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EEGR409

HOMEWORK 4

10/28/2011

REPORT/DESIGN SOLUTION

Libraries used: stdio.h, stdlib.h, ctype.h, and string.h

The main function serves the purpose of an interface which interacts with the user. The main function provides instructions and a skeleton for all operations. The iteration of whether the program should re-run is also within the main function where a while loop was used.
This program consists of several other functions specifically for several operations.

OPERATION	NAME OF FUNCTION	TYPE
Input Matrices	getAndFillMatrix()	int
Addition of matrices	Add2Matrices()	int
Subtraction of matrices	Substract2Matrices()	int
Multiplication of two matrices	Mult2Matrices()	int
Multiplication by scalar	MultiplyByScalar()	int
Transpose of matrices	TrasnposeAMatrix	int

Variables used and argument for these functions include;
float myScalarVariable – holds scalar value
float myFirstMatrix[sizeOfMatrix][sizeOfMatrix] - holds first matrix values
float mySecondMatrix[sizeOfMatrix][sizeOfMatrix] – holds second matrix values
float myResultMatrix[sizeOfMatrix][sizeOfMatrix] – holds result matrix values
char *myInput[sizeOfInputString]; - holds input string and serves as a pointer
const int sizeOfMatrix = 3; - holds a constant value for size of the matrix
const int sizeOfInputString = 50; - holds a constant value for size of string

FUNCTIONS USED FROM CTYPE.H LIBRARY

isdigit	Check if character is decimal digit
isspace	Check if character is a white-space

FUNCTIONS USED FROM STRING.H LIBRARY

strpbrk	Locate character in string

FUNCTIONS USED FROM STDLIB.H LIBRARY

atof	Convert string to double (function)
atoi	Convert string to integer (function)

One important challenge was the use of pointers as arguments where scalar value was need from input.

I used a switch-case statement for the selection of operation choice, then breaking out of the switch statement after a certain selection has been executed.

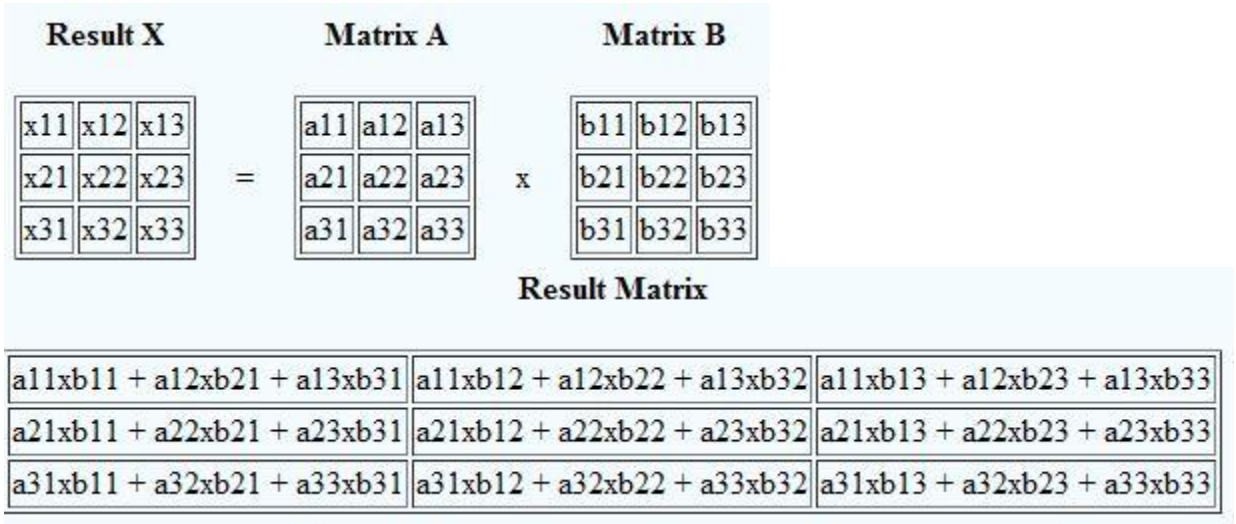
Case 1 to multiply Matrix 1 with the scalar value
Case 2 to multiply Matrix 2 with the scalar value
Case 3 to add Matrix 1 to Matrix 2 together
Case 4 to subtract Matrix 2 from Matrix 1
Case 5 to subtract Matrix 1 from Matrix 2
Case 6 to get the transpose of Matrix 1
Case 7 to get the transpose of Matrix 2
Case 8 to re-enter Matrix 1
Case 9 to re-enter Matrix 2
Case 10 to re-enter the scalar value
Case 11 to clear all variables and start over
Case 12 to multiply Matrix 1 by Matrix 2
Case 13 to multiply Matrix 2 by Matrix 1

