

NNDL ASSIGNMENT-1

18K41A0420

- 1) Find the global minimum point & value for the function $f(x) = x^4 + 3x^2 + 10$.
→ manual calculations for two iterations:

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

$$\text{let } x=2; \quad \eta = 0.01 \text{ (learning rate)}$$

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

for 1 iteration

$$\left. \frac{\partial f(x)}{\partial x} \right|_{x=2} = 4(2)^3 + 6(2) \\ = 32 + 12 = 44$$

$$\Delta x = -\eta \times \frac{\partial f(x)}{\partial x}$$

$$\Delta x = -(0.01)(44) = -0.44$$

$$x = x + \Delta x$$

$$x = 2 - 0.44 = 1.56$$

For 2 iteration:

$$\left. \frac{\partial f(x)}{\partial x} \right|_{x=1.56} = 4(1.56)^3 + 6(1.56) \\ = 24.54$$

$$\Delta x = -\eta \times \frac{\partial f(x)}{\partial x}$$

$$\Delta x = -(0.01)(24.54)$$
$$= -0.2454$$

$$x = x + \Delta x$$

$$x = 1.56 - 0.24$$

$$x = 1.314$$

This procedure is repeating until gradient is near to zero.