Assignment -1:

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

Do manual calculations for 2 iterations

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

Step1 : initialize variable

$x = 0$

$\eta = 0.1$

epochs = 2

iter = 1

Step 2 : $\dfrac{\partial f}{\partial x} = 4x^3 + 6x = 4(0) + 6(0) = 0$

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

$= -(0.1)(0)$

$\Delta x = 0$

Step 4 : Update variable x

$x = x + \Delta x$

$= 0 + 0$

$x = 0$

Step 5 : incsement itesation

iter = iter + 1

iter = 1 + 1

iter = 2

Step 6 : if (iter > epochs) go to step ⑦

else

goto step ②

Here if (2 > 2) → false goto step ②

Step ② : Calculate first order derivative of $f(x)$

at $x = 0$

$$\frac{df}{dx} = 4x^3 + 6x$$
$$= 0$$

Step ③ : $\Delta x = -\eta \frac{df}{dx}$

$$= (-0.1)(0)$$

$$\Delta x = 0$$

Step ④ : Update variable x

$$x = x + \Delta x$$
$$= 0 + 0$$
$$x = 0$$

Step ⑤ : iter = iter + 1

$$iter = 2 + 1$$
$$iter = 3$$

Step ⑥ : if (iter > epochs)

Here $3 >$ epochs → ~~False~~ True

goto step 7

step ⑦ : print values of x, $f(x)$

$$\boxed{x = 0}$$

$$f(x) = x^4 + 3x^2 + 10$$
$$= (0)^4 + 3(0)^2 + 10$$

$$\boxed{f(x) = 10}$$