Find the global min-point & value for the function

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

sol:- Step 1: initialization

$x = 1$, epoch $= 2$, $\eta = 0.1$

iteration 1:

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

$$= 10$$

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

$$= -(0.1)(10)$$

$$= -1$$

$$x = x + \Delta x$$

$$= 1 - 1$$

$$= 0$$

iteration 2:

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

$$= 0$$

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

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

$$= 0$$

$$x = x + \Delta x$$

$$= 0 + 0$$

$$= 0$$

Now, the global min point is $x = 0$

min value of the function is $f(0)$

$$= 0 + 0 + 10$$

$$= 10$$