

Assignment-3

$$f(x, y) = 3x^2 + 5e^{-y} + 10$$

$$\eta = 0.01, x = 2, y = 3, \text{ epochs} = 100, \text{ iter} = 1$$

Iteration-1

$$\left. \frac{\partial f}{\partial x} \right|_{x=2} = 6x = 6 \times 2 = 12$$

$$\left. \frac{\partial f}{\partial y} \right|_{y=3} = -5 \times e^{-3} = -0.24$$

$$\Delta x = -\eta \left. \frac{\partial f}{\partial x} \right|_{x=2} = -(0.01)(12) = -0.12$$

$$\Delta y = -\eta \left. \frac{\partial f}{\partial y} \right|_{y=3} = -(0.01)(-0.24) = 0.0024$$

$$x = x + \Delta x = 2 - 0.12 = 1.88$$

$$y = y + \Delta y = 3 + 0.0024 = 3.002$$

$$\text{iter} = \text{iter} + 1 = 2 > \text{epochs}$$

Iteration-2

$$\left. \frac{\partial f}{\partial x} \right|_{x=1.88} = 6 \times 1.88 = 11.28$$

$$\left. \frac{\partial f}{\partial y} \right|_{y=3.002} = -5 \times e^{-3.002} = -0.24$$

$$\Delta x = -\eta \left. \frac{\partial f}{\partial x} \right|_{x=1.88} = -(0.01)(11.28) = -0.1128$$

$$\Delta y = -\eta \left. \frac{\partial f}{\partial y} \right|_{y=3.002} = -(0.01)(-0.24) = 0.0024$$

$$x = x + \Delta x = 1.88 - 0.1128 = 1.76$$

$$y = y + \Delta y = 3.002 + 0.0024 = 3.0044$$