

## **List with all exercises**

### **Ex001**

The registration of an address book, names, age and telephone numbers of 5 people, complements an appropriate registration structure in C, that performs the following tasks:

- A - registration of information: name, address, telephone number and age.
- B - age research.
- C - alphabetical classification.
- D - alteration of a record that occurred with an error. E - exit the program.

### **Ex002**

Develop an algorithm that controls the ages of 50 administrative staff at a school and displays retirees and active workers. The algorithm in question should perform the following routines:

- a-register the 50 administrative staff and their ages
- b-classify the registered administrators
- c-correct administrative and / or ages that have been registered with errors
- d-search administrative by name and age
- e-list retired employees ( $\geq 60$  years)
- f-list active administrators

### **Ex003**

Suppose that a simple virus has infected the university's database system and that, as the only damage, it has altered the students' RA's. After some time, it was discovered that given the RA generated by the RAV virus =  $x_1 x_2 x_3 x_4 x_5 x_6 x_7 x_8 x_9$ , the correct RA  $RAC = y_1 y_2 y_3 y_4 y_5 y_6 y_7 y_8 y_9$  could be obtained through the following operations:  $y_1 = x_1$ ,  $y_2 = x_2$ ,  $y_3 = x_8$ ,  $y_4 = x_7$ ,  $y_5 = x_5$ ,  $y_6 = x_6$ ,  $y_7 = x_3$ ,  $y_8 = x_4$ ,  $y_9 = x_9$  For example, if  $RAV = 197845602$  then  $RAC = 190645782$ . Design a C program that reads RAV and generates 9-digit RAC.

### **Ex004**

Describe a program in Language C that reads the value of an RA (number consisting of 9 digits) and generates a new RA by reversing the 4 less initiated digits of the initial RA.

For example, if the initial RA for 972845236 then the new RA should be 972846325.

If initial RA for 984475211 then the new RA must be 984471125.

The algorithm should read the initial RA and present the new RA.

### **Ex005**

Describe a C program that reads the value of an RA (9-digit number) and generates a new RA by reversing the 2 most significant digits and reversing the 2 least significant digits of the initial RA. For example, if the initial RA is 972845236 then the new RA must be 792845263. If the initial RA is 984475213 then the new RA must be 894475231. The algorithm must read the initial RA and print the new RA.

### **Ex006**

Read 5 elements in an array A type vector.

Create a matrix B of the same dimension with the elements of matrix A multiplied by 3.

Display matrix B. Element B [1] should be implied by element A [1] \* 3,

element B [2] by element A [ 2] \* 3 and so on, up to 5.

#### **Ex007**

Read a vector-type matrix A with 6 elements. Create a matrix B of the same type, with each element in matrix B being the factorial of the corresponding element in matrix A. Display matrix B.

#### **Ex008**

Read two arrays A and B of the vector type with 5 elements each. Create a matrix C, where each element of A is the subtraction of the corresponding element of A with B. Display matrix C.

#### **Ex009**

Make a program that receives the month (from 1 to 12) as input and returns the name of the respective month. (Use switch / case)

#### **Ex010**

Read 12 elements of a vector-type matrix, put them in order decreasing and presenting the ordered elements.

#### **Ex011**

Read 8 elements in an array A type vector. Create a matrix B of the same dimension with the elements of the matrix multiplied by 5. Display matrix B in ascending order. Create a routine to search for the elements stored in matrix B.

#### **Ex012**

Read 2 matrix A and B, each of 2D with 5 rows and 3 columns. Create a matrix C of the same dimension, where C is formed by the sum of the elements of matrix A with the elements of matrix B. Display this matrix.

#### **Ex013**

Read a 1D matrix A with 10 elements. Create a 2D matrix B with 3 columns, where:

- The 1st column of matrix B is formed by the elements of matrix A plus 5;
  - the 2nd column is formed by the value of calculating the factorial of each corresponding element of matrix A;
  - the 3rd column should be formed by the squares of the corresponding elements of matrix A.
- Display matrix B.

#### **Ex014**

Read 2 matrix A and B, each with 1D for 4 elements. Create a 2D C matrix, where the 1st column of matrix C should be formed by the elements of matrix A multiplied by 2 and the 2nd column should be formed by the elements of matrix B subtracted from 5. Display matrix C.

#### **Ex015**

Develop a program that controls the bimonthly grades of 20 students in a classroom and that calculates the average of each student, and the student who obtains an average  $\geq 7.0$  will be considered approved. The program in question must perform the following routines:

a-register the 20 students and their grades

b-classify the registered students

c-correct students and / or grades that have been registered with errors

d-search students by name  
e-list approved students  
f-list failed students.

#### **Ex016**

elaborate a program that has a subroutine that performs and allows to display the total sum of the first N whole numbers, defined by an operator.  
 $(1 + 2 + 3 + \dots + N)$ .

#### **Ex017**

create a program that uses a subroutine to calculate the Fibonacci series of N terms. The series is formed by the sequence: 1,1,2,3,5,8,13,21,34 ... etc. It is characterized by the sum of a later term with its subsequent previous one.