



Level: 1st year of computer science
Course: ADS1

series TD/TP N°: 07

Academic year: 2025/2026
Chapter 5 : Matrices & strings

Exercise 1: TD/TP

Write a program that performs the subtraction ($S=A-B$) of two real-type matrices of size L/C .

Exercise 2: TP

Write a program that calculates the sum of the elements on the main diagonal. This sum is called the trace of the matrix.

Exercise 3: TD

Write an algorithm that:

- Fills a matrix $M(L,C)$ with integers.
- Asks the user to enter an integer 'x'.
- Fills an array T with the numbers that are multiples of 'x' from the matrix 'M'.
- Displays the resulting array.

Exercise 4: TP

A symmetric matrix M of order 'n' is a square matrix (number of rows = number of columns) that satisfies the following condition: $M[i, j] = M[j, i]$ for all i and j .

Write a program that checks if a matrix is symmetric or not.

Exercise 5: TD

Write a program that, given a string of characters S , displays whether S is a palindrome (symmetric) or not.

Note: A string is a palindrome if it reads the same backward as forward. For example, "radar" is a palindrome.

Exercise 6: TD/TP

Write a program that removes all occurrences of a character in a string by shifting the rest to the left.

Exercise 7: (at home)

Let M be a square matrix. M is diagonal if all the coefficients outside the main diagonal are zero. M is upper triangular if all the coefficients below the main diagonal are zero. M is lower triangular if all the coefficients above the main diagonal are zero.

Write a program to determine whether a matrix M is diagonal, upper triangular, lower triangular, or not.

Exercise 8 : (at home)

Pascal's triangle is represented by a triangular matrix P whose elements $p(i,j)$ are defined as follows:

- $p(i,j) = 1$ if $j=1$ (the first column is always 1).
- $p(i,j) = 1$ if $i = j$ (the diagonal is always 1).
- $p(i,j) = p(i-1,j-1) + p(i-1,j)$ if $j > 1$ and $j < i$ (the element in row i and column j is obtained by adding the values of the elements in row $i-1$ and column $j-1$, and in row $i-1$ and column j).
- $p(i,j) = 0$ si $j > i$ (upper part of the matrix is zero).

Write a program to automatically generate Pascal's triangle for a given size N .