

TD 3 – Exercices « pqcr* »

**Pour Que Ca Rentre*

Exercises based on type

1-a Write the program that asks two integer numbers `n1` et `n2` to the user and then prints the summation, multiplication, division and modulo results of `n1` et `n2`.

1-b Ask the user a character (type **char**). Print its decimal value, hexadecimal value, ASCII character and the memory address of the variable as the example below:

```
Enter a character: Z
Decimal value: 90
Hexadecimal value: 5a
ASCII code: Z
Physical memory address: 0xbf8deb43
```

1-c Write the program that computes and prints the impedance of an electronic RC series circuit at a given frequency. This program also prints the impedance's modulus and argument.

1-d Write the program that asks you your name and wish you a nice day!

Functions exercises

2-a Write the function that evaluates for any given (x,y) the following expression :

$$f(x,y) = x^2 + y^2 + x.y + x + y$$

Give all values of f for any x and $y \in [-1;1]$ using 0.4 as step length.

2-b Write the function that determines if the input integer value is odd or even. The function returns 1 if its input value is odd, and 0 if it is even.

Test this function using an interactive main program. The main program will print if the number is “even” or “odd”.

2-c Write a procedure that asks for your birth date (3 integer values). Then, write a function that prints your date in using French name of month (01 → Janvier).

Test these 2 functions using a main program.

Static Array exercises

3-a In a main function, create an array of 10 `double` elements. Initialize all values to 0. Print all the values.

3-b Write and test a procedure that that prints one by one each character of a string.

3-c Write a procedure that prints the contents of an array of double. Modify this function in order to display first a string that represents the array name (this string will be a new input argument of the procedure, see question 3-b).

3-d Write a procedure that asks the user to enter each value of an array. The array is already allocated and its size is already known. Test this procedure.

3-e Write the function that computes the mean of an input array of integers (`int`).

3-f Write the function that computes the solution of $f(x)=0$ in the interval $x \in [x_{\min}; x_{\max}]$ using dichotomy approach. The function f will be a function of your choice (create it as in question 2-a). We assume that only one solution of $f(x)=0$ exists in the considered interval.

Algorithm Exercises

4-a Sorting algorithm: Write a function that sorts in an ascent order a sequence array of double (use the sorting algorithm you want: bubble, insertion sort, quick sort, ...).

4-b Write the function that computes the mean, the variance and the median value of an array.

4-c Write a program that tests if a number is prime or not.

4-d Write the **MinacWillans** function using n as integer input parameter, which returns the integer value $T(n)$ that is a prime number:

$$T(n) = 2 + n \cdot \left[\frac{1}{1 + \sum_{p=2}^{n+1} \left[(n+2)/p - \lfloor (n+1)/p \rfloor \right]} \right], \text{ for } n > 1$$

Attention:

- for $n = 0$, $T(0) = 2$
- for $n = 1$, $T(1) = 3$.

Write the program based on the **MinacWillans** function prints the nb first prime numbers computed by the function $T(n)$. « nb » should be enter by the user. Example of use:

Number of values (nb) : 6

$T(0) = 2$; $T(1) = 3$; $T(2) = 2$; $T(3) = 5$; $T(4) = 2$; $T(5) = 7$;

4-e Write the function that computes the histogram of an input array consisting of integer values. Deduce a sorting algorithm.