Assignment - 3(A)

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

$x = 2, \quad y = 3, \quad l = 0.01$

Iteration - (1)

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

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

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

$\Delta y = -l\left(\frac{\partial f}{\partial x}\right)_{y=2} = -(0.01)(-0.24) = 0.0024.$

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

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

Iteration - (2)

$\left(\frac{\partial f}{\partial x}\right)_{x=1.88} = (6)(1.88) = 11.28$

$\left(\frac{\partial f}{\partial y}\right)_{y=3.002} = -5 \times e^{-3.002} = -0.0024.$

$\Delta x = \left(\frac{\partial f}{\partial x}\right)_{x=2} = -(0.01)(11.28) = -0.1128$

$\Rightarrow -(0.01)(-0.24) = 0.0024.$

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

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