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University of Msila **Department of Mathematics**
Level : 1st year Maths **Module** : **ASD2** 2023/2024

Chapter 1: Subprograms (Functions & Procedures)

Exercise series

TD

1. Write a subroutine that displays the multiples of an integer n that are between two limits a and b; test this procedure in the main function
2. Write a C program that finds the max of four integers using a function **Max** that finds the max of two integers.
3. Create a function that returns the number of letters in a character string passed as a parameter. Its prototype will be***: int numberLet(char text[]);*** .
4. Write a function that searches if a value is present in an array (integers). It will return (-1) if the value is not found and the position of the value in the array otherwise.
5. The following program calculates the number of digits of an integer; he uses a procedure for this reason.

```
#include<stdio.h>
void   myproc(int n , int s)
{      int s=0;
       while(n!=0) {
          s=s+1;
          n=n / 10;}          }
```

```
int main ( ){
int  a, x=0;
printf ( " enter a positive integer:  " ) ;
 scanf("%d",&a);
myproc(a,x);
printf (" the number  of digits of    %d is : %d ", a,x);  }
```

   - Execute the program and detect the error then correct it.
   - Replace the procedure with a function

6. Either the following function:

```
void conv (int n) {
  if (n<2)
       printf ("%d",n);
   Else    {conv (n/2) ;
             printf ("%d",n%2); }   }
```

   - Calculate conv(23)?
   - What does this function do?
   - Test this function in a main function.
   - Generalize this function to do other similar roles.

7. Write a recursive function ***Nb_div*** which calculates the number of divisors of a positive integer
   Write a function ***Is_prime*** which uses the ***Nb_div*** function to check if a positive integer is prime or not
   Write the ***main()*** function which tests the ***Is_prime*** function

TP

1. Write a subroutine which displays a number of seconds in minutes and seconds; test this subroutine in the main function.
2. Write a function that returns the integer part of a real number; use this function to check if the value of an entered real is integer or not.
3. write a procedure that returns the average of two real numbers using the following approaches:

– Utilizing a **global** variable
– Employing "**variable passing**"
– Rewrite this procedure as a **function**

4. Write a subroutine **sum_tab** that calculates the sum of the elements of a vector. Write a program that reads two vectors T1 and T2 and calculate their sum together.
5. Write a recursive function that calculates the GCD of two positive integers.
6. Write the function ***Puis(x:real, n: integer)*** which calculates X^n. use this function in a main function to calculate X^n for any value of X and n (write the function using two methods (iterative and recursive).

Homework

To be submitted before March 7, 2024

The owner of a safe has forgotten the code to open it. He still reminds me that:
– When it takes the number consisting of the thousands digit followed by the tens digit, then the ones digit and finally the hundreds digit of the code, the digits of this number are in ascending order and furthermore this number is prime.
– The sum of the digits of this number is equal to 27.
– The code is made up of 5 digits and in addition it is a perfect square.
Can you first help him find this code using:

- A recursive **Sumdig** function: to calculate the sum of the digits of an integer.
- A **Compose4** Function which composes a 4-digit number following the method cited above.
- A recursive **ascensOrder** function: to check that the digits of a number are in ascending order.
- A recursive function **isPerfectSq**: to check if a number is a perfect square.