* Manual Calculations for Two Iterations

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

$\eta = 0.001$

Let, intial value of x be 2 $(x=2)$.

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

Iteration -1:

Gradient at $x=2$. $\left.\frac{\partial f(x)}{\partial x}\right|_{x=2} = 4(2)^3 + 6(2) = 44.$

Step length $\Delta x = -0.001 \times 44 = -0.044$

update x:

$x = 2 - 0.044 = 1.956$

Iteration -2:

Gradient at $x=1.956$ $\left.\frac{\partial f(x)}{\partial (x)}\right|_{x=1.956} = 4(1.956)^3 + 6(1.956) = 41.670.$

Step length $\Delta x = -0.001 \times 41.670 = 0.0416.$

uptate x:

$x = 1.956 - 0.0416 = 1.9144$

⋮