

PRÁCTICA Nº 3

CÓDIGO SAGA

A25984-5

Calificación

CARRERA:

INGENIERÍA DE SISTEMAS

ASIGNATURA:

MÉTODOS NUMÉRICOS

FECHA DE ENTREGA: 12/04/2023

Apellidos y Nombres: Gutiérrez Castro Huáscar Aarón

C.I: 9951591 LP

CURSO: 4to "A"

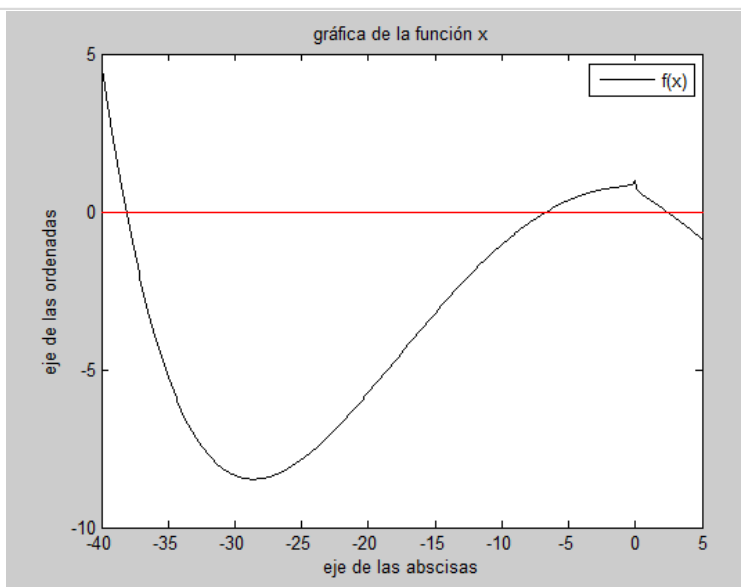
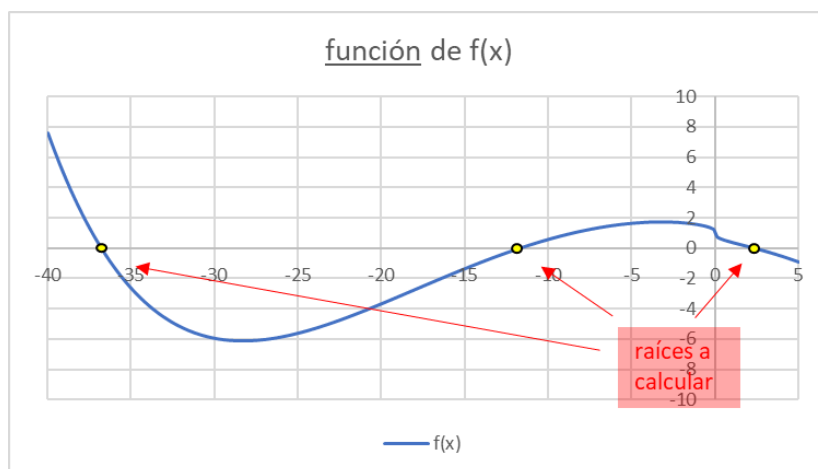
DOCENTE: M. Sc. Ing. Ariel Villca Paye

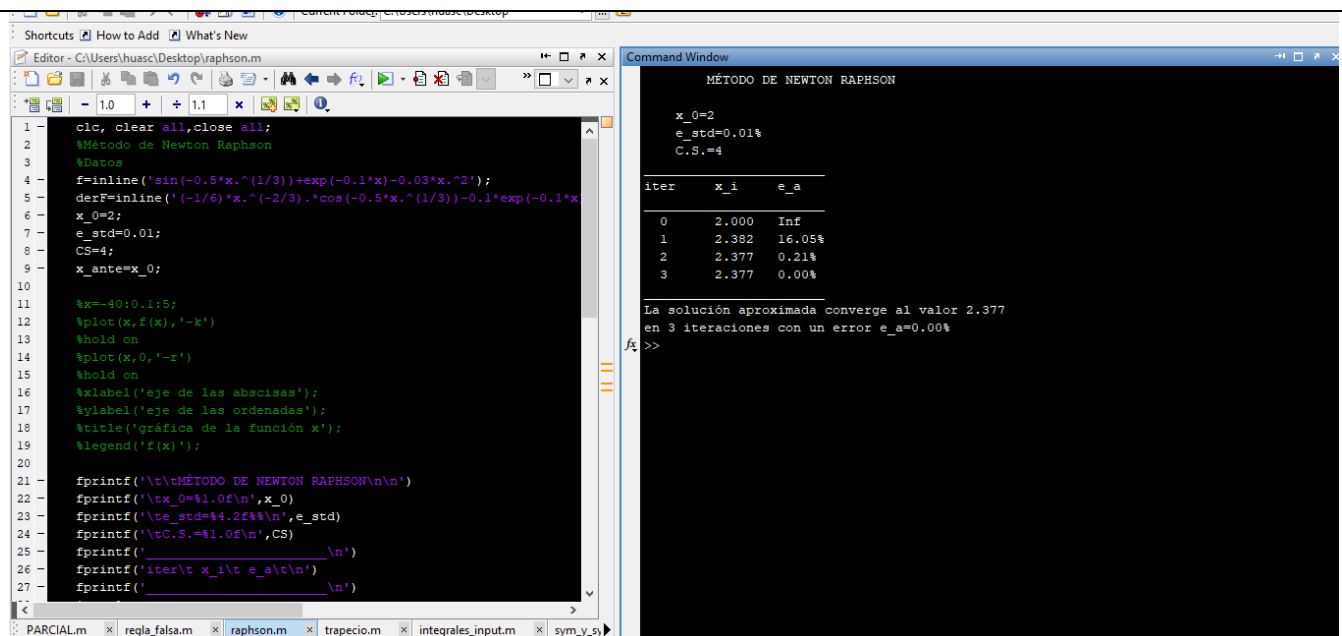
Problema 1

Hallar las raíces de la siguiente función:

$$f(x) = \sin(-0,5 * x^{(1/3)}) + e^{(-0.1x)} - 0.03x^2$$

- Gráfico





- X₁

Método de Newton Rapson

Datos

$$f(x) = \sin(-0.5x^{\frac{1}{3}}) + e^{-0.1x} - 0.03x^2$$

solucion: $x_i - f(x)/f'(x)$

$$f(x) = \sin(-0.5x^{1/3}) + \exp(-0.1x) - 0.03x^2$$

$$\epsilon_{std} = 0.01\%$$

$$C.S. = 4$$

$$x_0 = 2$$

iter	x _a	ε _a	ε _a < ε _{std}
0	2.000	/	/
1	2.382	16.05%	siguiterando
2	2.377	0.21%	siguiterando
3	2.377	0.00%	Valor verdadero
4	2.377	0.00%	Valor verdadero
5	2.377	0.00%	Valor verdadero
6	2.377	0.00%	Valor verdadero

Gráfico de la serie

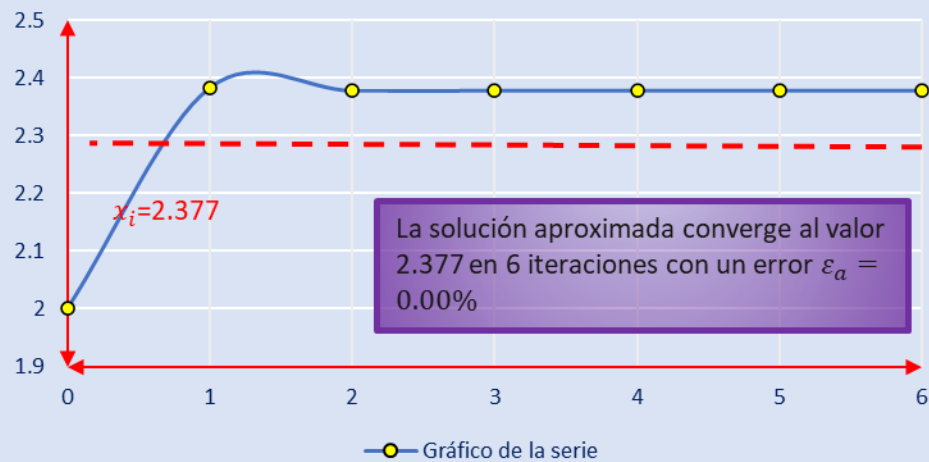
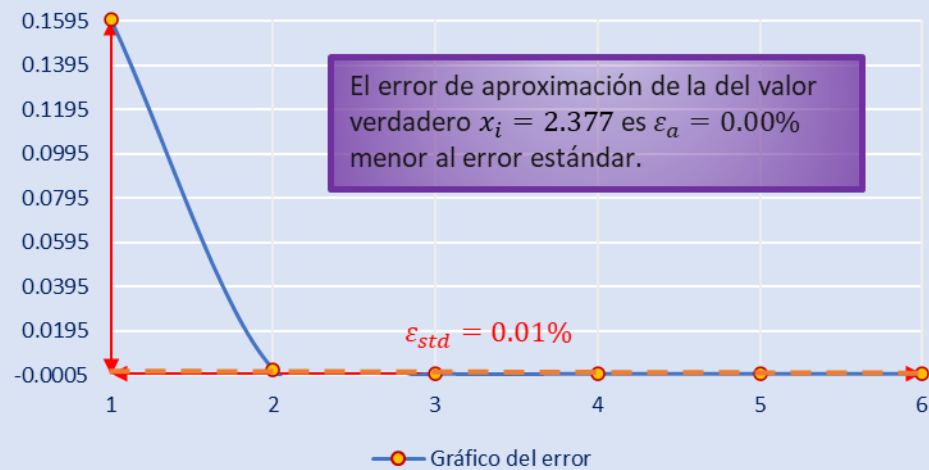


Gráfico del error

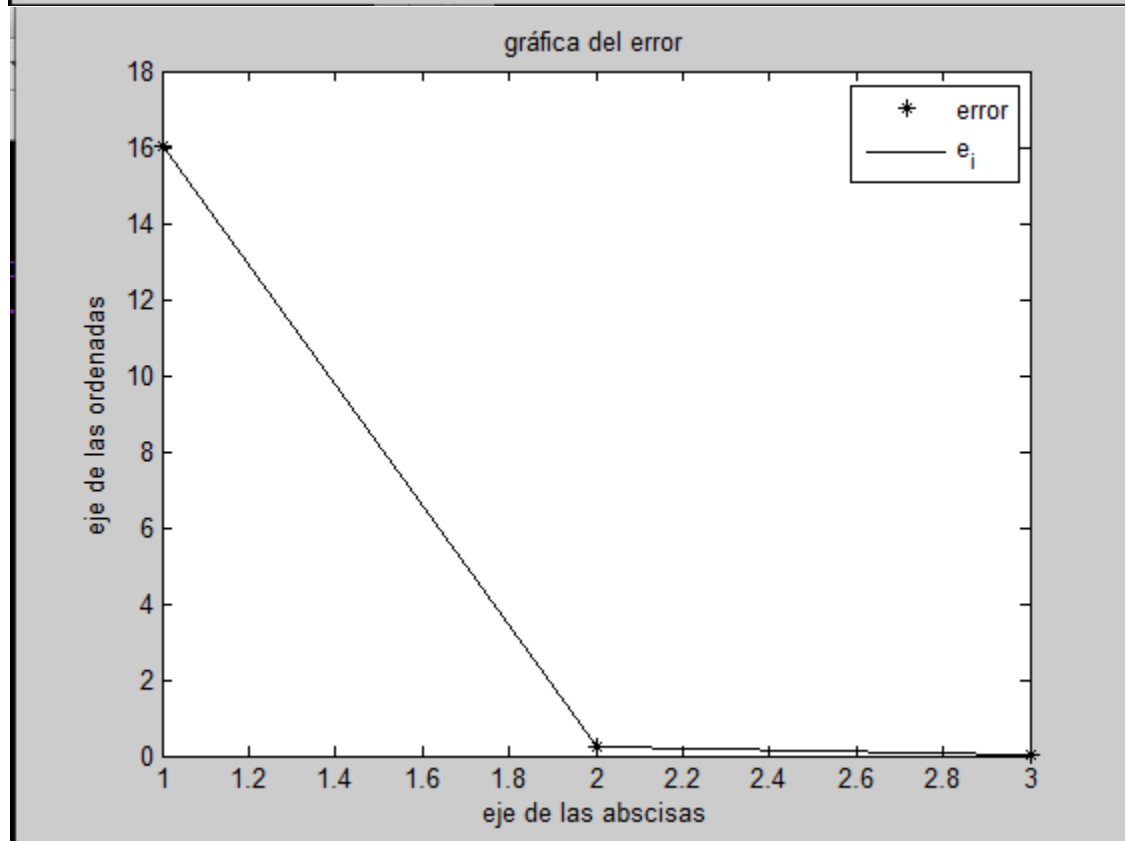
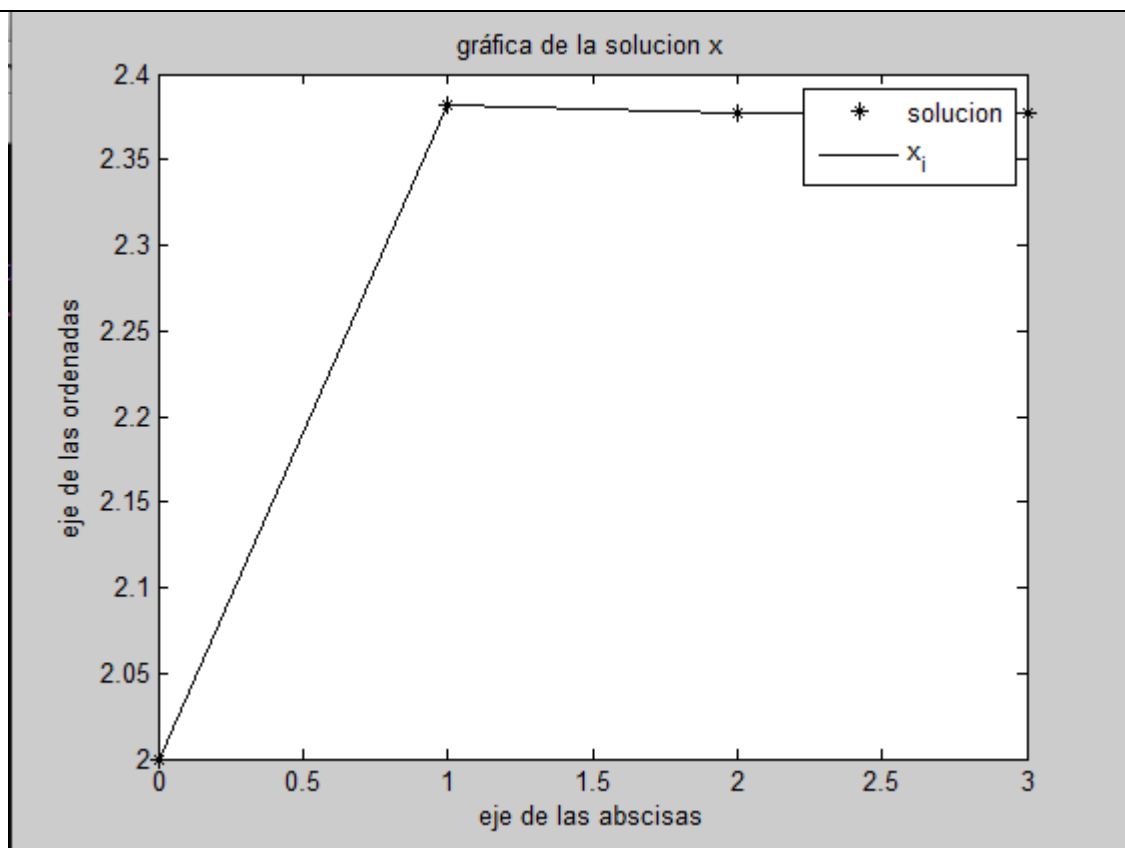


