Directed Work N°5

Exercise 1:

Write an algorithm that reads a vector of N real values and splits it into two vectors: one containing positive values and the other containing negative values.

Exercise 2:

Write an algorithm that reads a vector of n integer values and checks whether it is sorted in ascending order or not.

Exercise 3:

Write an algorithm that inserts an element NBR into a vector sorted in ascending order while maintaining the order.

Exercise 4:

Write an algorithm that reverses an array, i.e., swaps its elements by placing the last element first and so on. For example, for N = 8:

Initial Array :

15	18	13	99	68	71	96	55

Array after permutation :

55	96	71	68	99	13	18	15

Exercise 5:

Write an algorithm that calculates the trace (the sum of elements on the main diagonal) of a square matrix with n*n elements.

5	2	-6	4
45	**2**	16	20
-6	-9	**3**	5
89	12	4	**1**

The trace =5+2+3+1=11

Exercise 6:

The calculation of elements in a matrix C, the sum of two matrices A and B of the same dimensions (n, m), is given by the following relation: C[i,j] = a[i,j] + b[i,j]. Write an algorithm to construct matrix C from matrices A and B.

Exercise 7:

Write a program that determines the maximum value along with its indices in a 5x5 matrix of integer elements.

Exercise 8:

Write an algorithm that calculates, for each row, the sum of even values and, for each column, the count of odd elements in a matrix of 4 rows and 8 columns of integer elements.

Exercise 9:

Write an algorithm to fill the cells of a matrix with the coefficients of Pascal's Triangle. Example: for a matrix of size (6,6).

1					
1	1				
1	2	1			
1	3	3	1		
1	4	6	4	1	
1	5	10	10	5	1

Exercise 10: Additional

Consider a matrix A(N, M) of integers (where N = 10 and M = 15). Write an algorithm that allows you to:

- Calculate and store the sum of each column in an integer vector V. The vector V will contain 15 sums.

- Determine in vector V the position Jmin of the minimum sum and the position Jmax of the maximum sum.

- Swap the two columns with indices Jmin and Jmax in matrix A if Jmin > Jmax.

- Display matrix A after the permutation.

Exercise 11: Additional

The calculation of elements in a matrix C, the product of two matrices A and B with dimensions (n, r) and (r, m) respectively, is given by the following relation:

$$c_{ij}= \sum_{k=1}^{r} a_{ik} * b_{kj}$$

Write an algorithm to construct matrix C, the product of two matrices A and B.