



Algorithmic and Data Structures1 (ASD1)

Exercise Series N° 7

Exercise #1

An industrial carpentry manages a stock of wooden panels. Each panel has a width, length and thickness in millimetres, as well as the type of wood which can be pine (code 0), oak (code 1) or beech (code 2).

Write an algorithm that:

- Define a Panel structure containing all the information relating to a wooden panel.
- Entering and displaying a wooden panel.
- Calculate the volume in cubic meters of a panel.

Exercise #2

Write a program that allows you to fill a table of dimension N with patient information which is: the patient's name, weight (integer, in kg), height (integer, in cm) (N entered by the user); the program then displays the number of obese patients (BMI).

Fat mass is assessed from the calculation of the body mass index or BMI which takes into account weight and height.

$$BMI = \frac{\text{Weight in kg}}{(\text{height in meters})^2} \quad \text{Obese} \rightarrow BMI \geq 30$$

Exercise #3

Write a program which generates an array V of n integers then arranges the non-zero elements of the array in an array of structure T; a structure contains 3 fields defined according to the following principle:

- ValAbs: is the absolute value of a non-zero element of table V.
- Pos: its position (index).
- Sign: its sign; either "+" for a positive element or "-" for a negative element.

Finally the program iterates through T and displays these positive elements and their sum.

Example: if the user reads the following table V:

0	1	2	3	4	5	6	7
3	0	-8	-4	0	0	0	9

The program constructs the following table T:

0			1			2			3		
3	0	'+'	8	2	'-'	4	3	'-'	9	7	'+'
ValAbs	pos	signe	ValAbs	pos	signe	ValAbs	pos	signe	ValAbs	pos	signe

The program displays:

The positive elements of T are: 3 9 their sum: 12

Additional exercise

Consider the structure below; using the latter, write a C program which allows you to fill in a table suitable for n students, and subsequently:

- 1- Calculate the number of students who belong to the wilaya of M'sila?
- 2- Display students (first and last names) who study in the MI faculty and have the right to reside in the university campus (distance not less than 50 km for males and 35 km for females).
- 3- Calculate the number of students who are not entitled to university accommodation.

Note: Distances entered must be positive. Msila wilaya code =28.

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NumIns : string
Nom : string
Prenom : string
Genre : character (m/f)
Wilaya : integer
Distance : integer
Faculté : string

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Structure : Student