

Assignment - 1

18K41A0278

1) Find the global minimum point for 2 iteration

$$f(x) = x^4 + 3x^2 + 10$$

Step 1: Initialization

$$x = 1.2, \eta = 0.01, \text{epochs} = 2, \text{iteration} = 1$$

Step 2: Derivation at $x = 1.2$

$$\left(\frac{\partial f}{\partial x}\right)_{x=1.2} = (4x^3 + 6x) = 4(1.2)^3 + 6(1.2) \Rightarrow 6.912 + 7.2 \Rightarrow \underline{\underline{14.112}}$$

$$\text{Step 3: } \Delta x = -\eta \frac{\partial f}{\partial x} = (-0.01)(14.112) \Rightarrow \underline{\underline{-0.14112}}$$

$$\text{Step 4: } x = x + \Delta x$$

$$x = 1.2 - 0.14112 \Rightarrow 1.05888$$

$$\text{Step 5: } \text{iteration} = \text{iteration} + 1 \Rightarrow 1 + 1 \Rightarrow \underline{\underline{2}}$$

Step 6: if (iter > epochs)

2 > 2 go to step 7

else

Then go to step 2

$$\text{Step 2: } \left(\frac{\partial f}{\partial x}\right)_{\text{at } x=1.05}$$

$$4x^3 + 6x \Rightarrow 4(1.05)^3 + 6(1.05) \Rightarrow \underline{\underline{10.9305}}$$

$$\text{Step 3: } \Delta x = -\eta \frac{\partial f}{\partial x}$$

$$\Rightarrow -(0.01)(10.9305) \Rightarrow \underline{\underline{-0.109305}}$$

Step 4: $x = x + bx$
 $= 1.05 + 0.109305$
 $= \underline{\underline{1.159305}}$

Step 5: $\text{iteration} = \text{iteration} + 1 \Rightarrow 2 + 1 \Rightarrow 3$

Step 6: if (iteration, epochs)

go to step 7	372
else	
go to step 2	True

Step 7: $x = 1.159$

$$x^4 + 3x^2 + 10 \Rightarrow (1.15)^4 + 3(1.15)^2 + 10$$

$$\Rightarrow \underline{\underline{15.7165}}$$