

Assignment-2

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

Iteration 1

let us take $x=3$ and $\eta=0.01$

$$\frac{\partial f(x)}{\partial x} = 4x^3 + 6x$$

$$\begin{aligned}\frac{\partial f}{\partial x} \bigg|_{x=2} &= 4(2)^3 + 6(2) \\ &= 32 + 12 \\ &= 44.\end{aligned}$$

as gradient not near to zero,

$$\begin{aligned}\Delta x &= -\eta \frac{\partial f}{\partial x} \\ &= -0.01(44) = -0.44\end{aligned}$$

$$\begin{aligned}\text{update } x \text{ values as } x &= 2 - 0.44 \\ &= 1.56\end{aligned}$$

Iteration 2

let us take $x=1.56$

$$\begin{aligned}\frac{\partial f}{\partial x} &= 4x^3 + 6x \\ &= 4(1.56)^3 + 6(1.56) \\ &= 24.546\end{aligned}$$

$$\Delta x = 0.01 \times (24.546) = 0.245$$

update x value as

$$\begin{aligned}x &= 1.56 - 0.245 \\ &= 1.315\end{aligned}$$