MÉTODO DE NEWTON RAPHSON

```
x_0=2
e_std=0.01%
C.S.=4
```

iter	x_i	e_a
0	2.000	Inf
1	2.382	16.05%
2	2.377	0.21%
3	2.377	0.00%

```
La solución aproximada converge al valor 2.377
en 3 iteraciones con un error e_a=0.00%
>> |
```



- X_2

Método de Newton Rapson

Datos

$$f(x) = \sin(-0.5x^{1/3}) + e^{-0.1x} - 0.03x^2$$

solucion: $x_i - f(x)/f'(x)$

$$f(x) = \sin(-0.5x^{1/3}) + \exp(-0.1x) - 0.03x^2$$

$$\epsilon_{std} = 0.01\%$$

$$C.S. = 4$$

$$x_0 = -11$$

iter	x_a	ϵ_a	$\epsilon_a < \epsilon_{std}$
0	-11.000	/	/
1	-11.786	6.67%	siga iterando
2	-11.760	0.22%	siga iterando
3	-11.760	0.00%	Valor verdadero
4	-11.760	0.00%	Valor verdadero
5	-11.760	0.00%	Valor verdadero
6	-11.760	0.00%	Valor verdadero

Gráfico de la serie

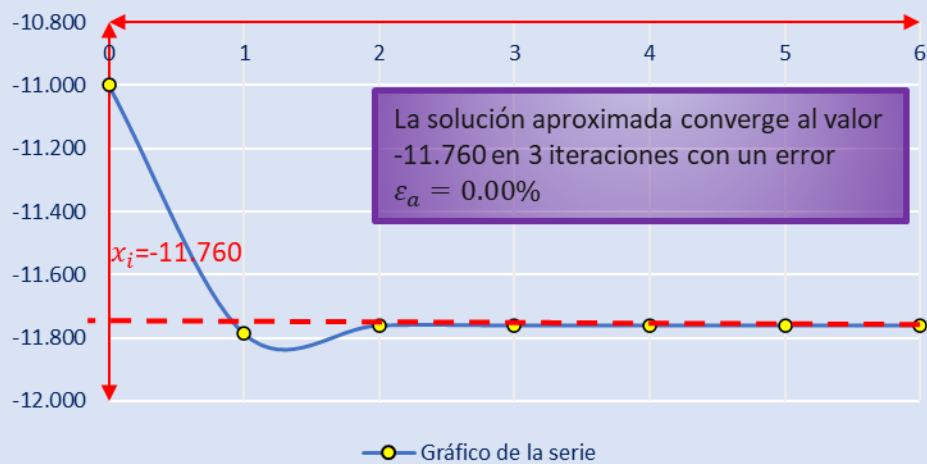
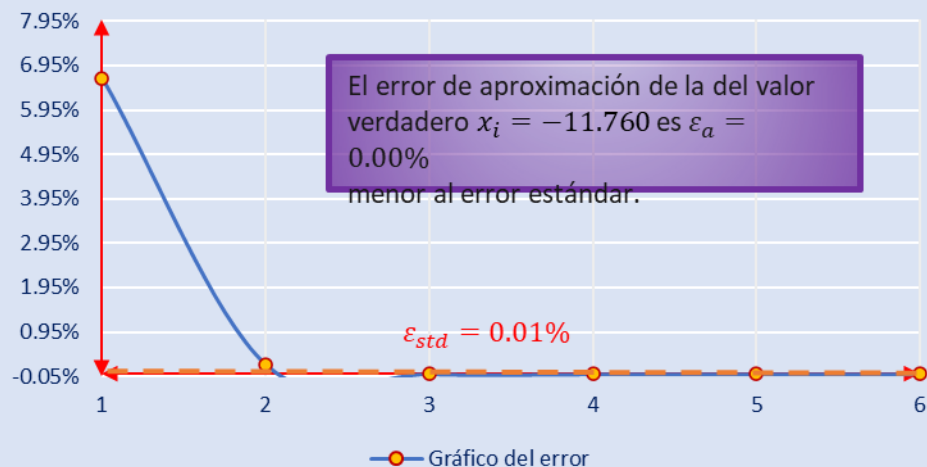


Gráfico del error

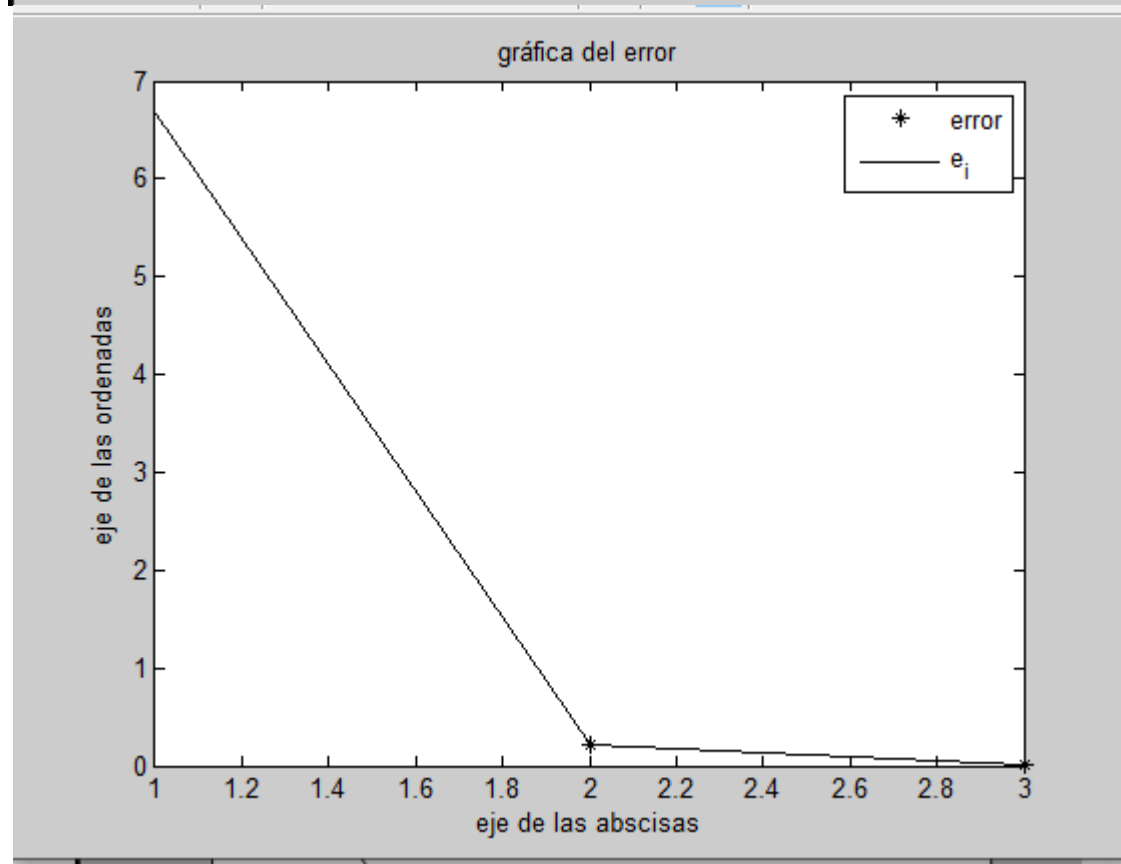
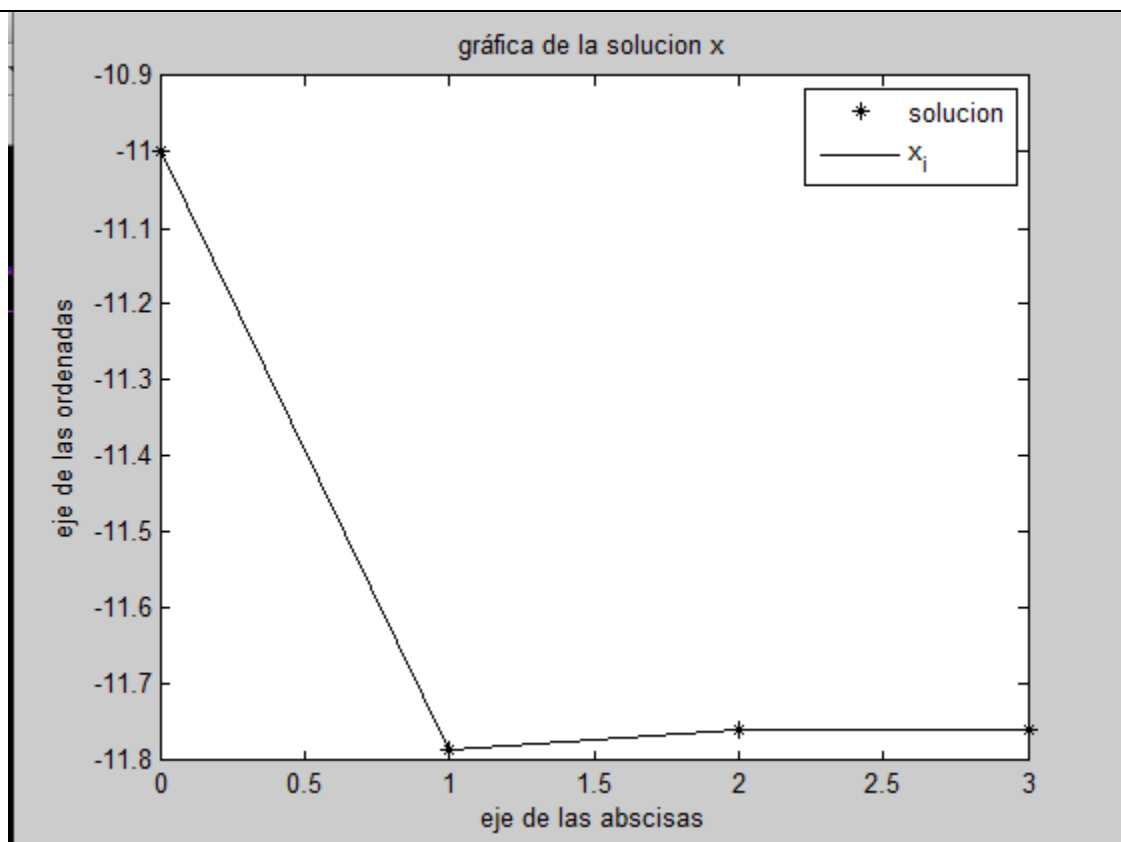


MÉTODO DE NEWTON RAPHSON

```
x_0=-11  
e_std=0.01%  
C.S.=4
```

iter	x_i	e_a
0	-11.000	Inf
1	-11.786	6.67%
2	-11.760	0.22%
3	-11.760	0.00%

La solución aproximada converge al valor -11.760
en 3 iteraciones con un error e_a=0.00%
>>



