Manual calculation for 2 iterations

step 1 :- Initialization of variables.

$x = 2$ $\eta = 0.01$ epochs = 2   itr = 1

step 2 :-

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

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

$$\Rightarrow 4(8) + 12$$

$$\Rightarrow 32 + 12$$

$$\Rightarrow 44$$

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

$$= -0.01 (44)$$

$$= -0.44$$

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

$$= 2 - 0.44$$

$$= 1.56$$

step 5 :- iter = iter + 1

$$= 1 + 1$$

$$= 2$$

step 6 :- if (iter > epoch) $\Rightarrow$ if (2 > 2)

~~if 1.56~~   False

go to step 2

step 2 :- $\dfrac{\partial f}{\partial x} = 4x^3 + 6x$

$$= 4(1.56)^3 + 6(1.56)$$

$$= 24.545$$

step 3 :- $\Delta x = -0.01(24.545)$

$$= -0.24545$$

step 4 :- $x = 1.56 - 0.24545$

$$x = 1.31455$$

step 5 :- ~~iter~~ $\text{iter} = \text{iter} + 1$

$$= 2 + 1$$

$$= 3$$

step 6 :- if $(3 > 2)$

$$\text{True}$$