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***INSTITUTE OF INFORMATION TECHNOLOGY***

***JAHANGIRNAGAR UNIVERSITY***

**Lab Report :** 04

**Submission Date :** 03/12/2020

**Course Tittle :** Numerical Analysis Lab

**Course Code :** ICT - 2106

**Submitted To Submitted By**

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Professor Roll – 2023

IIT – JU 2nd year 1st Semester

IIT – JU

1.Write programs to find the real root of the following equations by using **Newton Raphson** Method.

a) https://lh6.googleusercontent.com/4mnmB4N-EAKb2rINeGLJqGTJ3h93Dx_dKVHi_ozcDlnxGK8RSKopriAOvhD57vusL5wma5_HRHoBHwSo1_vXkj7WdtolWaSVaaWK7bf-pbXCCWpxXsOKrRD1rvIxL3TBe9O0VJkcorrect to 5 decimal point, near

b)  https://lh4.googleusercontent.com/kN2q6tAnmq3EbCCM38lK_hh-VWO3EYPgaxZgcMnrZmJoMbbmL31WpXaIYW7WpdmGfkmQaEluiFIFassg8PTEv-qdLoiftD2gxbftsGegxpGr9thPiwHtH1jnMwqouyD8_XzzTmw; correct to 5 decimal point, near x=3

c)  https://lh5.googleusercontent.com/BdD_OaKAhl2o5NmHoNDah0X27ajdMqbMv0D6z2u4wZo3fTPxiagHEYLP7a_Kmlz8Q4ixiLSB8sVQFU8gUKz654EjTplYJM7lSMpP0jbwadTcLfsyKqV0f3jf5P2wj2pB0m9QEKwcorrect to 5decimal point, near x=2

**Problem 1(a).**

**Code:**

clear all;

format LONG

f = @(x) x^3 -3\*x -1;

dif = @(x) 3\*x^2 - 3;

x=0;

fprintf('\nX\t\tRoot\n');

fprintf('------------------\n');

for i = 1:3

if(i==2)

x=2;

end

if(i==3)

x=-2;

end

fprintf('%d',x);

for j = 1:100

x1 = x - (f(x)/dif(x));

if(abs(x-x1)<10^(-5))

break;

else

x=x1;

end

end

fprintf('\t\t%f\t\t',x1);

fprintf('\n');

end

**Output:**

>> Lab4\_Problem1a

X Root

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0 -0.347296

2 1.879385

-2 -1.532089

**Problem 1(b).**

**Code:**

clear all;

format LONG

f = @(x) x\*sin(x)+ cos(x);

dif = @(x) x\*(cos(x));

x=3;

for i = 1:100

x1 = x - (f(x)/dif(x));

if(abs(x-x1)<10^(-5))

break;

else

x=x1;

end

end

fprintf('\nRoot is: %f\n', x)

**Output:**

>> Lab4\_Problem1b

Root is: 2.798386

**Problem 1(c).**

**Code:**

clear all;

format LONG

f = @(x) x-exp(-x);

dif = @(x) 1+exp(-x);

x=3;

for i = 1:100

x1 = x - (f(x)/dif(x));

if(abs(x-x1)<10^(-5))

break;

else

x=x1;

end

end

fprintf('\nRoot is: %f\n', x)

**Output:**

>> Lab4\_Problem1c

Root is: 0.567143

2.How does the program act if the starting value of x is 1? Explain the reason behind it.

**Problem 2(a).**

**Code:**

clear all;

format LONG

f = @(x) x^3 -3\*x -1;

dif = @(x) 3\*x^2 - 3;

x=1;

for j = 1:3

x1 = x - (f(x)/dif(x));

if(abs(x-x1)<10^(-5))

break;

else

x=x1;

end

end

fprintf('\nRoot is: %f\n', x)

**Output:**

>> Lab4\_Problem2a

Root is: NaN

**Problem 2(b).**

**Code:**

clear all;

format LONG

f = @(x) x\*sin(x)+ cos(x);

dif = @(x) x\*(cos(x));

x=1;

for i = 1:100

x1 = x - (f(x)/dif(x));

if(abs(x-x1)<10^(-5))

break;

else

x=x1;

end

end

fprintf('\nRoot is: %f\n', x)

**Output:**

>> Lab4\_Problem2b

Root is: 56.530984

**Problem 2(c).**

**Code:**

clear all;

format LONG

f = @(x) x-exp(-x);

dif = @(x) 1+exp(-x);

x=1;

for i = 1:100

x1 = x - (f(x)/dif(x));

if(abs(x-x1)<10^(-5))

break;

else

x=x1;

end

end

fprintf('\nRoot is: %f\n', x)

**Output:**

>> Lab4\_Problem2c

Root is: 0.567143

3.Solve 1 (a) using **roots, fzero, fsolve** Matlab function

**Problem 3.**

**Code:**

clear all;

m=[1 0 -3 -1]

r=roots(m)

f = @(x) x^3 -3\*x -1;

dif = @(x) 3\*x^2 - 3;

x=0;

fprintf('\nX\t\tfzero\n');

fprintf('------------------\n');

for i = 1:3

if(i==2)

x=2;

end

if(i==3)

x=-2;

end

fprintf('%d',x);

for j = 1:3

n=fzero(f,x);

end

fprintf('\t\t%f\t\t',n);

fprintf('\n');

end

**Output:**

>> Lab4\_Problem3

m =

1 0 -3 -1

r =

1.879385241571817

-1.532088886237957

-0.347296355333861

X fzero

-----------------------------------

0 -0.347296

2 1.879385

-2 -1.532089

**FSOLVE**

When x=0

>> p=fsolve(@(x)x^3-3\*x-1,0)

Equation solved.

fsolve completed because the vector of function values is near zero

as measured by the default value of the function tolerance, and

the problem appears regular as measured by the gradient.

<stopping criteria details>

p =

-0.3473

When x=2

>> p=fsolve(@(x)x^3-3\*x-1,2)

Equation solved.

fsolve completed because the vector of function values is near zero

as measured by the default value of the function tolerance, and

the problem appears regular as measured by the gradient.

<stopping criteria details>

p =

1.8794

When x=-2

>> p=fsolve(@(x)x^3-3\*x-1,-2)

Equation solved.

fsolve completed because the vector of function values is near zero

as measured by the default value of the function tolerance, and

the problem appears regular as measured by the gradient.

<stopping criteria details>

p =

-1.5321

4.Solve 1(b) and 1(c) using **fzero, fsolve** Matlab function

**Problem 4.**

**ROOTS:**

### Find all the roots of the given equation 1b

**FZERO :**

>> n=fzero(@(x)x\*sin(x)+cos(x),3)

n =

2.7984

**FSOLVE :**

>> p=fsolve(@(x)x\*sin(x)+cos(x),3)

Equation solved.

fsolve completed because the vector of function values is near zero

as measured by the default value of the function tolerance, and

the problem appears regular as measured by the gradient.

<stopping criteria details>

p =

2.7984

**ROOTS:**

### Find all the roots of the given equation 1c

**FZERO :**

>> n=fzero(@(x)x-exp(-x),2)

n =

0.5671

**FSOLVE :**

>> p=fsolve(@(x)x-exp(-x),2)

Equation solved.

fsolve completed because the vector of function values is near zero

as measured by the default value of the function tolerance, and

the problem appears regular as measured by the gradient.

<stopping criteria details>

p =

0.5671

**THE END**