- X_3

Método de Newton Rapson

Datos

$$f(x) = \sin(-0.5x^{1/3}) + e^{-0.1x} - 0.03x^2$$

solucion: $x_i - f(x)/f'(x)$

$$f(x) = \sin(-0.5x^{1/3}) + \exp(-0.1x) - 0.03x^2$$

$$\epsilon_{std} = 0.01\%$$

$$C.S. = 4$$

$$x_0 = -36$$

iter	x_a	ϵ_a	$\epsilon_a < \epsilon_{std}$
0	-36.000	/	/
1	-36.857	2.33%	siguiterando
2	-36.792	0.18%	siguiterando
3	-36.791	0.00%	Valor verdadero
4	-36.791	0.00%	Valor verdadero
5	-36.791	0.00%	Valor verdadero
6	-36.791	0.00%	Valor verdadero

Gráfico de la serie

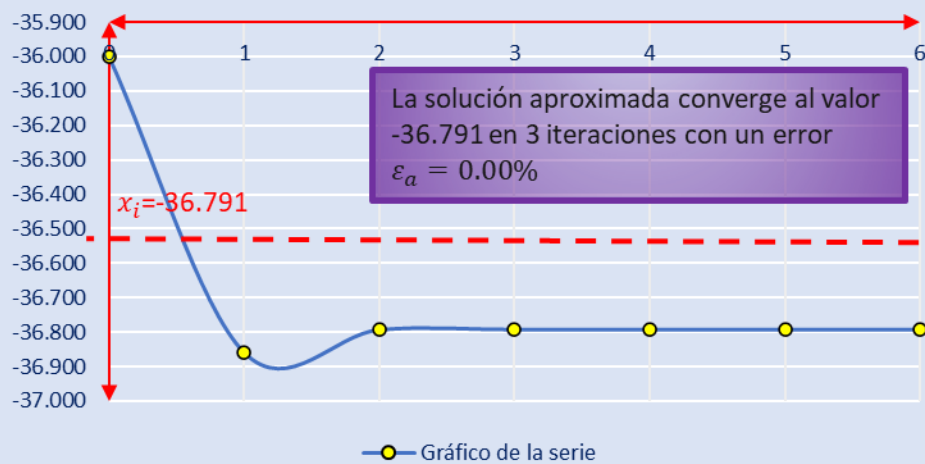
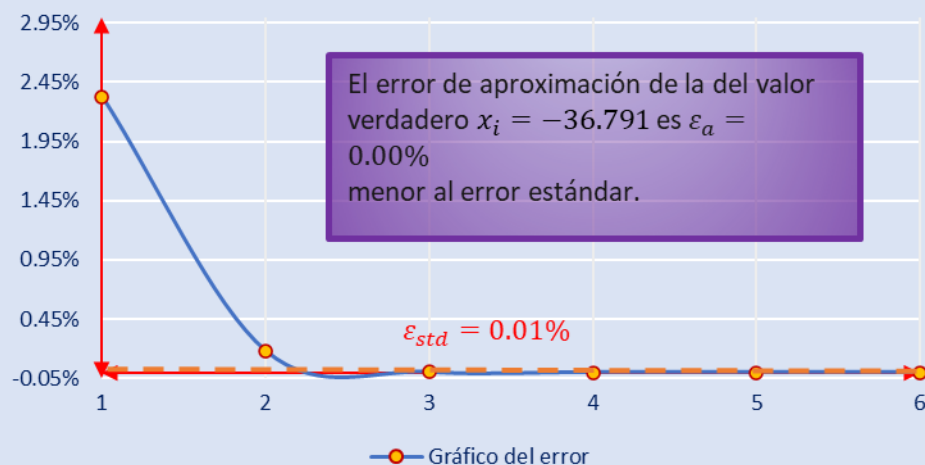


Gráfico del error

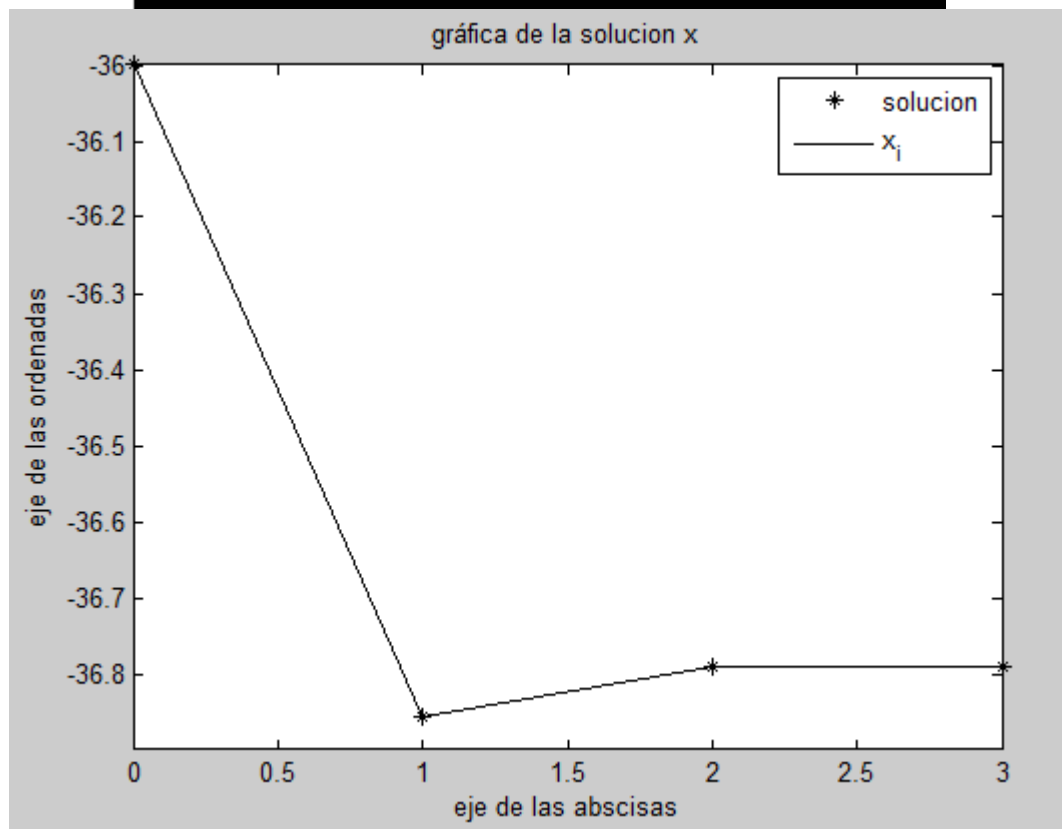


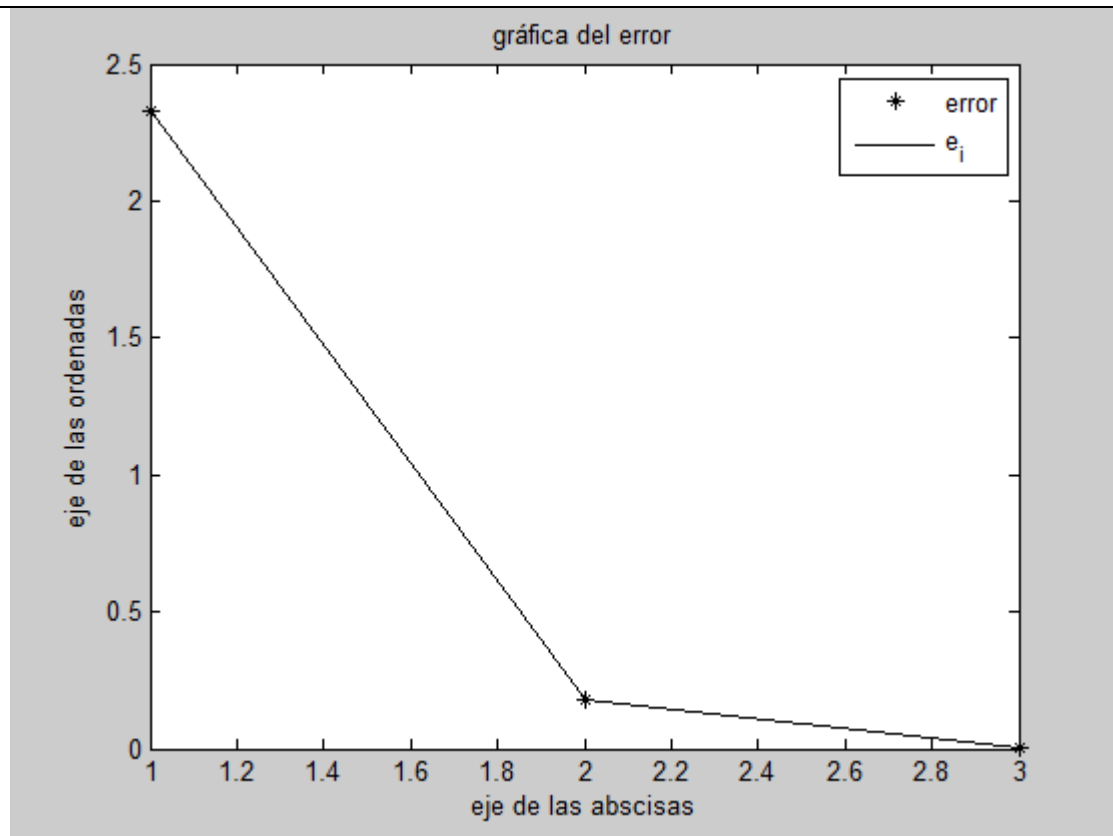
MÉTODO DE NEWTON RAPHSON

$x_0 = -36$
 $e_{std} = 0.01\%$
 $C.S. = 4$

iter	x_i	e_a
0	-36.000	Inf
1	-36.857	2.33%
2	-36.792	0.18%
3	-36.791	0.00%

La solución aproximada converge al valor -36.791
en 3 iteraciones con un error $e_a = 0.00\%$
>>





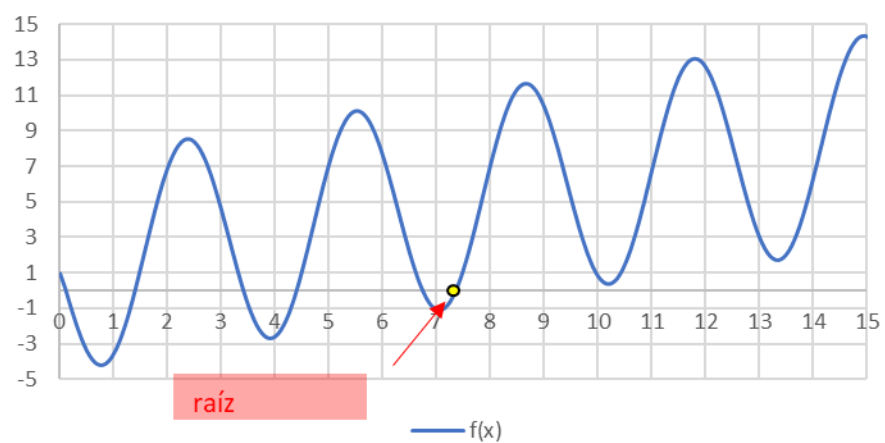
Problema 2

Hallar la raíz real positiva más grande de la siguiente función:

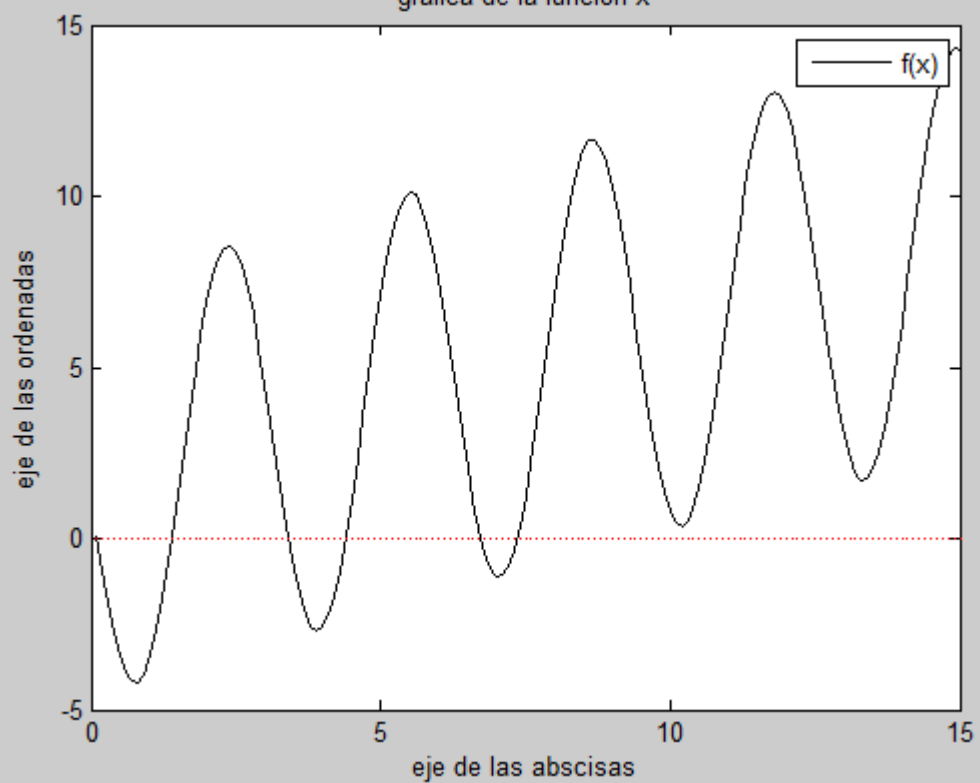
$$f(x) = \sqrt{(3x^{1.25}) + 2e - 0.5x - 6\sin(2x) - \pi/3}$$

