Tutorial Series N° 5

Ex 01

Given a 10-element array T,

1. Write an algorithm to input the array T, then calculate and print the sum of its even elements.
2. Write an algorithm to input the array T, then reverse it and print it.

Ex 02

Write an algorithm to input an array of N real numbers, then to find the number of its minimum elements and the index of its first occurrence. The algorithm should make only one pass through the array.
Example: Consider the following array: [5, 2, 4, 2, 1, 7, 9, 4, 1, 1]. The minimum element in this array is 1, which occurs 3 times, the index of the first occurrence of the minimum element is 4.

Ex 03

Given a 10-element array T, write an algorithm to determine if the elements of T are all consecutive.
For example, the array {7, 8, 9, 10, 11, 12} has consecutive elements, while the array {7, 8, 9, 10, 11, 14} does not.

Ex 04

Write an algorithm to enter a matrix of 10 * 6 integers, and an integer number ***nb***. Then count the number of multiples of ***nb*** contained in the matrix.

Ex 05

Given a square matrix ***I*** of integers of size ***N=10***, write an algorithm to check if ***I*** is an identity matrix.

An identity matrix is a square matrix whose main diagonal consists of ones and the others of zeros. It is denoted by ***I***.

Ex 06

Given a 60 * 120 matrix ***A*** of integers, where the values range from 0 to 99, write an algorithm to input the matrix ***A***, calculate its histogram, and display it.
The histogram of the matrix ***A*** is an array ***H*** of 100 integers (0..99), where ***H[i]*** represents the number of occurrences of the value i in the matrix ***A***.

Ex 07

Given two rational numbers ***R1*** and ***R2***, write an algorithm to input them, calculate their sum, and display the result.

Ex 08

In order to prevent traffic congestion in Guelma during rush hour, the city's transportation authority is implementing a system that allows public transportation vehicles to transmit a signal indicating its geolocation, represented by a latitude and longitude (two real numbers), as well as the traffic condition: blocked, slow, normal. Each vehicle is characterized by a 12-character license plate, the owner's name, and the line number. To do this, the authority uses an array ***S*** (of size 1000) in which the signals transmitted by the different vehicles are recorded. Each element of this array contains the vehicle information, its geolocation, the traffic condition, and the time represented by the hour and minute.

Propose the data structures representing a geolocation, a vehicle, a time, and the array of transmitted signals ***S***.

Ex 09

We want to manage a set (album) of ***N*** (N=200) photos. Each photo is described by a set of information: dimensions (length and width), a string representing the path on the hard drive, a date of shooting (day, month, year), the category which can be: family, work or leisure.

Write an algorithm to enter a photo album, then to calculate and display the number of family photos taken in 2024.