

Penza State University
Faculty of Computer Science
Department of Computer Science

EXPLANATORY NOTE

for course design ~~for the course~~

Logic and DSA

Matrix Addition and Multiplication

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Accepted: Fedjunin R.N.

Own
14.10.2026

Penza 2026

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PENZA STATE UNIVERSITY
FACULTY OF COMPUTER ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING

Head of Department of Technical Education


Mrs : Karamsheva

"14" oct 2026

Task

Course project assignment for the course

Programming

Project topic: development of a complex structure program using top-down programming.

Initial data (technical requirements) for the design

Scientific calculator is a desktop application built using Python, aimed at executing a variety of complex functions and automating other simple calculations.

Mandatory requirements for the program:

- 1-Use of built-in Python data types: string, integer, Boolean and list.
- 2-Screensaver.
- 3-Graphical operating mode of the video system.
- 4-Menu and toolbar.
- 5-MS Windows as the target operating system.
- 6-PyCharm as the development environment.

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2. Project Task

The task

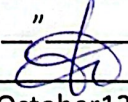
Write a program in the C language that adds two matrices and multiplies two matrices. The report must contain an introduction, a description of all the functions used, the code, a run of the program with its result, and a graph that explains how the functions work.

Steps

1. **Understood the task.** I read the requirement and listed what the program must do: take two matrices, add them, multiply them, and show the results.
2. **Reviewed the mathematics.** I recalled the rules of matrix addition (same position, same size) and matrix multiplication (row of the first matrix times column of the second), and tried both on a small 2 x 2 example.
3. **Chose a simple design.** I used fixed 2 x 2 matrices (#define SIZE 2) and only basic C features: arrays, for loops, scanf and printf, so that the code stays very simple.
4. **Divided the program into functions.** Each function has one job: inputMatrix reads, printMatrix prints, addMatrices adds, multiplyMatrices multiplies, and main connects them.
5. **Wrote the code step by step.** First the input and print functions; then the addition, then the multiplication, and last the main function that calls everything in order.
6. **Compiled the program.** I compiled it with gcc using the -Wall option, which shows warnings, to find and remove mistakes.
7. **Tested the program.** I ran it with sample matrices, A = [1 2; 3 4] and B = [5 6; 7 8], and checked every result by hand.
8. **Drew a flowchart.** I made a graph that shows the order in which main() calls the functions, to explain how the program works.
9. **Wrote the report.** I organized the work in the required order: introduction, description of the functions, code, program run and result, and graph, followed by a conclusion and references.

The date of the issue of the task is "October 12" 2026

Project defense date " " 2026

Teacher Fediunin R.N. 

Received the task on October 12, 2026

Student Mohamedalhafez Mahmoud 1050



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7. Conclusion

In this project a simple C program was written that adds two matrices and multiplies two matrices. The program is divided into small functions (inputMatrix, printMatrix, addMatrices, multiplyMatrices and main), and each function does one clear job. This makes the code short, easy to read and easy to test.

The test run gave correct results: for $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ the program printed $A + B = \begin{bmatrix} 6 & 8 \\ 10 & 12 \end{bmatrix}$ and $A \times B = \begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$, which are the same as the values calculated by hand. The project also shows how two-dimensional arrays, for loops, nested loops and functions that receive arrays are used in the C language. The program can be improved in the future by allowing matrices of different sizes and by adding a menu.

8. References and Sources

- [1] Kernighan, B. W., and Ritchie, D. M. *The C Programming Language*, 2nd edition. Prentice Hall, 1988.
- [2] cppreference.com. "C reference: printf and scanf". <https://en.cppreference.com/w/c>
- [3] GNU Project. *GCC, the GNU Compiler Collection: Online Documentation*. <https://gcc.gnu.org/onlinedocs/>
- [4] Wikipedia. "Matrix addition". https://en.wikipedia.org/wiki/Matrix_addition
- [5] Wikipedia. "Matrix multiplication". https://en.wikipedia.org/wiki/Matrix_multiplication

9. Sources

W3schools--URL :

<https://www.w3schools.com/c/>