



Lab 5 : Arrays

Exercise 1:

1. Write a C program that reads N integer elements of a vector V, asks the user to input a number X, adds X to all elements of V, and then displays the resulting vector.
2. Modify your program using functions: one function to read an array of size M (M passed as a parameter), one function to display an array passed as a parameter, and one function to add a number A to the elements of a vector T of size M (T, M, and A are given as parameters).

Exercise 2:

1. Provide a C function that calculates and returns the mean of a vector V of N real numbers passed as parameters.
2. Provide a C function that calculates and returns the variance of a vector V of N real numbers passed as parameters.

$$Var = \frac{1}{N} \sum_{i=1}^N (V[i] - V_{mean})^2 \quad V_{mean} \text{ is the mean value of } V.$$

2. Provide the C code for a function (replace) that accepts a vector V of real numbers as a parameter and then replaces the elements in V that are less than its mean with 0. The function should also return the number of elements that are greater than the mean.
3. Test your functions in a main program.

Exercise 3:

Write a C program (using functions) to calculate the trace of a square matrix T of N real numbers.

$$trace = \sum_{i=1}^N T(i, i)$$

Exercise 4:

Provide a C program (using functions) that reads a matrix T(N,M) and then constructs two vectors A and B with A containing the sum of the elements in the rows and B containing the sum of the elements in the columns.

Example :

$$\begin{bmatrix} 1.00 & 2.00 & 3.00 \\ 4.00 & 5.00 & 6.00 \\ 7.00 & 8.00 & 9.00 \end{bmatrix} \quad \begin{bmatrix} 6.00 \\ 15.00 \\ 24.00 \end{bmatrix}$$
$$\begin{bmatrix} 1.00 & 15.00 & 18.00 \end{bmatrix}$$