Assignment -3(A)

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

Let $\eta = 0.01$, $x = 2$, $y = 5$, epochs $= 100$, iter $= 1$

Iteration - 1

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

$$\frac{\partial f}{\partial y}\Big|_{y=5} = -5(e)^{-5} = -0.034$$

$$\Delta x = -\eta \frac{\partial f}{\partial x}\Big|_{x=2}$$

$$= -(0.01)(12)$$

$$= -0.12$$

$$\Delta y = -\eta \frac{\partial f}{\partial y}\Big|_{y=5}$$

$$= -(0.01)(-0.034)$$

$$= 0.00034$$

$$x = x + \Delta x$$

$$= 2 - 0.12$$

$$= 1.88$$

$$y = y + \Delta y$$

$$= 5 + 0.00034$$

$$= 5.00034$$

Iteration - 2

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

$$\frac{\partial f}{\partial y}\Big|_{y=5.00034} = -5(e)^{-5.00034}$$
$$= -0.034$$

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

$$\Delta y = -\eta \frac{\partial f}{\partial y}\Big|_{y=5}$$
$$= -(0.01)(-0.034)$$
$$= 0.00034$$

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

$$y = y + \Delta y$$
$$= 5.00034 + 0.00034$$
$$= 5.0006$$