



Level: 1st year “Computer Science”

Date: 18/01/2024

Module: Algorithmic and Data Structures 1

Duration: 1h30m

Exam n°1

Standard Correction

Exercise n°1

(Course questions) **(5 points)**

Q1. Check the correct answer, how are the elements of an array organized in RAM? **(0.25 point)**

- Randomly
- Contiguously
- The last element that is added into an array will be the first to come out
- Each programming language has its own way of organizing elements in any table

Q2. Determine the errors in the following C program, then write it correctly in the box opposite.

(1 point -0.25 for each error)

```
#include <stdio.h>
main( )
{
int digit, s;
float N;
s=0;
while( N!=0)
{
digit=N%10;
s+=digit ;
N=N/10;
}
printf ("%f \n", s);
}
```

```
#include <stdio.h>
main( )
{
int N, digit, s;
scanf ( "%d", &N);
s=0;
while( N!=0)
{
digit=N%10;
s+=digit ;
N=N/10;}
printf ("%d \n", s);
}
```

Q3. Complete, to increase the value of a counter, we use **an increment (++)**. **(0.25 point)**

Q4. What is the difference between the while loop and the repeat loop? **(0.5 point)**

While to express iterations in which **the first execution** of the body of the loop **is subject to a condition**, the number of executions can be =0.

Repeat to express iterations in which the first execution of the body of the loop is not subject to a condition, **the body of the loop executes at least once**.

Q5. What are the following functions: **(0.75 point / 0.25 for each function)**

- **Length ()** : it provides the length of string.

- **sqrt()** : function returns the square root of a real number.
- **abs()** : function returns the absolute value of a real number .
- **Q6.** Check the correct answer, what does a matrix represent in algorithms? **(0.25 point)**
 - Multidimensional array.
 - Two-dimensional array.

Q7. Type_Month = (JANUARY, FEBRUARY, ..., DECEMBER). Type_Month is an enumerated type, is this declaration correct? Explain
 This declaration is not correct **(0.25 point)** because it is necessary to list all the values. **(0.5 point). Correct declaration**

Type_Month = (JANUARY, FEBRUARY, MARCH, APRIL, MAY, JUNE, JULY, AUGUST, SEPTEMBER, OCTOBER, NOVEMBER, DECEMBER);

Q8. Complete, a set of values with the same variable name, the same type and identified by a number, is called **an array (0.25 point)**

Q9. Declare new types or structures that make it possible to store a basketball player, who is characterized by his name, his date of birth, his nationality, and his height. **(1 point)**

```
Type N_Date= Record
    Day : integer ;
    Month: integer;
    Year: integer;
EndRecord
```

```
Type player =Record
    Name : string ;/Name :array [1..20] character ;
    Data: N_Date;
    Nationality: string;
    Size: real;
EndRecord
```

Exercise n°2 (5 points)

1.

```
Algorithm calculator;
Variables A, B, C: integer; } (0.5 point)
    op: character; }
Begin
Write (“Enter two integers”); } (0.5 point)
Read (A,B);
Write (“Enter the operator”);
Read (op);
```


Begin

Write (" Enter a natural integer");

Read (X);

CP ← False ; i ← 0 ;

While ((i ≤ X div 2) and (CP=false)) **do**

If (X=(i*i)) **then**

 CP ← True ;

 RC ← i;

Endif

 i ← i+1 ;

endwhile

If (CP=true) **then**

 Write ("The given number is a perfect square and its root is , RC);

else

 Write ("The given number is not a perfect square);

endif

End

(0.5 point)

(2 points)

(1 point)

Exercise n°4

(6 points)

Algorithm Succession_three_values ;

Variables T :array[1..150] integer ;

 i, n, V1, V2, V3, NBrep :integer ;

Begin

Repeat

 Write ("Give the size of the array n ≤ 150");

 Read (n) ;

Until (n > 0 and n ≤ 150)

For i ← 1 à n **do**

 Read (T[i]) ;

Endfor

Write ("Give the values V1, V2 and V3");

Read (V1, V2, V3);

(0.5 point)

(0.5 point)

(1 point)

(0.5 point)

```
i←1; NBrep←0;
While (i<n) do
  If (T[i]=V1 and T[i+1]=V2 and T[i+2]=V3) then
    NBrep← NBrep+1 ;
    i←i+3;
  else
    i←i+1
  Endif
Endwhile
Write (“Number of successions of values“,V1, V2, V3, “ is “,NBrep) ;
End
```

(3.5 points)