

Assignment - 3A

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

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

Iteration-1:

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

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

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

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

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

$$y = y + \Delta y = 3 - 0.0024 = 2.9976$$

Iteration-2:

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

$$\frac{\partial f}{\partial y} \Big|_{y=2.9976} = -5 \times e^{-2.9976} = -0.24$$

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

$$\Delta y = \eta \frac{\partial f}{\partial y} \Big|_{y=2.9976} = (0.01)(-0.24) = -0.0024$$

$$x = x + \Delta x = 1.88 - 0.1128 = 1.7672$$

$$y = y + \Delta y = 2.9976 - 0.0024 = 2.9952$$