If there is no case match, the program prints an error message then prompts to start again or not.

I added two addition operations for extra credit.

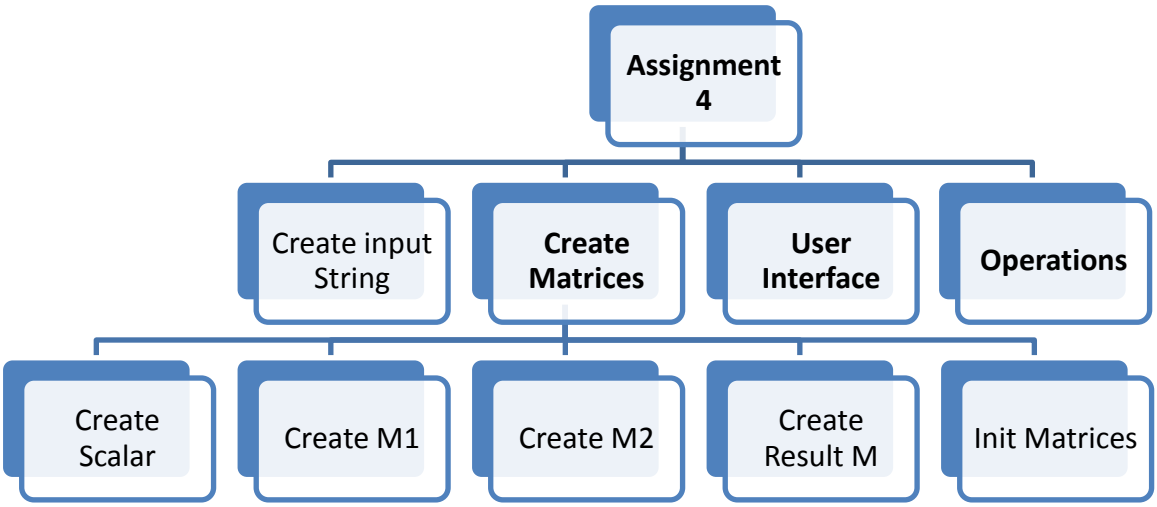
