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

Iteration 1:

1) choose initial value for x , let $x = 2$ &

$$\eta = 0.01$$

2) find gradient at $x = 2$ i.e. $\left. \frac{\partial f(x)}{\partial x} \right|_{x=2}$

$$= 4x^3 + 6x$$

$$= 4(2)^3 + 6(2)$$

$$= 4 \times 8 + 12$$

$$= 44.$$

3) As gradient not near to zero, calculate step length

$$\Delta x = -0.01 \times 44 = -0.44$$

4) update x value as $x = 2 - 0.44 = 1.56$

Iteration 2:

1) choose initial value for x

2) find gradient at $x = 1.56$ i.e. $\left. \frac{\partial f(x)}{\partial x} \right|_{x=1.56}$

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

$$= 15.18 + 9.36 = 24.54.$$

3) calculate step length $\Delta x = -0.01 \times 24.54 = -0.2454$

4) update x value as $x = 1.56 - 0.2454 = 1.3146$.

This procedure is repeating until gradient is near zero.