Assignment - 3

A) Do manual calculations for two iterations.

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

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

Iteration - 1 :-

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

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

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

$$= -0.12$$

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

$$= 0.0024$$

$$x = x + \Delta x$$

$$= 2 - 0.12$$

$$= 1.88$$

$$y = y + \Delta y$$

$$= 3 + 0.0024$$

$$= 3.002$$

iter = iter + 1 = 2 > epochs

Iteration-2 :-

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

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

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

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

$$= 0.0024$$

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

$$= 1.76$$

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

$$= 3.0044$$