****MULTIPLICATION OF TWO MATRICES****

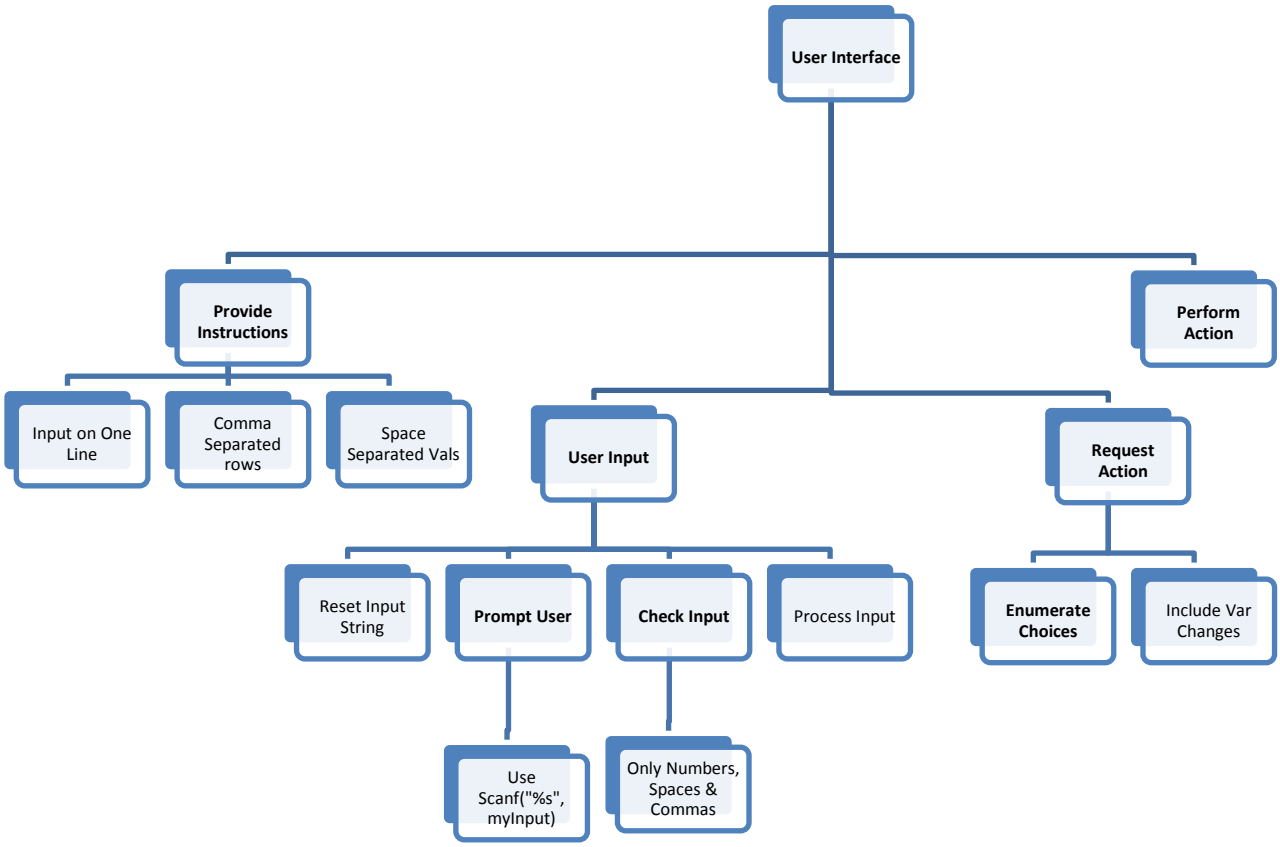
I used the algorithm below;

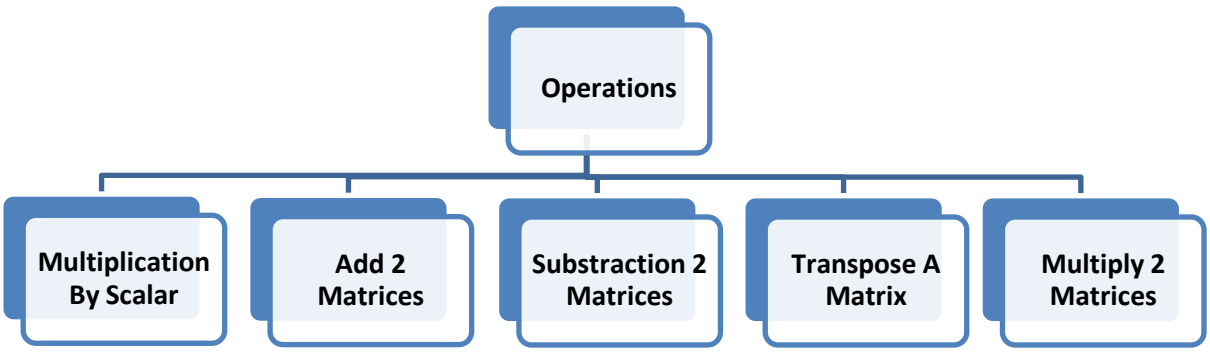


This was quite challenging as I eventually used 3 loops nested in each other for my algorithm.

