Tutorial 4 : Arrays

Part A : Arrays

1. Given an array of N numbers, write the algorithm that:
   a. Initializes the elements of the array to 1
   b. Reads the elements of the array, then display them
   c. Finds the largest number of the array (maximum)
   d. Finds the mean (E) and the standard deviation (sigma = var^2) of its elements
      (Given that $var(X) = E[X^2] - E[X]^2$)

2. Given an array of N characters (char), write the algorithm that:
   a. Allows you to perform a circular right shift of two positions.
   b. Displays the elements that occur once in the array
   c. Finds the most frequent element amidst the array's elements, and the number of its occurrences
   d. Performs the search for an element in an array and displays its position when it finds it.
   e. Reverses an array.

3. Given two vectors tab1 and tab2 of the same size N, write an algorithm that:
   a. Performs the addition of the two arrays
   b. Performs the product of the two arrays
   c. Allows reading numbers entered by the user, and places even numbers in tab1 and multiple numbers of 3 in tab2. Handle the case where the tables are filled by displaying a message screen.

4. Given an array of numbers, write the algorithm that performs the sort of its elements according to the bubble sort.

Part B : Matrices

5. Given a matrix of N × M dimension, write the algorithm that
   a. Computes the sum of elements of each column, and the sum of elements of each row.
   b. Computes the transpose of the given matrix

6. Given a square matrix, write the algorithm that
   a. Checks if its two diagonals are equal.
   b. Verifies, if the matrix is symmetric