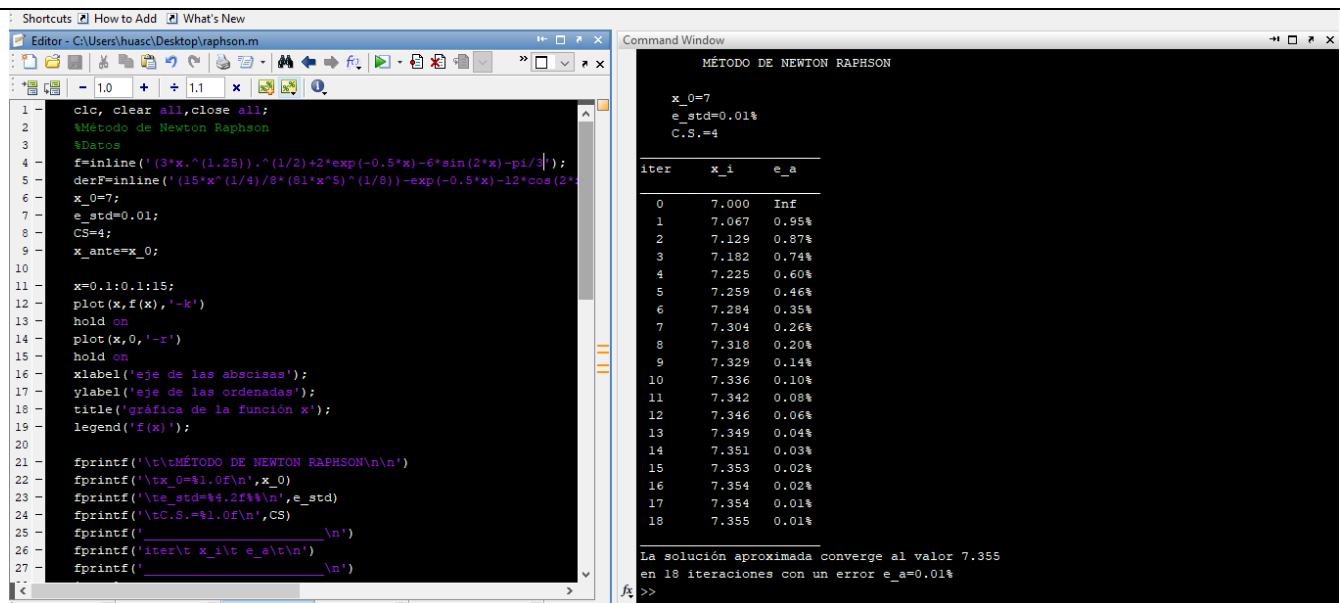
- EXCEL
 - Gráfico

función de $f(x)$



gráfica de la función x





X

Método de Newton Rapson

Datos

$$f(x) = \sqrt{(3x^{1.25}) + 2e^{(-0.5x)} - 6\sin(2x) - \pi/3}$$

$$f'(x) = \text{SQRT}(3x^{1.25}) + 2 \cdot \text{EXP}(-0.5x) - 6 \cdot \text{SIN}(2x) - \text{PI}() / 3$$

$$\epsilon_{\text{std}} = 0.01\%$$

$$\text{C.S.} = 4$$

$$x_0 = 7$$

iter	x_a	ϵ_a	$\epsilon_a < \epsilon_{\text{std}}$
0	7.000	/	/
1	7.067	0.95%	siguiterando
2	7.129	0.87%	siguiterando
3	7.182	0.74%	siguiterando
4	7.225	0.60%	siguiterando
5	7.259	0.46%	siguiterando
6	7.284	0.35%	siguiterando
7	7.304	0.26%	siguiterando
8	7.318	0.20%	siguiterando
9	7.329	0.14%	siguiterando
10	7.336	0.10%	siguiterando
11	7.342	0.08%	siguiterando
12	7.346	0.06%	siguiterando
13	7.349	0.04%	siguiterando
14	7.351	0.03%	siguiterando
15	7.353	0.02%	siguiterando
16	7.354	0.02%	siguiterando
17	7.354	0.01%	siguiterando
18	7.355	0.01%	siguiterando
19	7.355	0.01%	siguiterando
20	7.356	0.00%	Valor verdadero

Gráfico de la serie

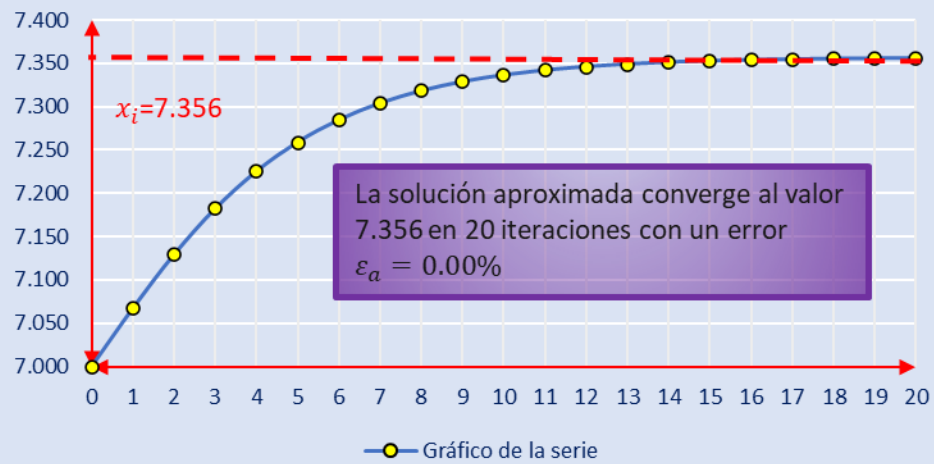
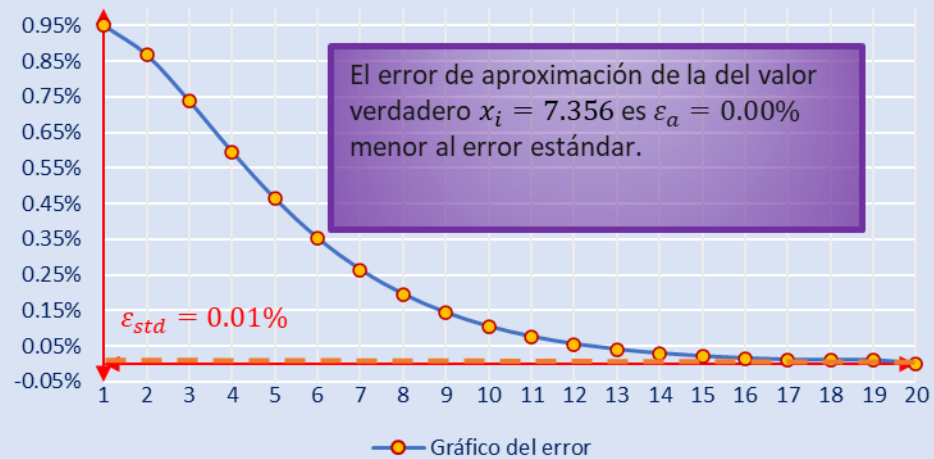


Gráfico del error

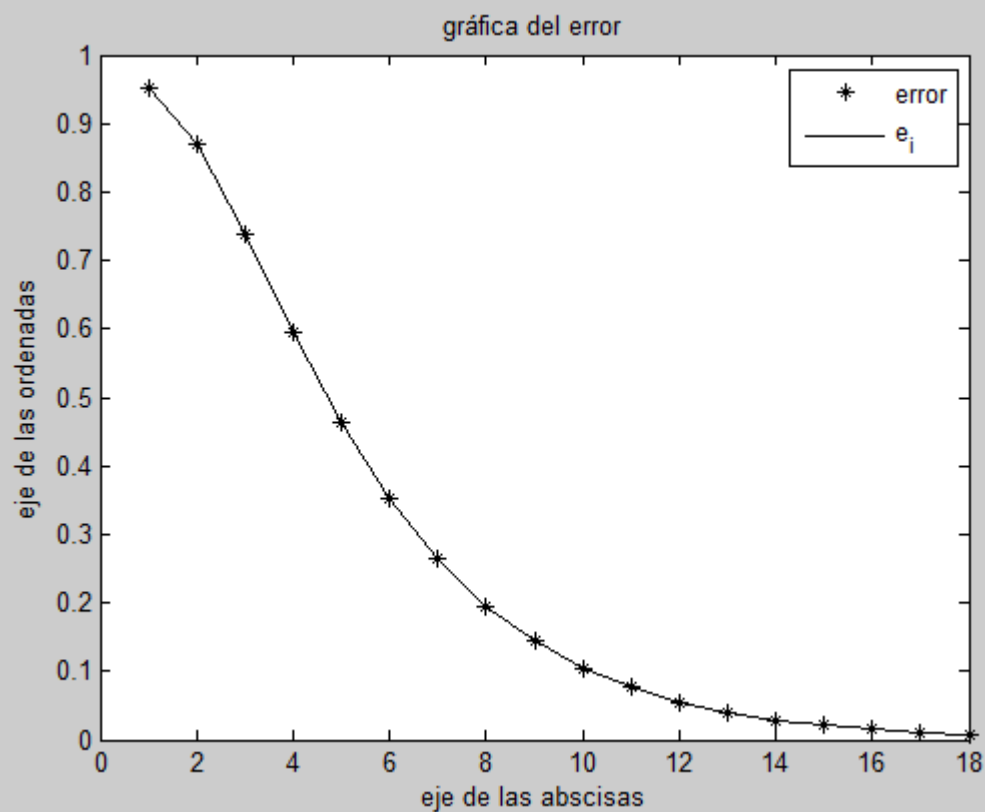
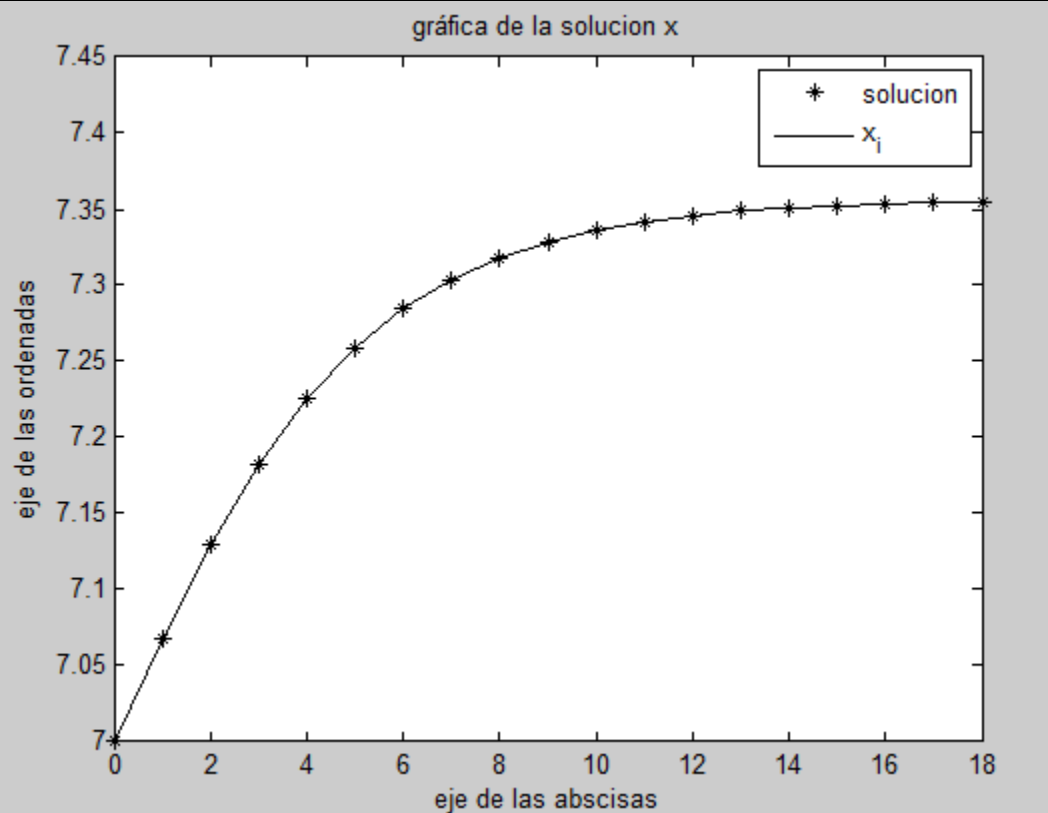


MÉTODO DE NEWTON RAPHSON

x_0=7
e_std=0.01%
C.S.=4

iter	x_i	e_a
0	7.000	Inf
1	7.067	0.95%
2	7.129	0.87%
3	7.182	0.74%
4	7.225	0.60%
5	7.259	0.46%
6	7.284	0.35%
7	7.304	0.26%
8	7.318	0.20%
9	7.329	0.14%
10	7.336	0.10%
11	7.342	0.08%
12	7.346	0.06%
13	7.349	0.04%
14	7.351	0.03%
15	7.353	0.02%
16	7.354	0.02%
17	7.354	0.01%
18	7.355	0.01%

La solución aproximada converge al valor 7.355
en 18 iteraciones con un error e_a=0.01%
>>