STRUCTURE CHART




User Interface
Provide Instructions
Input on One Line
Comma Separated rows
Space Separated Vals
User Input
Reset Input String
Prompt User
Use Scanf("%s", myInput)
Check Input
Only Numbers, Spaces & Commas
Process Input
Perform Action
Request Action
Enumerate Choices
Include Var Changes



SCREENSHOTS

```
0.00    0.00    0.00
0.00    0.00    0.00
0.00    0.00    0.00

You will be asked to provide input for this application.
Please provide all input in one line for a specific structure

For scalar values, please enter only a numeric value and nothing else.
For a matrix, please enter all elements of the matrix in one line.
Enter each matrix by rows separated with hypens instead of spaces.
(i.e. '2.3-7.1-8,1.9,,' is a 3x3 matrix ([2.3 7.1 8],[1.9 0 0],[0 0 0])
For negative elements, please enter 2 hyphens before the number.
(i.e. '2--7.1,-1.9,--,' is a 3x3 matrix ([2 -7.1 0],[1.9 0 0],[0 0 0])
You may skip the remaining elements of a row, only if they are all zeros.

Input is initialized


Please enter a scalar value: 2

Input first matrix:
Please provide a matrix according to instructions provided: 1-1-1,2-2-2,3-3-3


The Matrix entered is:
1.00    1.00    1.00
2.00    2.00    2.00
3.00    3.00    3.00


Input second matrix:
Please provide a matrix according to instructions provided: 1-2-3,4-3-2,3-3-3


The Matrix entered is:
1.00    2.00    3.00
4.00    3.00    2.00
3.00    3.00    3.00




Please select what you would like to do from the following options:

Enter the corresponding number for your choice

 To multiply Matrix 1 with the scalar value  : 1
 To multiply Matrix 2 with the scalar value  : 2
 To add Matrix 1 to Matrix 2 together        : 3
 To subtract Matrix 2 from Matrix 1          : 4
 To subtract Matrix 1 from Matrix 2          : 5
 To get the transpose of Matrix 1            : 6
 To get the transpose of Matrix 2            : 7
 To re-enter Matrix 1                        : 8
 To re-enter Matrix 2                        : 9
 To re-enter the scalar value                : 10
 To clear all variables and start over       : 11

What operation would you like to do?: 1

OPERATION SELECTED: Multiply Matrix 1 with the scalar value

2.00    2.00    2.00
4.00    4.00    4.00
6.00    6.00    6.00


Do you want to start over (Press 1 for yes):
```

```
0.00    0.00    0.00
0.00    0.00    0.00
0.00    0.00    0.00

You will be asked to provide input for this application.
Please provide all input in one line for a specific structure

For scalar values, please enter only a numeric value and nothing else.
For a matrix, please enter all elements of the matrix in one line.
Enter each matrix by rows separated with hypens instead of spaces.
(i.e. '2.3-7.1-8,1.9,,' is a 3x3 matrix ([2.3 7.1 8],[1.9 0 0],[0 0 0])
For negative elements, please enter 2 hyphens before the number.
(i.e. '2--7.1,-1.9,--,' is a 3x3 matrix ([2 -7.1 0],[1.9 0 0],[0 0 0])
You may skip the remaining elements of a row, only if they are all zeros.

Input is initialized


Please enter a scalar value: 3

Input first matrix:
Please provide a matrix according to instructions provided: 2-2-2,1-2-3,3-2-1


The Matrix entered is:
2.00    2.00    2.00
1.00    2.00    3.00
3.00    2.00    1.00


Input second matrix:
Please provide a matrix according to instructions provided: 9-3-2,4-5-6,8-1-7


The Matrix entered is:
9.00    3.00    2.00
4.00    5.00    6.00
8.00    1.00    7.00



Please select what you would like to do from the following options:

Enter the corresponding number for your choice

 To multiply Matrix 1 with the scalar value  : 1
 To multiply Matrix 2 with the scalar value  : 2
 To add Matrix 1 to Matrix 2 together        : 3
 To subtract Matrix 2 from Matrix 1          : 4
 To subtract Matrix 1 from Matrix 2          : 5
 To get the transpose of Matrix 1            : 6
 To get the transpose of Matrix 2            : 7
 To re-enter Matrix 1                        : 8
 To re-enter Matrix 2                        : 9
 To re-enter the scalar value                : 10
 To clear all variables and start over       : 11

What operation would you like to do?: 3

OPERATION SELECTED: Add Matrix 1 to Matrix 2

11.00   5.00    4.00
5.00    7.00    9.00
11.00   3.00    8.00


Do you want to start over (Press 1 for yes):
```


