INSTITUTE OF INFORMATION TECHNOLOGY

JAHANGIRNAGAR UNIVERSITY

Lab Report   **:** 03

Submission Date **:** 28/11/2020

Course Tittle   **:** Numerical Analysis Lab

Course Code   **:** ICT - 2106

Submitted To	**Submitted By**
Dr M Shamim Kaiser	MD. Shakil Hossain
Professor	Roll – 2023
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	IIT - JU

Problem 1(a).

Code:

```
f =@(x)x^3-2*x-5;

x0=2;
x1=3;

for i=1:100
      x2 = x0 - (f(x0)* (x1-x0)/(f(x1)-f(x0)));
      c = f(x2)
      a_c = abs(c);
    if  (a_c <= 10^-5)
        break
        end
    if f(x0)*c <0
        x1=x2;
        continue
    else
        x0=x2;
        continue
    end
    end
    i
```

Output:

>> Lab3_Problem1a

x2 =

  2.0946

c =

 -6.8619e-06

i =

  12

Problem 1(b).

Code:

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

x0=1;
x1=2;

for i=1:100
    x2 = x0 - (f(x0)* (x1-x0)/(f(x1)-f(x0)));
    c = f(x2)
    a_c = abs(c);
  if  (a_c <= 10^-5)
      break
      end
  if f(x0)*c <0
      x1=x2;
      continue
   else
       x0=x2;
       continue
   end
   end
   i
```

Output:

>> Lab3_Problem1b

x2 =

   9.3179

c =

   7.0451e-07

i =

11

Problem 1(c).

Code:

```
f =@(x)e^-x;

x0=0;
x1=1;

for i=1:100
    x2 = x0 - (f(x0)* (x1-x0)/(f(x1)-f(x0)));
    c = f(x2)
    a_c = abs(c);
  if  (a_c <= 10^-5)
      break
      end
  if f(x0)*c <0
      x1=x2;
      continue
   else
        x0=x2;
        continue
  end
  end
  i
```

Output:

>> Lab3_Problem1c

x2 =

   0.5671

c =

 -1.2066e-06

i =

   6

Problem 2. (5 decimal)

Code:

```
syms x;
y=x^3-2*x-5;
a=2;
b=3;
error=0.00001;
fa = eval(subs(y,x,a));

fb = eval(subs(y,x,b));

if fa*fb > 0

disp('Root does not exist between the range');
else
    c = a - (a-b) * fa/(fa-fb);
    fc = eval(subs(y,x,c));
    i=1;
while abs(fc)>error
    i=i+1;
        if fa*fc< 0
            b =c;
            fb = eval(subs(y,x,b));
        else
            a =c;
            fa = eval(subs(y,x,a));
        end
        c = a - (a-b) * fa/(fa-fb);
        fc = eval(subs(y,x,c));
    end
 fprintf('\nRoot is: %f\n', c);
end
i
```

Output:

>> Lab3_Problem2

Root is: 2.094551

i =

12

Problem 2. (8 decimal)

Code:

```
syms x;
y=x^3-2*x-5;
a=2;
b=3;
error=0.00000001;
fa = eval(subs(y,x,a));
fb = eval(subs(y,x,b));

if fa*fb > 0

disp('Root does not exist between the range');
else
    c = a - (a-b) * fa/(fa-fb);
    fc = eval(subs(y,x,c));
    i=1;
while abs(fc)>error
    i=i+1;
        if fa*fc< 0
            b =c;
            fb = eval(subs(y,x,b));
        else
            a =c;
            fa = eval(subs(y,x,a));
        end
        c = a - (a-b) * fa/(fa-fb);
        fc = eval(subs(y,x,c));
    end
 fprintf('\nRoot is: %f\n', c);
end
i
```

Output:

>> Lab3_Problem2

Root is: 2.094551

i =

   19

Problem 4.

Code:

```
a=[1 0 -2 -5];
x1=2;
x2=3;
for i=1:1000
x0=x1-[(polyval(a,x1)*(x2-x1))/(polyval(a,x2)-polyval(a,x1))]
n=polyval(a,x0)
e=abs(n);
if(e<=10^-5)
break;
end
if polyval(a,x1)* polyval(a,x0)
x2=x0;
continue
else
x1=x0;
continue
end
end
```

Output:

>> Lab3_Problem4

x0 =

  2.0946

n =

 -3.7918e-06