



Algorithmic and Data Structures1 (ASD1)

Exercise Series N° 6

| Exercises                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tutorials</b>            | <ol style="list-style-type: none"> <li>Write an algorithm that reads an integer array of N elements, and displays the elements with odd index.</li> <li>Write an algorithm that reads an array of N reals, it also reads an integer p, and then it puts the elements starting at index p into another array.</li> <li>Write an algorithm that reads a binary integer coded in SVA on 8 bits; the algorithm calculates its decimal value and its representation in C1 (index bit 0 is the sign bit)</li> <li>Write an algorithm that reads a matrix of R rows and C columns and displays the inner part of the matrix</li> <li>Write an algorithm that reads a matrix of real numbers, calculates and displays its transpose</li> <li>Write an algorithm that reads a square matrix and calculates the sum of its lower half and the sum of the two diagonals</li> <li>Write an algorithm that reads a character string; it adds the character '.' to the end of the string.</li> <li>Write a program that reads a CH character string and converts all uppercase letters into lowercase letters and vice versa. The result will be stored in the same CH variable and displayed after the conversion.</li> <li>Write an algorithm that reads a character string and starting from the character ';' it transfers the rest of the chain to another chain.</li> </ol>                                                                                                                                                                                                                                                                               |
| <b>Practical Work</b>       | <ol style="list-style-type: none"> <li>Write a program to calculate the number of occurrences of a given element in an integer array of N elements.</li> <li>Write a program that reads the averages of a module of n students; the program sets averages between 9.5 and 10 to 10 ; the program also displays a grade summary containing: best grade; bad grade ; students who have the module.</li> <li>Write a program that reads a matrix of R rows and C columns and sets its negative elements to zero.</li> <li>Write a program that reads a square matrix and check whether it is symmetric or not.<br/>A symmetric matrix <math>\leftrightarrow M[i][j] = M[j][i] \forall i, j &lt; n</math></li> <li>Write a program that reads a CH character string and an integer n then deletes the last n characters of CH, finally it displays the CH string after this change.</li> <li>Write an algorithm that reads two character strings CH1 and CH2 and adds CH2 at the end of CH1.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Additional Exercises</b> | <ol style="list-style-type: none"> <li>Write an algorithm that concatenates two vectors V1 and V2 into a vector V.</li> <li>Write an algorithm that reads an integer and puts the digits of that number into a vector (each digit in a cell)</li> <li>Write an algorithm that calculates the sum of two vectors of the same size.</li> <li>Write an algorithm that reads a decimal and gives its binary representation in the codes: SVA, C1, C2.</li> <li>Write an algorithm that reads a matrix and calculates the sum of each column.</li> <li>Write an algorithm that reads a matrix that sets to zero the elements of the row and column where the smallest element in the array appears.</li> <li>Write an algorithm that reads a character string and replaces each occurrence of the character a with another character b (a, b entered by the user)</li> <li>Write an algorithm that reads a character string and calculates the number of letters, the number of digits and the number of other characters in this string</li> <li>Write an algorithm that reads a character string which calculates the number of words in the string in the following two cases: <ul style="list-style-type: none"> <li>Two words are separated by a space.</li> <li>Two words can be separated by one or more spaces.</li> </ul> </li> <li>Write an algorithm that reads a vector of n integers, the algorithm arranges the elements of the vector in a matrix of R rows and C columns.</li> <li>Write an algorithm that reads an integer matrix of R rows and C columns; the algorithm arranges the elements of this matrix in a vector.</li> </ol> |