C:\Users\Habad\Dropbox\FALL 2011 CLASSES\EEGR409\HOMEWORKS\Testing Homeworks.exe
0.00 0.00 0.00
0.00 0.00 0.00
0.00 0.00 0.00
You will be asked to provide input for this application.
Please provide all input in one line for a specific structure
For scalar values, please enter only a numeric value and nothing else.
For a matrix, please enter all elements of the matrix in one line.
Enter each matrix by rows separated with hypens instead of spaces.
(i.e. '2.3-7.1-8,1.9,,' is a 3x3 matrix ([2.3 7.1 8],[1.9 0 0],[0 0 0])
For negative elements, please enter 2 hyphens before the number.
(i.e. '2--7.1,-1.9,--,' is a 3x3 matrix ([2 -7.1 0],[1.9 0 0],[0 0 0])
You may skip the remaining elements of a row, only if they are all zeros.
Input is initialized
Please enter a scalar value: 4
Input first matrix:
Please provide a matrix according to instructions provided: 1-2-3,4-3-2,9-2-1
The Matrix entered is:
1.00 2.00 3.00
4.00 3.00 2.00
9.00 2.00 1.00
Input second matrix:
Please provide a matrix according to instructions provided: 3-4-5,1-2-3,9-4-5
The Matrix entered is:
3.00 4.00 5.00
1.00 2.00 3.00
9.00 4.00 5.00
Please select what you would like to do from the following options:
Enter the corresponding number for your choice
To multiply Matrix 1 with the scalar value : 1
To multiply Matrix 2 with the scalar value : 2
To add Matrix 1 to Matrix 2 together : 3
To subtract Matrix 2 from Matrix 1 : 4
To subtract Matrix 1 from Matrix 2 : 5
To get the transpose of Matrix 1 : 6
To get the transpose of Matrix 2 : 7
To re-enter Matrix 1 : 8
To re-enter Matrix 2 : 9
To re-enter the scalar value : 10
To clear all variables and start over : 11
What operation would you like to do?: 5
OPERATION SELECTED: Subtract Matrix 1 from Matrix 2
2.00 2.00 2.00
-3.00 -1.00 1.00
0.00 2.00 4.00
Do you want to start over (Press 1 for yes):

```
0.00    0.00    0.00
0.00    0.00    0.00
0.00    0.00    0.00

You will be asked to provide input for this application.
Please provide all input in one line for a specific structure

For scalar values, please enter only a numeric value and nothing else.
For a matrix, please enter all elements of the matrix in one line.
Enter each matrix by rows separated with hypens instead of spaces.
(i.e. '2.3-7.1-8,1.9,,' is a 3x3 matrix ([2.3 7.1 8],[1.9 0 0],[0 0 0])
For negative elements, please enter 2 hyphens before the number.
(i.e. '2--7.1,-1.9,--,' is a 3x3 matrix ([2 -7.1 0],[1.9 0 0],[0 0 0])
You may skip the remaining elements of a row, only if they are all zeros.

Input is initialized


Please enter a scalar value: 3

Input first matrix:
Please provide a matrix according to instructions provided: 1-2-3,4-5-6,7-8-9


The Matrix entered is:
1.00    2.00    3.00
4.00    5.00    6.00
7.00    8.00    9.00


Input second matrix:
Please provide a matrix according to instructions provided: 3-2.2-3,-1-3.9-3


The Matrix entered is:
3.00    2.20    3.00
1.00    3.90    3.00
0.00    0.00    0.00



Please select what you would like to do from the following options:

Enter the corresponding number for your choice

 To multiply Matrix 1 with the scalar value  : 1
 To multiply Matrix 2 with the scalar value  : 2
 To add Matrix 1 to Matrix 2 together        : 3
 To subtract Matrix 2 from Matrix 1          : 4
 To subtract Matrix 1 from Matrix 2          : 5
