Assignment - 3(A)

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

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

Iteration -1

$$\frac{\partial f}{\partial x}\Big|_{x=2} = 6x = 6 \times 2 = 12$$

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

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

$$\Delta y = -\eta \frac{\partial f}{\partial x}\Big|_{y=2} = -(0.01)(0.24) = 0.0024$$

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

$$y = y + \Delta y = 3 + 0.0029 = 3.0024$$

Iteration -2

$$\frac{\partial f}{\partial x}\Big|_{x=1.88} = (6)(1.88) = 11.28$$

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

$$\Delta x = -\eta \frac{\partial f}{\partial x}\Big|_{x=2} = -(0.01)(11.28) = -0.1128$$

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

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

$$y = y + \Delta y = 3.002 + 0.0024 = 3.004.$$