Assignment I

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Find the global minimum point and value for the function

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

* Do Manual calculation for two iteration

step 1: Intialization

$$x = 6.5 \quad \eta = 0.01, \text{ epochs} = 2, \text{ iter} = 1$$

step 2: 1st order derivation of $f(x)$ at $x = 6.5$

$$\left(\frac{\partial f}{\partial x}\right)_{x=6.5} = \left(4x^3 + 6x\right)_{x=6.5} = 1098.5 + 3$$
$$= 1137.5$$

step 3: find changing variabl

$$\Delta x = -\eta \frac{df}{dx} = -(0.01)(1137.5)$$

$$\Delta x = -11.375 //$$

step 4: $x = x + \Delta x$
$$= 6.5 + (-11.375)$$
$$x = -4.875$$

step 5: iter = iter + 1
$$= 1 + 1$$
$$\text{iter} = 2$$

step 6: if (iter >= epochs)

goto step 7

else goto step 2

2 > 2 , its false so go to step 2

again →

step 2: $\left(\frac{df}{dx}\right)_{n=-4.8} = (4x^3 + 6x)_{n=4.9} = -4.9267$ //

step 3: $\Delta x = -n\frac{df}{dv} = -(0.01)(-492.67)$

$\Delta x = 4.9$

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

$= -4.8 + 4.9$

$x = 0.1$ //

step 5: iter = iter + 1

$= 2 + 1$

$= 3$

step 6: if (iter >= epochs)

goto step 7

else goto step 2   (3 > 2, its true go to step 7)

step 7:

$x = 0.1$

$x^4 + 3x^2 + 10 = (0.1)^4 + 3(0.1)^2 + 10$

$= 10.030$ /