 To get the transpose of Matrix 1            : 6
 To get the transpose of Matrix 2            : 7
 To re-enter Matrix 1                        : 8
 To re-enter Matrix 2                        : 9
 To re-enter the scalar value                : 10
 To clear all variables and start over       : 11

What operation would you like to do?: 6

OPERATION SELECTED: Transpose of Matrix 1

1.00    4.00    7.00
2.00    5.00    8.00
3.00    6.00    9.00


Do you want to start over (Press 1 for yes):
```

```
You will be asked to provide input for this application.
Please provide all input in one line for a specific structure

For scalar values, please enter only a numeric value and nothing else.
For a matrix, please enter all elements of the matrix in one line.
Enter each matrix by rows separated with hypens instead of spaces.
(i.e. '2.3-7.1-8,1.9,,' is a 3x3 matrix ([2.3 7.1 8],[1.9 0 0],[0 0 0])
For negative elements, please enter 2 hyphens before the number.
(i.e. '2--7.1,-1.9,--,' is a 3x3 matrix ([2 -7.1 0],[1.9 0 0],[0 0 0])
You may skip the remaining elements of a row, only if they are all zeros.

Input is initialized


Please enter a scalar value: 3.1

Input first matrix:
Please provide a matrix according to instructions provided: 2-3-2,3-2-1,3-2-1


The Matrix entered is:
2.00    3.00    2.00
3.00    2.00    1.00
3.00    2.00    1.00


Input second matrix:
Please provide a matrix according to instructions provided: 3-2-1,3-2-3,4-3-2


The Matrix entered is:
3.00    2.00    1.00
3.00    2.00    3.00
4.00    3.00    2.00




Please select what you would like to do from the following options:

Enter the corresponding number for your choice

 To multiply Matrix 1 with the scalar value  : 1
 To multiply Matrix 2 with the scalar value  : 2
 To add Matrix 1 to Matrix 2 together        : 3
 To subtract Matrix 2 from Matrix 1          : 4
 To subtract Matrix 1 from Matrix 2          : 5
 To get the transpose of Matrix 1            : 6
 To get the transpose of Matrix 2            : 7
 To re-enter Matrix 1                        : 8
 To re-enter Matrix 2                        : 9
 To re-enter the scalar value                : 10
 To clear all variables and start over       : 11

What operation would you like to do?: 9

OPERATION SELECTED: Re-enter Matrix 2:

Please provide a matrix according to instructions provided: 2-3-4,2-1-2,3-2-1


The Matrix entered is:
2.00    3.00    4.00
2.00    1.00    2.00
3.00    2.00    1.00


Do you want to start over (Press 1 for yes):
```

```
0.00    0.00    0.00

You will be asked to provide input for this application.
Please provide all input in one line for a specific structure

For scalar values, please enter only a numeric value and nothing else.
For a matrix, please enter all elements of the matrix in one line.
Enter each matrix by rows separated with hypens instead of spaces.
(i.e. '2.3-7.1-8,1.9,,' is a 3x3 matrix ([2.3 7.1 8],[1.9 0 0],[0 0 0])
For negative elements, please enter 2 hyphens before the number.
(i.e. '2--7.1,-1.9,--,' is a 3x3 matrix ([2 -7.1 0],[1.9 0 0],[0 0 0])
You may skip the remaining elements of a row, only if they are all zeros.

Input is initialized


Please enter a scalar value: 3

Input first matrix:
Please provide a matrix according to instructions provided: 1.1-2-1,3-2-3,9.8-3-
