Assignment - 1

18K41A05E4

Question :-

Find global minimum point and value for the function $f(x) = x^4 + 3x^2 + 10$

$\Rightarrow$ Do manual calculations for 2 iterations

solution

Step 1 : Initialization

$x = 6.5$, $\eta = 0.01$, epoches = 2, iter = 1

Step 2 : 1st order derivative of $f(x)$ at $x = 6.5$

$$\left(\frac{\partial f}{\partial x}\right)_{x=6.5} = (4x^3 + 6x)_{x=6.5} = (1098.5 + 39)$$

$$= 1137.5$$

Step 3 : Finding the changing variable

$$\Delta x = -\eta \frac{\partial f}{\partial x} \Rightarrow -(0.01)(1137.5)$$

$$\Rightarrow -11.375$$

Step 4 :- $x = x + \Delta x$

$$x = 6.5 + (-11.375)$$

$$x = -4.875$$

Step 5 :- iter = iter + 1

= 1 + 1

= 2.

Step 6 :- if (iter > epoches) goto step 7

else goto step 2

now, 2 > 2 false so goto step 2

Step 2 :- $(4x^3 + 6x)_{x=-4.8} = -492.67$

Step 3 :- $\Delta x = -\eta \frac{df}{dx} = -(0.01) \cdot -492.67$

$\Delta x = 4.9$

Step 4 :- $x = x + \Delta x$

$= -4.8 + 4.9$

$= 0.1$

Step 5 :- iter = iter + 1

= 2 + 1

= 3

Step 6 :- if (iter > epoches) goto step 7

else goto step 2

now 3 > 2 true so goto step 7

Step 7 :- $x = 0.1$, $x^4 + 3x^2 + 10 \Rightarrow (0.1)^4 + 3(0.1)^2 + 10 \Rightarrow$

10.0301 //.