By using Newton Raphson Method, x^4-x-10=0 which is nearest to 2, find real root correct to three decimal places? (R.G.P.V. 2022 NOV)

Solution:

Let,

F(x)= x^4-x-10

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Newton Raphson Formula:
Xn+1= Xn – f(Xn)/f’(Xn)
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Here,

f’(Xn)= 4x^3-1

According to the question, it will be given x0= 2..

X0+1= x0- (x0^(4)-x0-10)/(4×0^(3)-1)

X1=x0-(x0^(4)-x0-10)/(4×0^3-1)

Put the value of xo=2;

X1= 2-(2^(4)-2-10)/(4*2^(3)-1)

X1=2- (16-12)/4*8-1

X1=2- 4/13

X1= 1.871

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Here x1= 1.871, and n=1

Xn+1= Xn- (Xn^(4)-Xn-10)/(4Xn^(3)-1)

Put the value of n=1

X1+1= X1-(X1^(4)-X1-10)/(4X1^(3)-1)

Put the value of x1= 1.871

X2= 1.871- (1.871^(4)- 1.871-10)/(4*1.871^(3)-1)

X2= 1.856

Here, x2= 1.856 , and n= 2

Xn+1= Xn- (Xn^(4)-Xn-10)/(4Xn^(3)-1)

Put n= 2

X2+1= X2- (X2^(4)-X2-10)/(4X2^(3)-1)

Put the value of x2= 1.856

X3= 1.856 – (1.856^(4)-1.856-10)/(4*1.856^(3)-1)

X3= 1.856

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Since, x2=x3, so the real root correct to three decimal place is 1.856.

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