Assignment-3A

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

$\eta = 0.01$, $x = 2$, $y = 3$

Iteration-1

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

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

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

$$\Delta y = -\eta \frac{\partial f}{\partial y}\Big|_{y=3} = -0.01 \times -0.24 = 0.0024$$

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

$$y = y + \Delta y = 3 + 0.0024 = 3.0024$$

Iteration-2

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

$$\frac{\partial f}{\partial y}\Big|_{y=3.0024} = -5 \times e^{-3.0024} = -0.24$$

$$\Delta x = -\eta \frac{\partial f}{\partial x}\Big|_{x=1.88} = -0.01 \times 11.28 = 0.1128$$

$$\Delta y = -\eta \frac{\partial f}{\partial y}\Big|_{y=3.0024} = -0.01 \times -0.24 = 0.00024$$

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

$$y = y + \Delta y = 3.0024 + 0.0024 = 3.0048$$