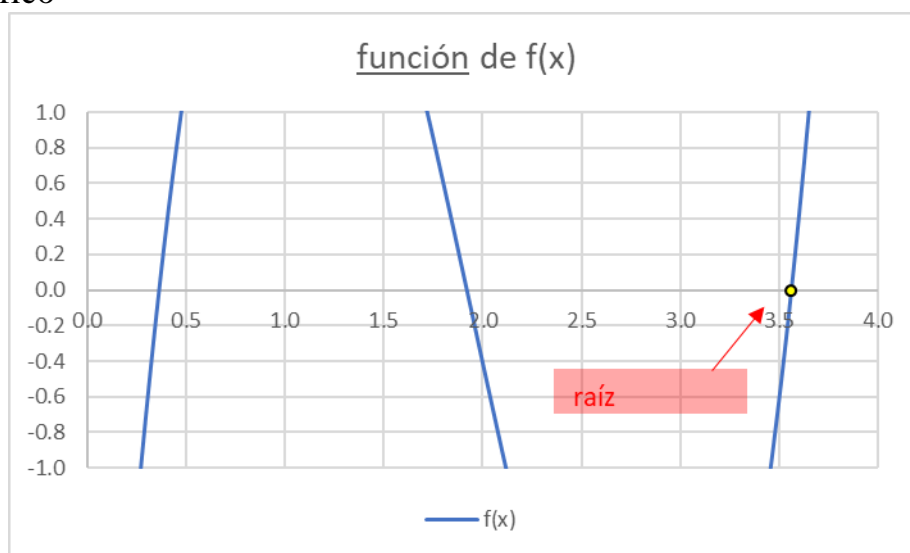


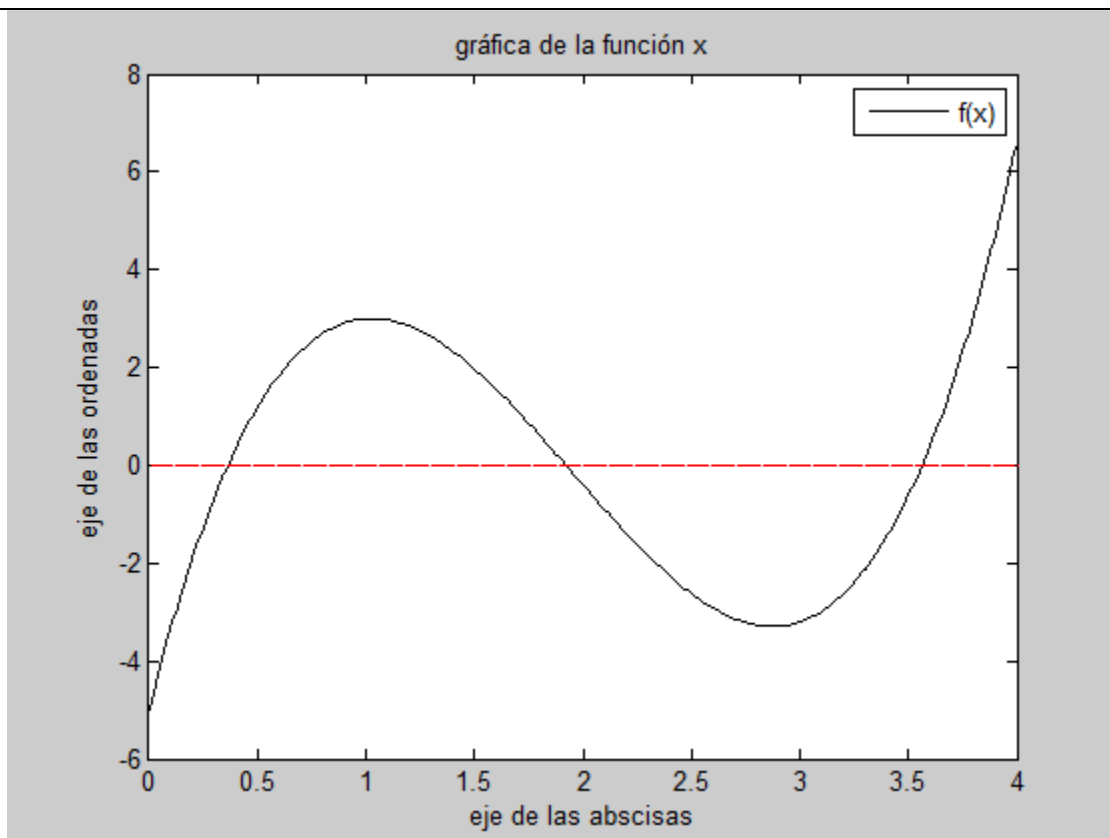
Problema 3

Determine la raíz real más grande de:

$$f(x)=2x^3-11.7x^2+17.7x-5$$

- EXCEL
 - Gráfico





```

1 clc, clear all, close all;
2 %Método de Newton Raphson
3 %Datos
4 f=inline('2*(x.^3)-11.7*x.^2+17.7*x-5');
5 derF=inline('6*x.^2-23.4*x+17.7');
6 x_0=3;
7 e_std=0.1;
8 CS=5;
9 x_ante=x_0;
10
11 x=0:0.1:15;
12 plot(x,f(x),'-k');
13 hold on
14 plot(x,0,'-r');
15 hold on
16 xlabel('eje de las abscisas');
17 ylabel('eje de las ordenadas');
18 title('gráfica de la función x');
19 legend('f(x)');
20
21 fprintf('\t\tMÉTODO DE NEWTON RAPHSON\n\n')
22 fprintf('\tx_0=%1.0f\n',x_0)
23 fprintf('\te_std=%4.2f%%\n',e_std)
24 fprintf('\tCS=%1.0f\n',CS)
25 fprintf('\n')
26 fprintf('iter\t x_i\t e_a\t\n')
27 fprintf('\n')

```

Command Window

MÉTODO DE NEWTON RAPHSON

x_0=3
e_std=0.10%
C.S.=5

iter	x_i	e_a
0	3.0000	Inf
1	5.1333	41.6%
2	4.2698	20.2%
3	3.7929	12.6%
4	3.5998	5.4%
5	3.5643	1.0%
6	3.5632	0.0%

La solución aproximada converge al valor 3.5632 en 6 iteraciones con un error e_a= 0.0%

f >>

• X

Método de Newton Rapson

Datos

$$f(x) = 2x^3 - 11.7x^2 + 17.7x - 5$$

$$f(x) = 2*(x^3) - 11.7*x^2 + 17.7*x - 5$$

$$\epsilon_{std} = 0.1\%$$

$$C.S. = 5$$

$$x_0 = 3$$

iter	x_a	ϵ_a	$\epsilon_a < \epsilon_{std}$
0	3.0000	/	/
1	5.1333	41.6%	sigla iterando
2	4.2698	20.2%	sigla iterando
3	3.7929	12.6%	sigla iterando
4	3.5998	5.4%	sigla iterando
5	3.5643	1.0%	sigla iterando
6	3.5632	0.0%	Valor verdadero
7	3.5632	0.0%	Valor verdadero
8	3.5632	0.0%	Valor verdadero

Gráfico de la serie

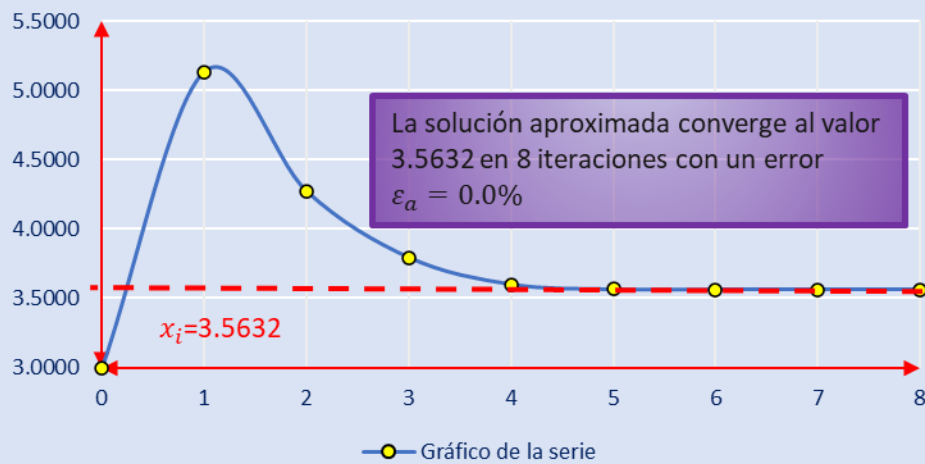
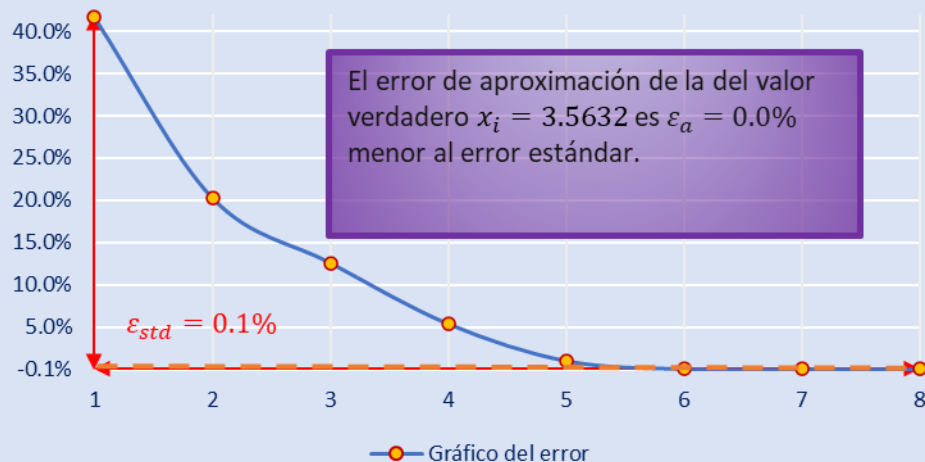


Gráfico del error



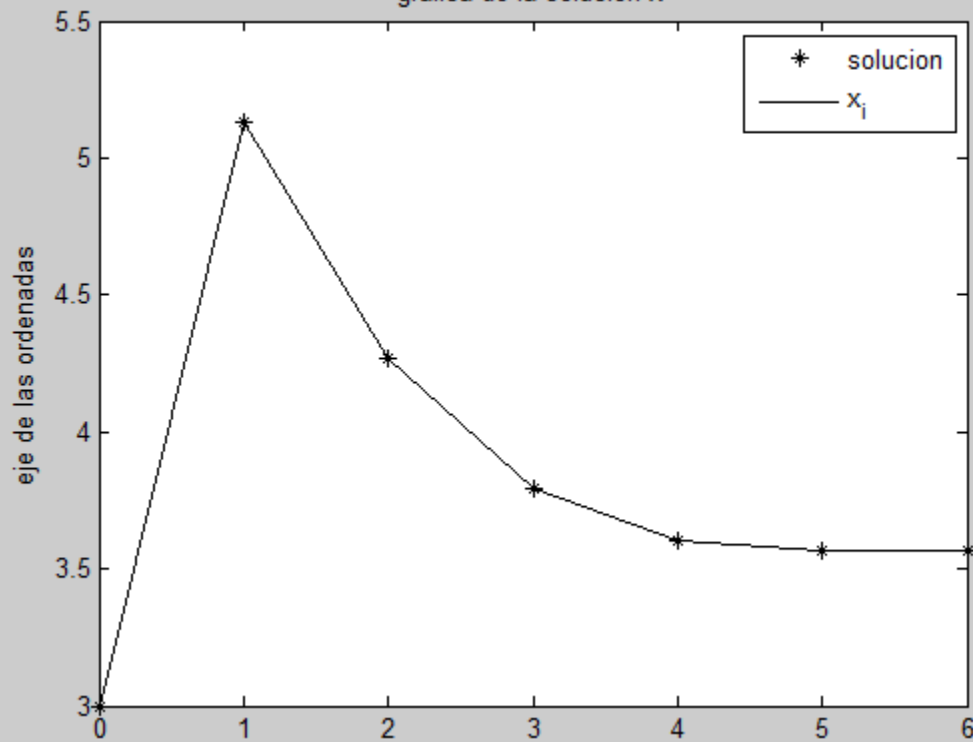
MÉTODO DE NEWTON RAPHSON

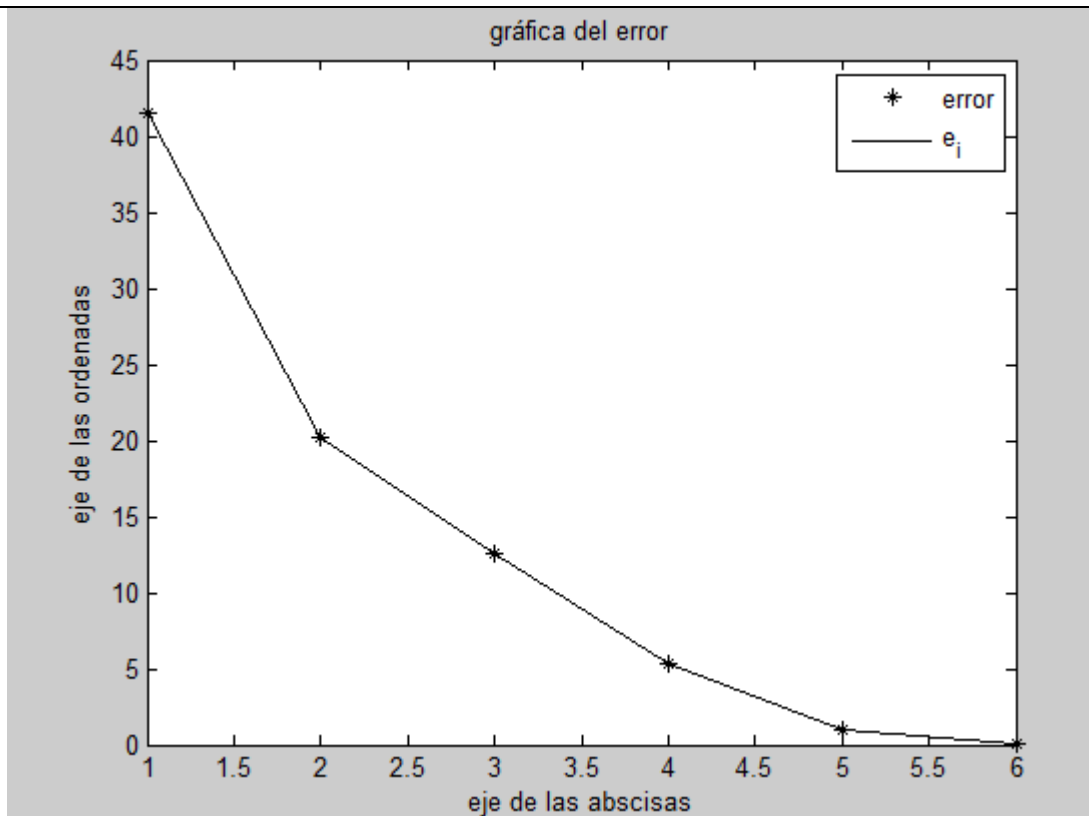
$x_0=3$
 $e_{std}=0.10\%$
C.S.=5

iter	x_i	e_a
0	3.0000	Inf
1	5.1333	41.6%
2	4.2698	20.2%
3	3.7929	12.6%
4	3.5998	5.4%
5	3.5643	1.0%
6	3.5632	0.0%

