MUHAMMAD UMAR KHAN 10619
NC LAB#06

Code:

```
import cmath

 fnctn= lambda x:x**3-2*x-5

 fnctn1=lambda x:x**2-3

fnctn2=lambda x:x**3-x-1

fnctn3=lambda x:x**3+1

 defMULL_METHOD(fnctn,x,xm1,xm2,epsilon):

   i = 0

   while(abs(fnctn(x)) > epsilon):

     q = (x - xm1)/(xm1 - xm2)

     a = q*fnctn(x) - q*(1+q)*fnctn(xm1) + q**2*fnctn(xm2)

     b = (2*q + 1)*fnctn(x) - (1+q)**2*fnctn(xm1) + q**2*fnctn(xm2)

c = (1 + q)*fnctn(x)        r = x - (x - xm1)*((2*c)/(b + cmath.sqrt(b**2 -

4*a*c)))

     s = x - (x - xm1)*((2*c)/(b - cmath.sqrt(b**2 - 4*a*c)))

      if (abs(fnctn(r)) < abs(fnctn(s))): xp = r

      else: xp = s

     xm2 = xm1

      xm1 = x

      x = xp

     i = i + 1

    return xp,i


xm2 = 4

xm1 = 3
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```
x = 2

epsilon = 0.00001

epsilon2 = 0.001

epsilon3 = 0.01

print("Serial Function Intervals epsilon iterations root")

xp,i=MULL_METHOD(fnctn,x,xm1,xm2,epsilon)

print("1 x**3+4*(x**2)-10 ",x,",",xm1,",",xm2," ",epsilon," ",i," ",xp)

xp,i=MULL_METHOD(fnctn1,x,xm1,xm2,epsilon)

print("2 x**2-3 ",x,",",xm1,",",xm2," ",epsilon," ",i," ",xp)

xp,i=MULL_METHOD(fnctn2,x,xm1,xm2,epsilon)

print("3 x**3-x-1 ",x,",",xm1,",",xm2," ",epsilon," ",i," ",xp)

xp,i=MULL_METHOD(fnctn3,x,xm1,xm2,epsilon)

print("4 x**3+1 ",x,",",xm1,",",xm2," ",epsilon," ",i," ",xp)

xp,i=MULL_METHOD(fnctn,x,xm1,xm2,epsilon2) print("1

x**3+4*(x**2)-10 ",x,",",xm1,",",xm2," ",epsilon2," ",i," ",xp)

xp,i=MULL_METHOD(fnctn1,x,xm1,xm2,epsilon2)

print("2 x**2-3 ",x,",",xm1,",",xm2," ",epsilon2," ",i," ",xp)

xp,i=MULL_METHOD(fnctn2,x,xm1,xm2,epsilon2)

print("3 x**3-x-1 ",x,",",xm1,",",xm2," ",epsilon2," ",i," ",xp)

xp,i=MULL_METHOD(fnctn3,x,xm1,xm2,epsilon2)

print("4 x**3+1 ",x,",",xm1,",",xm2," ",epsilon2," ",i," ",xp)

xp,i=MULL_METHOD(fnctn,x,xm1,xm2,epsilon3) print("1

x**3+4*(x**2)-10 ",x,",",xm1,",",xm2," ",epsilon3," ",i," ",xp)

xp,i=MULL_METHOD(fnctn1,x,xm1,xm2,epsilon3)

print("2 x**2-3 ",x,",",xm1,",",xm2," ",epsilon3," ",i," ",xp)
xp,i=MULL_METHOD(fnctn2,x,xm1,xm2,epsilon3)
```

```
print("3 x**3-x-1 ",x,",",xm1,",",xm2," ",epsilon3," ",i," ",xp)

xp,i=MULL_METHOD(fnctn3,x,xm1,xm2,epsilon3)

print("4 x**3+1 ",x,",",xm1,",",xm2," ",epsilon3," ",i," ",xp)
```

OUTPUT:

```
Serial Function Intervals epsilon iterations root
1 x**3+4*(x**2)-10  2 , 3 , 4   1e-05   3   (2.094551499242021+0j)
2 x**2-3  2 , 3 , 4   1e-05   1   (1.7320508075688772+0j)
3 x**3-x-1  2 , 3 , 4   1e-05   5   (1.3247180829929888-2.2217198462767617e-07j)
4 x**3+1  2 , 3 , 4   1e-05   6   (0.5000001620888104+0.8660252972676992j)
1 x**3+4*(x**2)-10  2 , 3 , 4   0.001   3   (2.094551499242021+0j)
2 x**2-3  2 , 3 , 4   0.001   1   (1.7320508075688772+0j)
3 x**3-x-1  2 , 3 , 4   0.001   5   (1.3247180829929888-2.2217198462767617e-07j)
4 x**3+1  2 , 3 , 4   0.001   5   (0.49972041731882183+0.8660968856717137j)
1 x**3+4*(x**2)-10  2 , 3 , 4   0.01   2   (2.0946776725061205+0j)
2 x**2-3  2 , 3 , 4   0.01   1   (1.7320508075688772+0j)
3 x**3-x-1  2 , 3 , 4   0.01   4   (1.3251049484802657+4.001082553352613e-05j)
4 x**3+1  2 , 3 , 4   0.01   5   (0.49972041731882183+0.8660968856717137j)
```