Your function prototype should look something like:

//Comments
matrix matrix_mult(matrix1, matrix2);

//Comments
matrix matrix_add(matrix1, matrix2);

of course, we do not have a type "matrix" in C. So, you should replace the matrices, with proper two dimensional arrays or pointers to pointers.

NOTE: You may need to know the size of the matrices when you provide them to your library. Also, the size of the resulting matrix should be know as well, right? Add any required variables to the input and/or the output of your functions to enable this.

2. Implement your design!
In mymatrix.c file

3. Assume your input is coming from stdin and goes to stdout (just like Stepik, or a file redirection (prog <input >output)).
Write a main function that reads the command (multiplication or addition) as the first line of the input, and then the result of the input file and print out the result.
The input file of your program would have the following format. Each input file should contain two matrices of the following format:
input file format:
<command> (either 'multiplication' or 'addition')
<matrix 1 no. of rows (n)> <matrix 1 no. of columns (m)>
<row 1: space separated integers>
<row 2: space separated integers>
...
<row n: space separated integers>

<matrix 2 no. of rows (n)> <matrix 2 no. of columns (m)>
<row 1: space separated integers>
<row 2: space separated integers>
  ...
<row n: space separated integers>

The resulting output should have only one matrix in the same format as the input matrices (with the proper shape based on the command):
output file:
<matrix output no. of rows (n)> <matrix output no. of columns (m)>
<row 1: space separated integers>
<row 2: space separated integers>
...
<row n: space separated integers>

For example:
input:
multiplication
2 3
1 2 3
4 5 6
3 1
0
1
0

command:
matrix < input > output

output:
2 1
2
5

4. Write a Makefile to fully automate compilation and linking of your your program and testing it using valgrind and proper inputs and expected outputs.

Create at least 4 different test cases, two for each command.

5. Make sure your program provides necessary feedback regarding the proper input and output and the usage of the program. For example, you can only calculate the multiplications of matrices of size nxm and mxn. The resulting matrix would be a nxn matrix. Or, the shape of the

matrices for addition should be exactly the same (nxm and nxm). Please provide the correct feedback to user on each invalid case.

(To double check the correct result, you could use: http://matrix.reshish.com/multiplication.php)

Submission:
In the comments, make sure to enter your id of your Stepik profile (click on your profile icon->profile and copy the number in the URL)
Submit a folder containing the following to D2L in Homework 1:
1. Makefile
2. mymatrix.c
3. mymatrix.h
4. matrix.c (your main program)
5. necessary input files
6. necessary expected files
7. valgrind non-verbose screen log for 4 test cases (generated using the make testall)
8. output of your program (generated using the make testall)
9. Up to four (4) Screenshots of the commandline showing the output of running each test case (provided by you) with the non-verbose valgrind output on the console.

NOTE:
Your program should contain no warnings (if possible) and no memory leaks (using Valgrind).

NOTE 2:
Your Makefile can be similar to the make file on CH7.

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