La solución aproximada converge al valor 3.5632
en 6 iteraciones con un error $e_a= 0.0\%$
>>

gráfica de la solución x





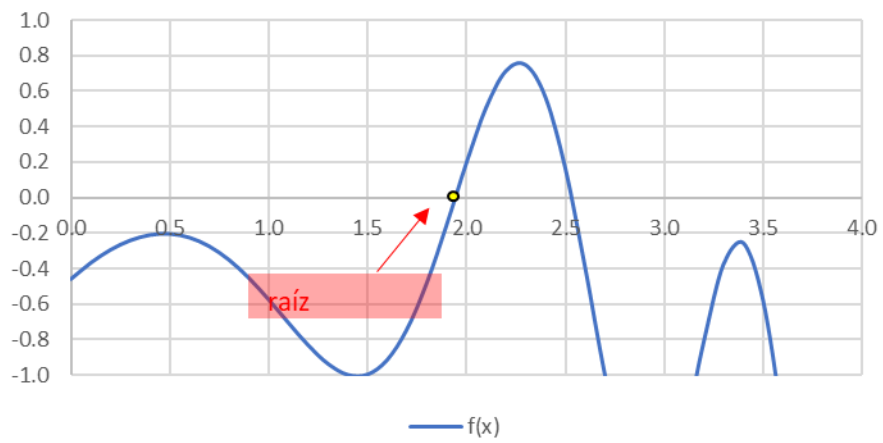
Problema 4

Localice la primera raíz positiva de:

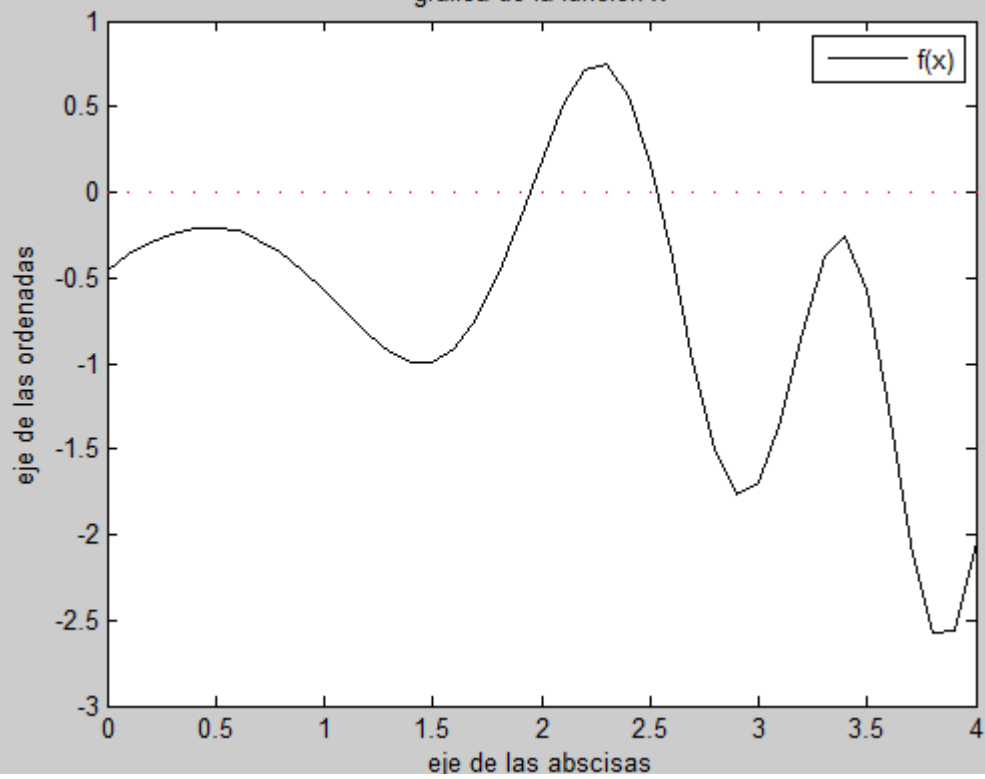
$$f(x) = \sin(x) + \cos(1+x^2) - 1$$

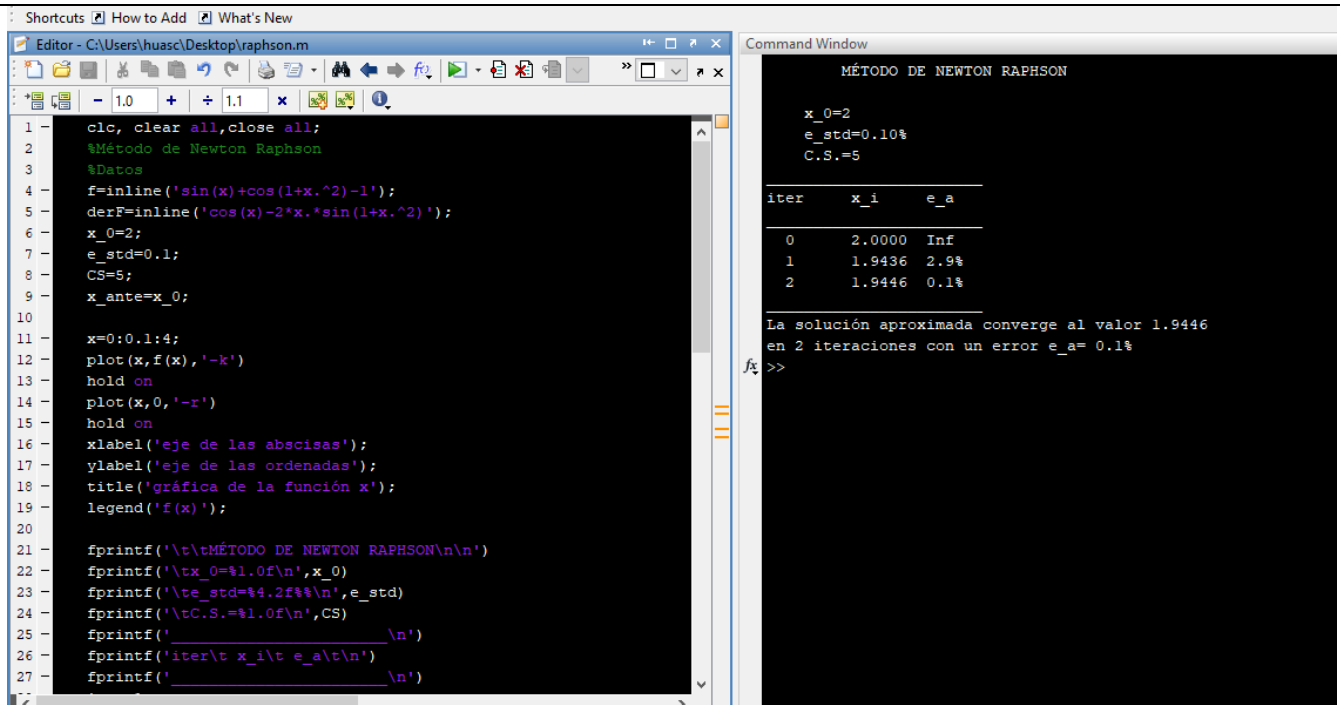
- EXCEL
 - Gráfico

función de $f(x)$



gráfica de la función x





- X

Método de Newton Rapson

Datos

$$f(x) = \sin(x) + \cos(1+x^2) - 1$$

$$f(x) = \sin(x) + \cos(1+x^2) - 1$$

$$\epsilon_{std} = 0.1\%$$

$$C.S. = 5$$

$$x_0 = 2$$

iter	x_a	ϵ_a	$\epsilon_a < \epsilon_{std}$
0	2.0000	/	/
1	1.9436	2.9%	siga iterando
2	1.9446	0.1%	siga iterando
3	1.9446	0.0%	Valor verdadero
4	1.9446	0.0%	Valor verdadero
5	1.9446	0.0%	Valor verdadero
6	1.9446	0.0%	Valor verdadero
7	1.9446	0.0%	Valor verdadero
8	1.9446	0.0%	Valor verdadero

Gráfico de la serie

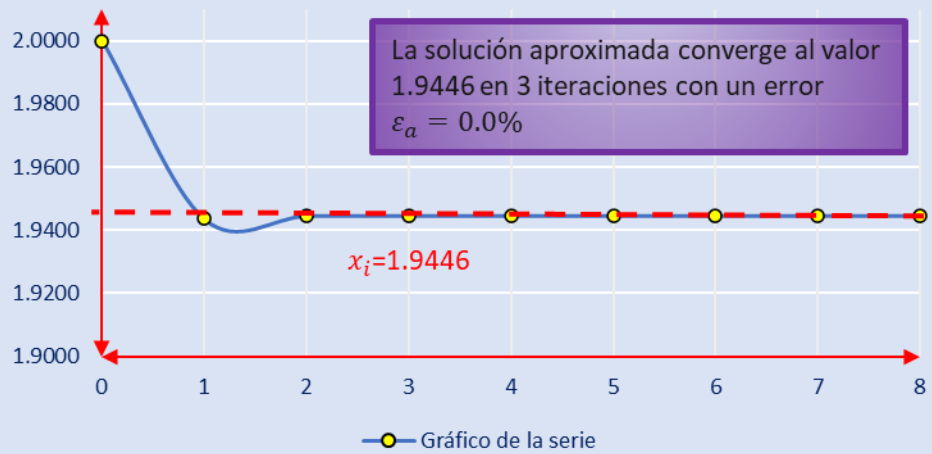
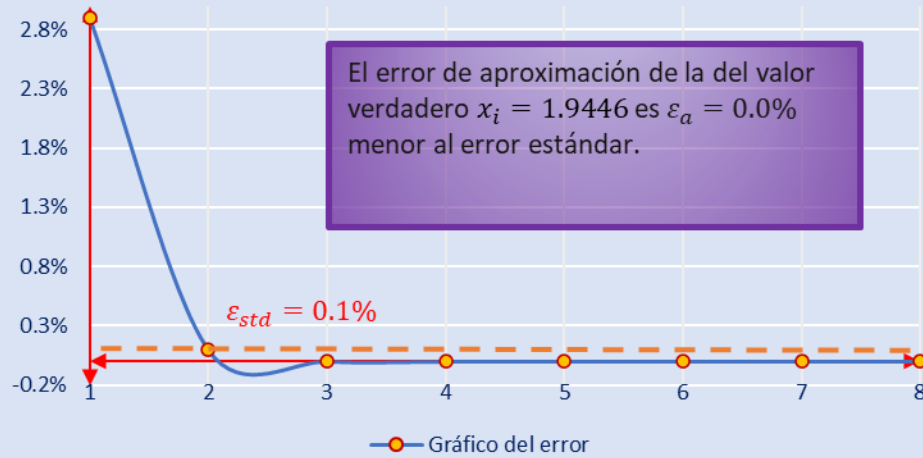


