

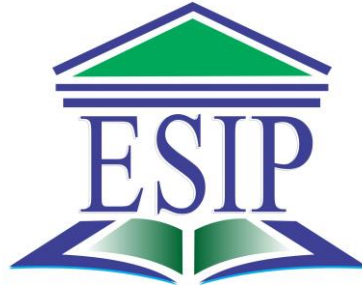
Tunisian republic

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State-approved Private Higher  
Education Institution Under No. 05-  
2013



الجمهورية التونسية

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المدرسة العليا الخاصة للمهندسين بقفصة

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مؤسسة جامعية خاصة مرخص لها من طرف  
الدولة تحت عدد: 05-2013

## EXAMEN Session S1

<b>Module :</b>	Numerical algorithmic	<b>Level:</b>	1
<b>Year</b>	2021/2022	<b>Duration:</b>	02H00
<b>Documents:</b>	Not authorized	<b>N° pages:</b>	2 pages

<i>Exercise</i>	<i>1(6pts)</i>	<i>2(4pts)</i>	<i>3(6pts)</i>	<i>4(4pts)</i>
<i>C.L.Os Assesment</i>	<i>K1, S1,</i>	<i>K1, S2,</i>	<i>S2, V1</i>	<i>V1 ; V4</i>

### Exercise 1 (6pts):

1. Write the function **MaxVal** which calculates the Maximum value of the three real numbers X, Y and Z
2. Write the function **MinVal** which calculates the minimum value of the three real numbers X, Y and Z
3. Write a program that displays the results of these two functions. The parameters will be entered on the keyboard with the input function from the main program.

### Exercise 2 (4pts):

Let consider the following function:

$$H(x) = \frac{2x+5}{x^5+5x^4+3x^2+4}$$

1. Write a Matlab code that breaks down a rational fraction into simple elements of H(x).
2. Assuming that the result of this code is the following:

r =  
-2.0000  
3.0000  
2.0000  
-5.0000  
1.0000

p =  
-4.0000  
5.0000  
-2.0000  
-3.0000  
0

k =  
3  
-2

Determine the mathematical formula of this decomposition.

### Exercise 3(6pts):

1. Write MATLAB code that allows you to:
2. Enter the polynomials:  $f(x) = 3x^4 - 2x^3 + 2$   
 $g(x) = 2x^2 + 5x$
3. Calculate the product  $f \cdot g$ .
4. Calculate the quotient and remainder of  $f$  by  $g$ .
5. Calculate the roots of  $f$  and  $g$ .
6. Plot on the same figure the curves representing the functions  $f$  and  $g$  for  $x$  ranging from 0 to 20 and using 30 points in the plot function.

### Exercise 4 (4pts):

Consider the following processing function saved in the `processing.m` file.

```
function [v, n, ares, bres] = traitement(a,b,c)
index =2;
tmp = a(index);
a(index) = b(index);
b(index) = tmp;
d = (a + b)/c;
e = b./a;
v=[1 5 -6 7 -3 0];
n=length(v);

for i=1 : n
    if v(i)<0
        v(i)=2*v(i);
    else
        v(i)= v(i)/2;
    end
end

ares = a;
bres = b ;
```

After executing the following command lines in the Matlab command window, in the directory containing the `processing.m` file,

```
>> a = [10 20 15 17 30];
>> b = [11 12 14 13 25];
>> c = 3;
>> d = 2;
>> e = 75;
>> [v, n, a, b] = traitement(a,b,c);
```

What are the variables  $a$ ,  $b$ ,  $v$  and  $n$ ?

**Good work**