4-3


Sorry, but your input does not follow the prescribed format. Please try again.
Please provide a matrix according to instructions provided: 1-2-3,4-3-2,9.9-3-2


The Matrix entered is:
1.00    2.00    3.00
4.00    3.00    2.00
9.90    3.00    2.00


Input second matrix:
Please provide a matrix according to instructions provided: 2-3-4,2-1-2,3-4-5


The Matrix entered is:
2.00    3.00    4.00
2.00    1.00    2.00
3.00    4.00    5.00




Please select what you would like to do from the following options:

Enter the corresponding number for your choice

 To multiply Matrix 1 with the scalar value  : 1
 To multiply Matrix 2 with the scalar value  : 2
 To add Matrix 1 to Matrix 2 together        : 3
 To subtract Matrix 2 from Matrix 1          : 4
 To subtract Matrix 1 from Matrix 2          : 5
 To get the transpose of Matrix 1            : 6
 To get the transpose of Matrix 2            : 7
 To re-enter Matrix 1                        : 8
 To re-enter Matrix 2                        : 9
 To re-enter the scalar value                : 10
 To clear all variables and start over       : 11

What operation would you like to do?: 11

OPERATION SELECTED: Clear all variables and start over



Do you want to start over (Press 1 for yes):
```

```
0.00    0.00    0.00

You will be asked to provide input for this application.
Please provide all input in one line for a specific structure

For scalar values, please enter only a numeric value and nothing else.
For a matrix, please enter all elements of the matrix in one line.
Enter each matrix by rows separated with hypens instead of spaces.
(i.e. '2.3-7.1-8,1.9,,' is a 3x3 matrix ([2.3 7.1 8],[1.9 0 0],[0 0 0])
For negative elements, please enter 2 hyphens before the number.
(i.e. '2--7.1,-1.9,--,' is a 3x3 matrix ([2 -7.1 0],[1.9 0 0],[0 0 0])
You may skip the remaining elements of a row, only if they are all zeros.

Input is initialized


Please enter a scalar value: 3

Input first matrix:
Please provide a matrix according to instructions provided: 1-2-3,3-2-1,3-4-1


The Matrix entered is:
1.00    2.00    3.00
3.00    2.00    1.00
3.00    4.00    1.00


Input second matrix:
Please provide a matrix according to instructions provided: 3-2-4,4-2-1,4-2-1


The Matrix entered is:
3.00    2.00    4.00
4.00    2.00    1.00
4.00    2.00    1.00




Please select what you would like to do from the following options:

Enter the corresponding number for your choice

 To multiply Matrix 1 with the scalar value  : 1
 To multiply Matrix 2 with the scalar value  : 2
 To add Matrix 1 to Matrix 2 together        : 3
 To subtract Matrix 2 from Matrix 1          : 4
 To subtract Matrix 1 from Matrix 2          : 5
 To get the transpose of Matrix 1            : 6
 To get the transpose of Matrix 2            : 7
 To re-enter Matrix 1                        : 8
 To re-enter Matrix 2                        : 9
 To re-enter the scalar value                : 10
 To clear all variables and start over       : 11
 To multiply Matrix 1 by Matrix 2            : 12
 To multiply Matrix 2 by Matrix 1            : 13

What operation would you like to do?: 13

OPERATION SELECTED: Multiply Matrix 2 by Matrix 1

21.00   26.00   15.00
13.00   16.00   15.00
13.00   16.00   15.00


Do you want to start over (Press 1 for yes):
```