Gráfico del error



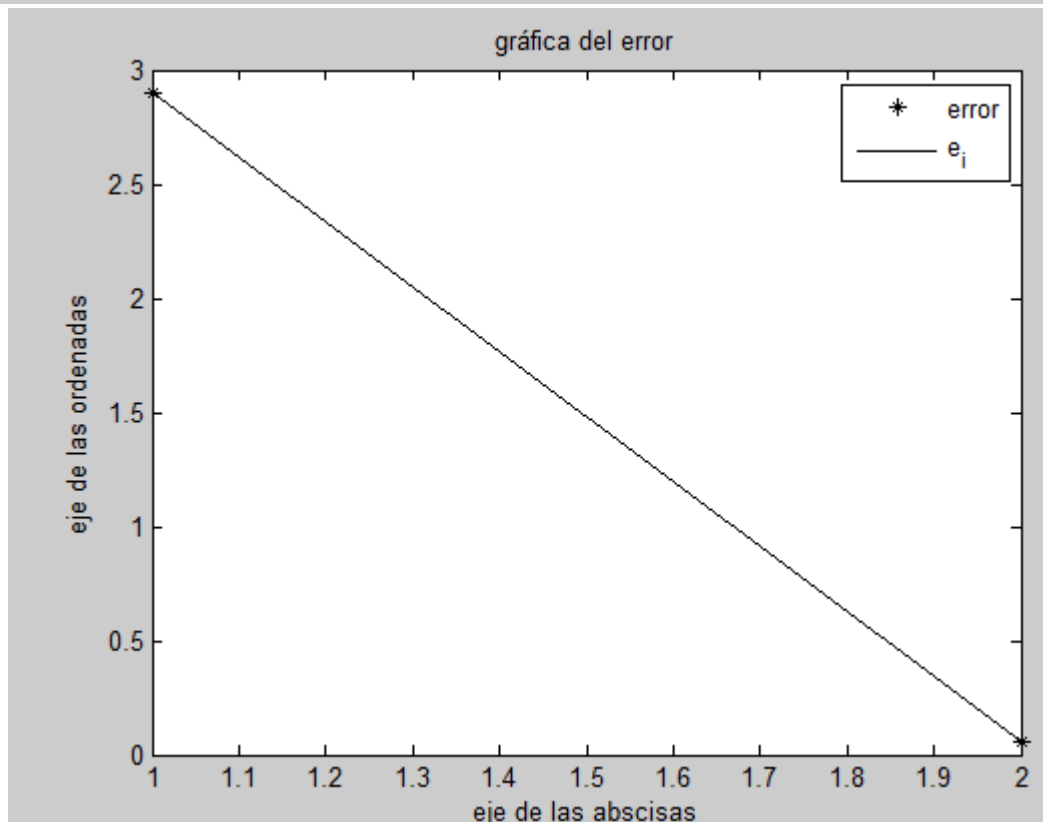
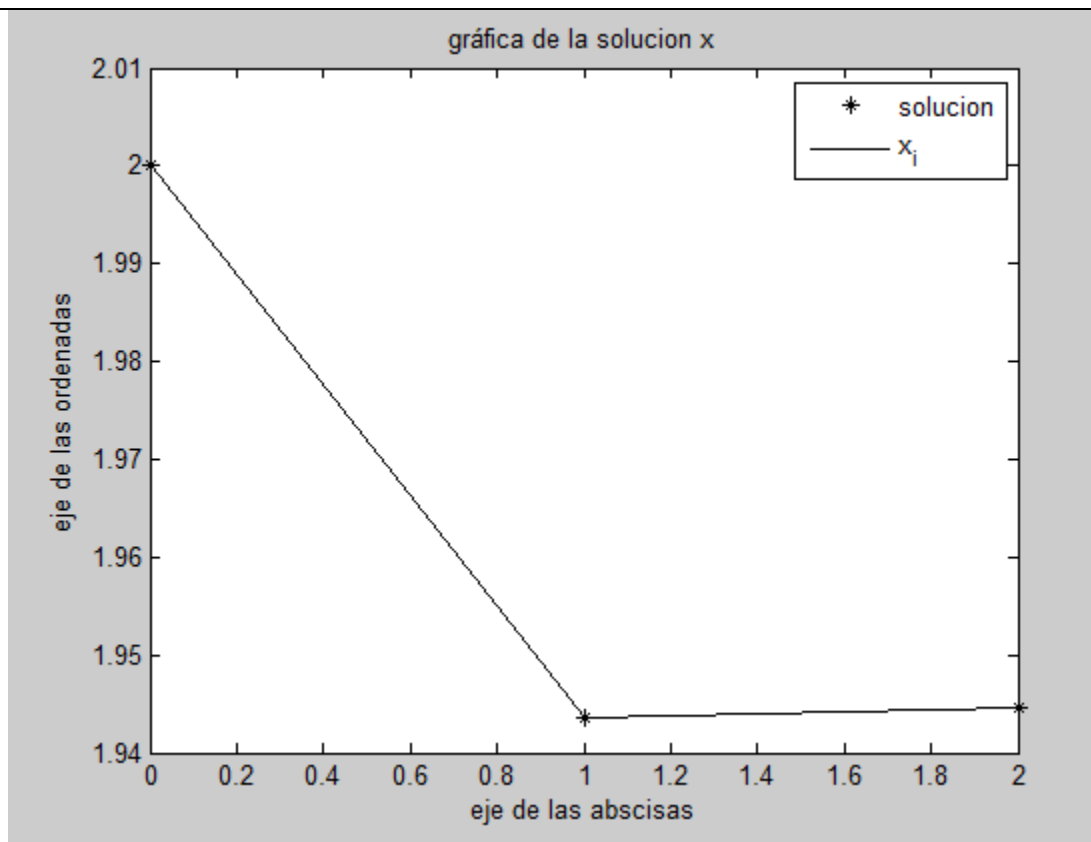
MÉTODO DE NEWTON RAPHSON

```
x_0=2
e_std=0.10%
C.S.=5
```

iter	x_i	e_a
0	2.0000	Inf
1	1.9436	2.9%
2	1.9446	0.1%

La solución aproximada converge al valor 1.9446 en 2 iteraciones con un error $e_a = 0.1\%$

>>

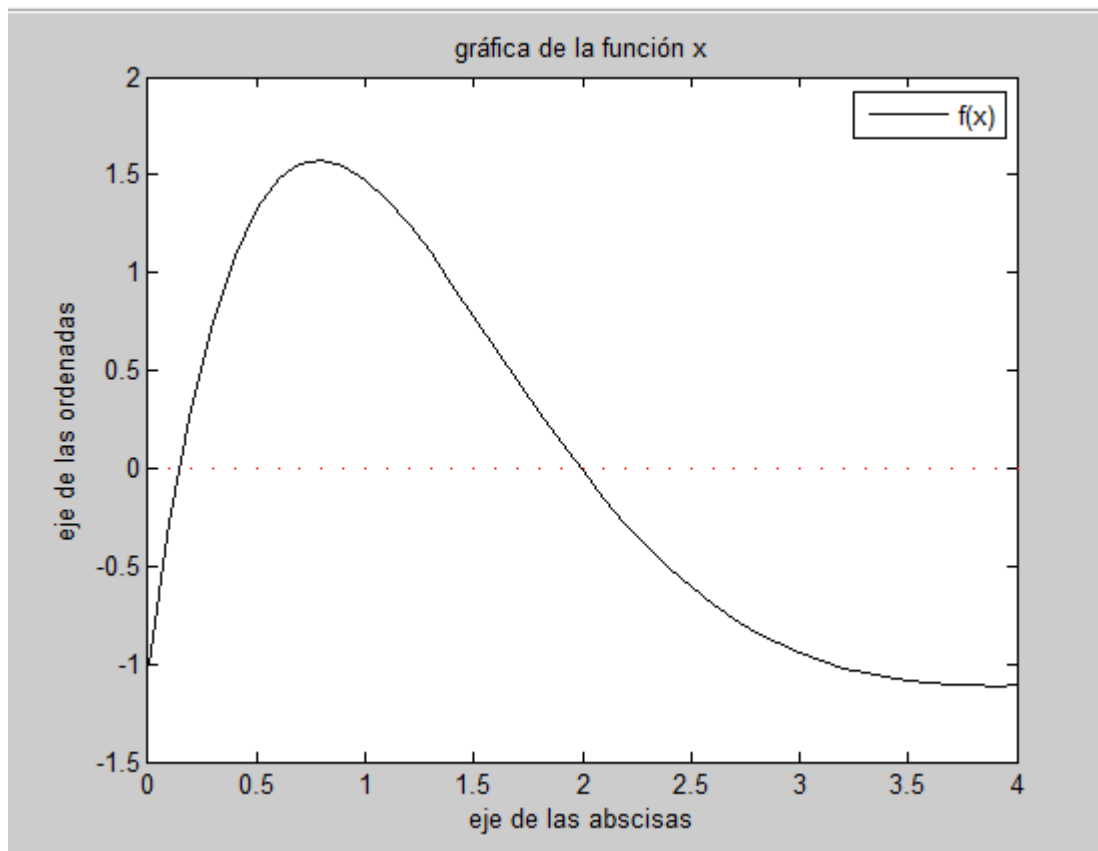
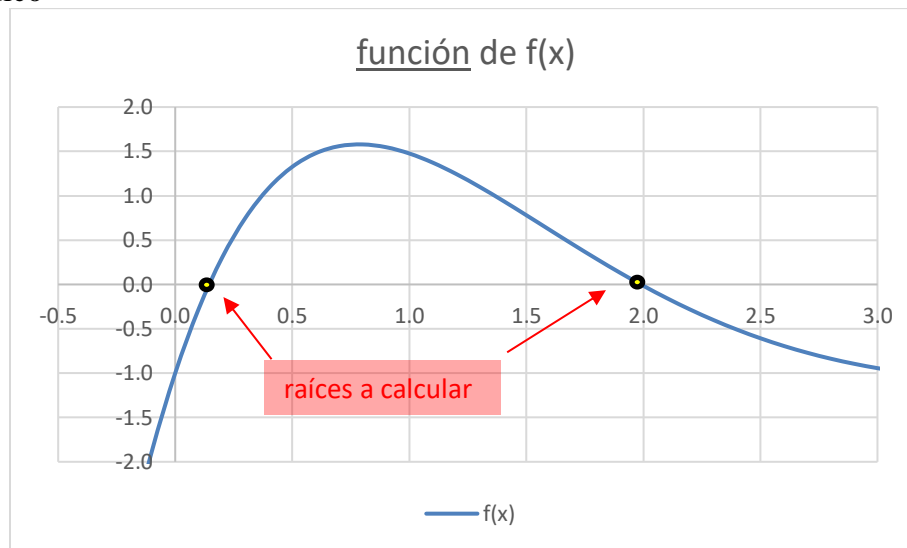


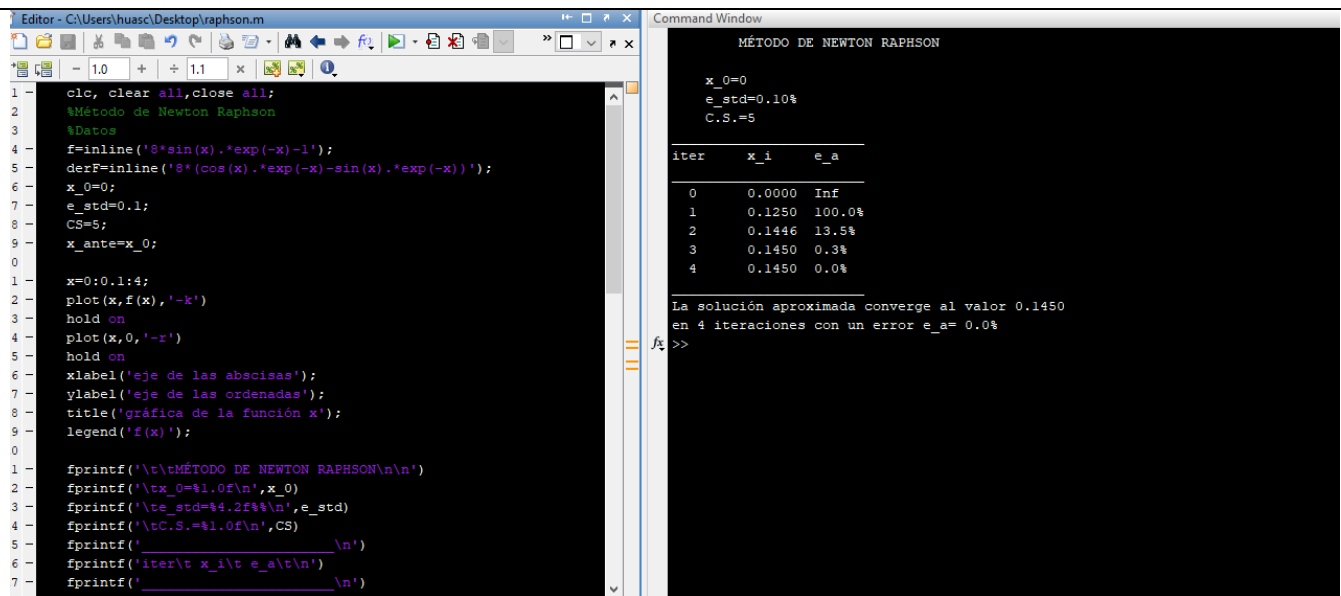
Problema 5

Localice todas las raíces positivas de:

$$f(x) = 8\sin(x)e^{-x} - 1$$

- EXCEL
 - Gráfico





- X_1

Método de Newton Rapson

Datos

$$f(x) = 8\sin(x)e^{-x}-1$$

$$f(x) = 8*\sin(x)*\exp(-x)-1$$

$$\varepsilon_{std} = 0.1\%$$

$$C.S. = 5$$

$$x_0 = 0$$

iter	x_a	ε_a	$\varepsilon_a < \varepsilon_{std}$
0	0.0000	/	/
1	0.1250	100.0%	sigua iterando
2	0.1446	13.5%	sigua iterando
3	0.1450	0.3%	sigua iterando
4	0.1450	0.0%	Valor verdadero
5	0.1450	0.0%	Valor verdadero
6	0.1450	0.0%	Valor verdadero
7	0.1450	0.0%	Valor verdadero
8	0.1450	0.0%	Valor verdadero

