University of Central Punjab
Faculty of Information Technology

PF Project # 3

Matrix Manipulator

Instructions

- Plagiarism will not be tolerated under ANY circumstances
- Make unit logical functions that are as small as possible
- Comment the code appropriately
- Do not use static memory or global variables
- Use good identifier names

Project

Create a program that provides near-complete functionality over the matrix space. Users should be given a simple and smooth work flow that implements following details according to specs:

Front-end:
- User can enter matrix personally or though files of their choosing
- User can get output on console or through files of their choosing
- Program should not end until user wishes to end their task
- User can enter Matrix of any size
- In case of file data entry each file will contain single matrix and you must use auto-grow techniques to read the data.

Functional Requirements:

1. Sum of Matrix (sum of all values)
2. Product of Matrix (product of all values)
3. Row-wise Average
4. Column-wise Average
5. Average or whole Matrix
6. Row-wise sorting of Matrix
7. Column-wise sorting of Matrix
8. Scalar Matrix Addition
9. Addition of two Matrices
10. Scalar Matrix Subtraction
11. Subtraction of two Matrices
12. Scalar Matrix Multiplication
13. Multiplication of two Matrices
14. Scalar Matrix Division
15. Matrix transpose
16. Matrix determinant
17. Matrix Inverse

Back-end:

- Use separate function for every task listed above that is controlled by menu function which guides users through the various options.
- Use separate functions for helping tasks such as file input/output.
- Use 2D static/dynamic array to represent Matrices.
- Handle any and all sanity checks such as "size < 1".
- In case there are any operations the program cannot perform, show a proper error message on screen to user to clearly state what is wrong with the input.
- Code should be thoroughly commented with appropriate details.
- There should be no memory leakage at all throughout the program.
- All functions must be pure generic.

Useful links:

https://www.shelovesmath.com/algebra/advanced-algebra/matrices-and-solving-systems-with-matrices/
https://www.khanacademy.org/math/algebra-home/alg-matrices
https://www.mathsisfun.com/algebra/matrix-introduction.html
https://courses.lumenlearning.com/boundless-algebra/chapter/introduction-to- matrices/
http://mathworld.wolfram.com/Matrix.html