Larbi Ben M'hidi -Oum El Bouaghi- University

Faculty of Exact Sciences and Natural and Life Sciences

Mathematics and Computer Science Department

Level: 1st year "Computer Science & Mathematics"

Module: Algorithmic and Data Structures 2

TD n°3

Pedagogic objective

→ Manipulate recursive sub-algorithms.

Exercise n°1

Run the following recursive function (for n = 8, x = 5) and deduce what it is doing.

```
Function Product (n: integer, x: integer): integer;
Begin
 If (n > 0) then
    Write ("before call n=", n, ", x=", x );
    Product <- Product (n-1, x) + x;
    Write (" after call n=", n, "x= ", x);
 Else
    Product <- 0;
 Endif
End;
```

```
Begin /* main algorithm*/
n = 8, x = 5;
Write (n, '*', x, '=' ,Product (n, x));
END
```

Exercise n° 2

a. Write an iterative function that returns the quotient of the Euclidean division of an integer **a** by an integer **b** using successive subtraction.

b. Give the corresponding recursive function.

Exercise n°3

Write an algorithm that uses a recursive sub-algorithm to calculate the greatest common divisor (GCD) of two strictly positive integer values using the Euclid method.

Exercise n°4

a. Write a recursive function **Sum_Tab**, allowing you to calculate the sum of the elements of an array of integers.

b. Write a recursive procedure **Inverse_Tab ,** allowing you to reverse the elements of an array of integers.

c. Write an algorithm that uses the Sum-Tab and Inverse_Tab sub-algorithms.