Gráfico de la serie

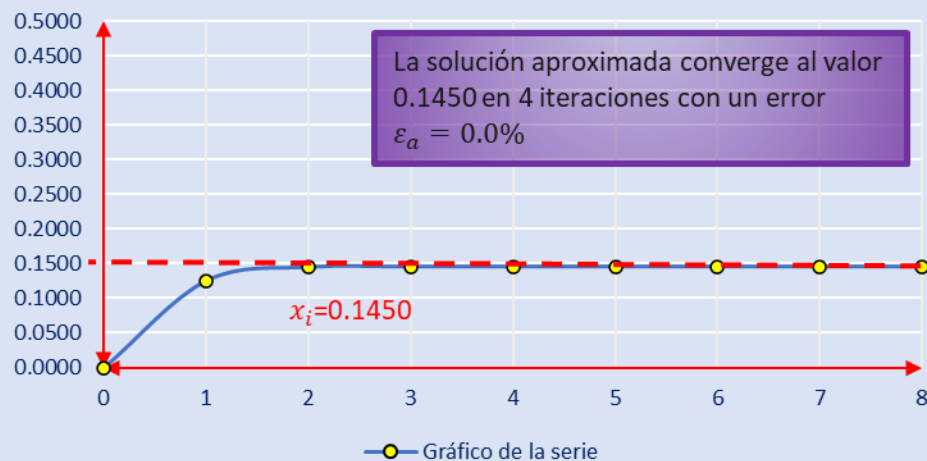
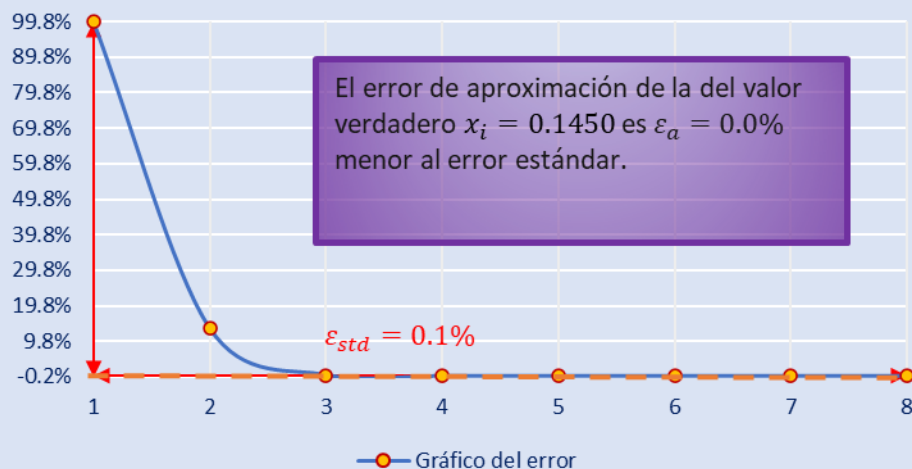


Gráfico del error

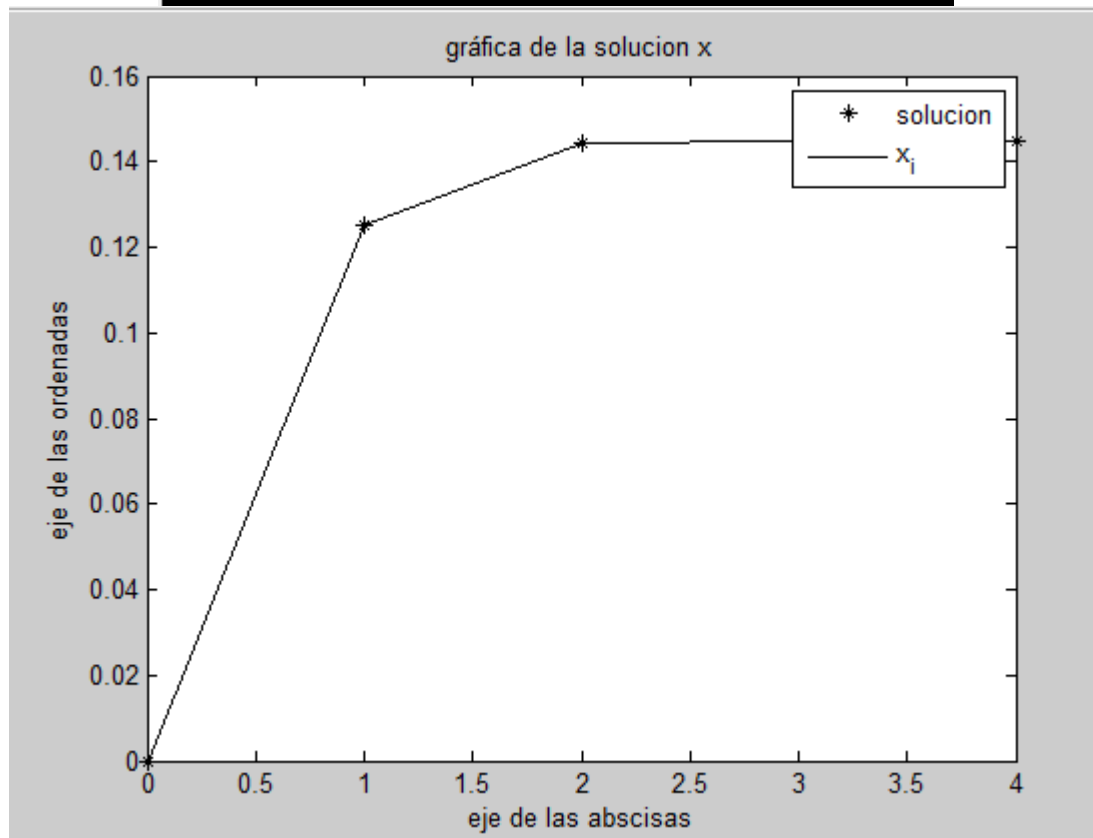


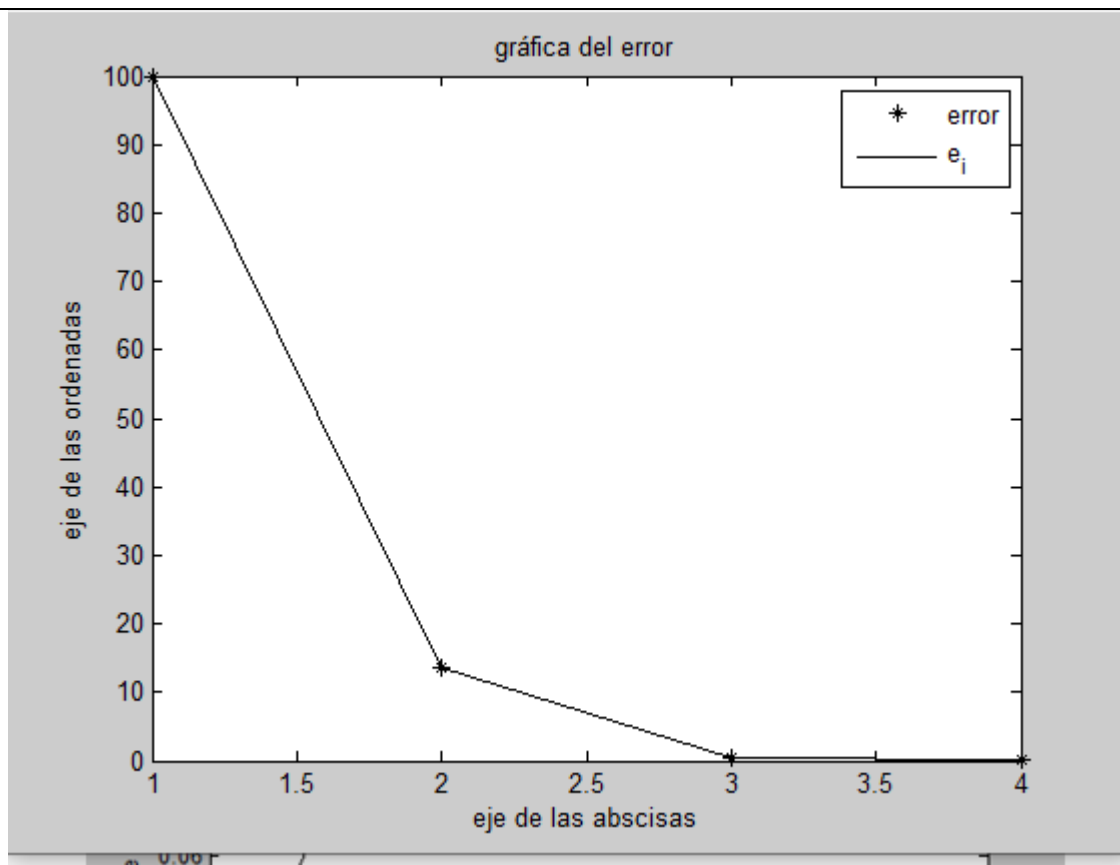
MÉTODO DE NEWTON RAPHSON

```
x_0=0  
e_std=0.10%  
C.S.=5
```

iter	x_i	e_a
0	0.0000	Inf
1	0.1250	100.0%
2	0.1446	13.5%
3	0.1450	0.3%
4	0.1450	0.0%

La solución aproximada converge al valor 0.1450
en 4 iteraciones con un error e_a= 0.0%
>>





- X_2

Método de Newton Rapson

Datos

$f(x) = 8\sin(x)e^{-x}-1$

$f(x) = 8*\text{SIN}(x)*\text{EXP}(-x)-1$

$\epsilon_{\text{std}} = 0.1\%$

C.S. = 5

$x_0 = 2$

iter	x_a	ϵ_a	$\epsilon_a < \epsilon_{\text{std}}$						
0	2.0000	/	/	/					
1	1.9892	0.5%	siga iterando						
2	1.9892	0.0%	Valor verdadero						
3	1.9892	0.0%	Valor verdadero						
4	1.9892	0.0%	Valor verdadero						
5	1.9892	0.0%	Valor verdadero						
6	1.9892	0.0%	Valor verdadero						
7	1.9892	0.0%	Valor verdadero						
8	1.9892	0.0%	Valor verdadero						

Gráfico de la serie

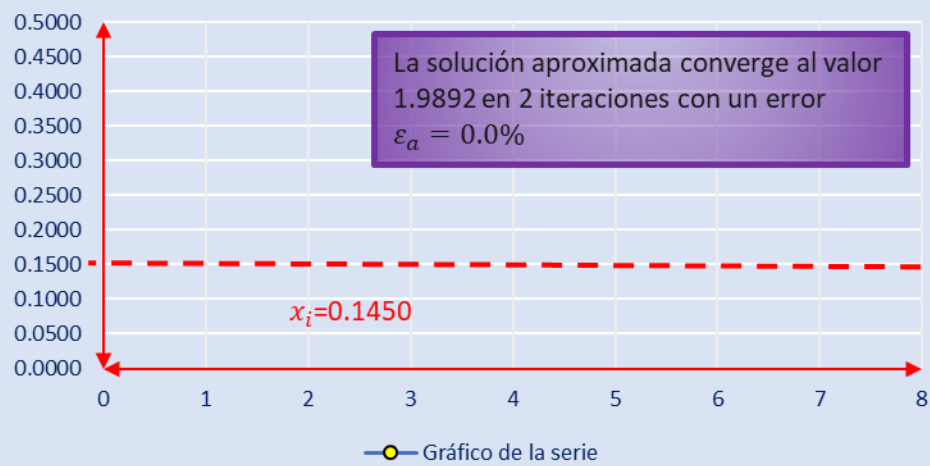
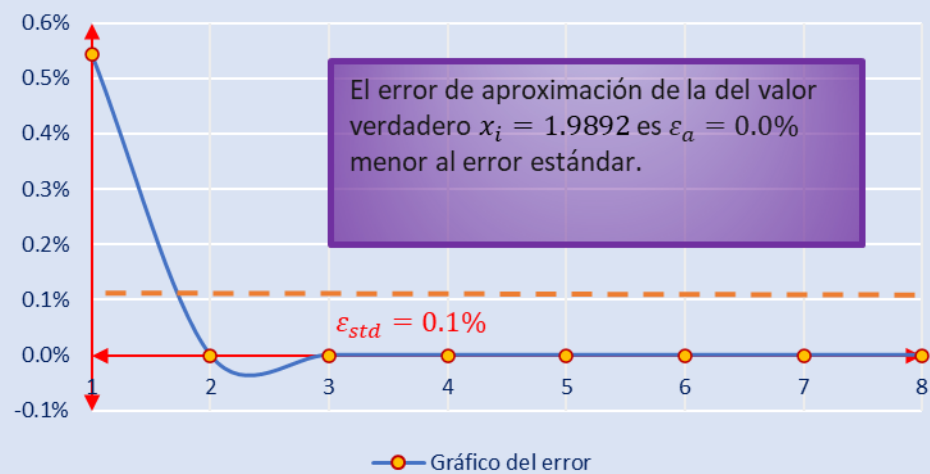


Gráfico del error



MÉTODO DE NEWTON RAPHSON

```
x_0=2  
e_std=0.10%  
C.S.=5
```

iter	x_i	e_a
0	2.0000	Inf
1	1.9892	0.5%
2	1.9892	0.0%

La solución aproximada converge al valor 1.9892
en 2 iteraciones con un error e_a= 0.0%
>>

