

Assignment -3.

$$f(x, y) = 3x^2 + 5e^{-y} + 10, \quad \eta = 0.001$$

Let, initial value of $x=2$, Initial value of $y=5$.

$$\frac{\partial f(x, y)}{\partial x} = 6x, \quad \frac{\partial f(x, y)}{\partial y} = -5e^{-y}$$

Iteration-1

$$\text{Gradient at } x=2, \left. \frac{\partial f(x, y)}{\partial x} \right|_{x=2} = 6 \times 2 = 12.$$

$$\text{Gradient at } y=5, \left. \frac{\partial f(x, y)}{\partial y} \right|_{y=5} = -5e^{-5} = -0.033689$$

$$\Delta x = -0.001 \times 12 = -0.012, \quad \Delta y = -0.001 \times -0.033689 \\ = 3.3689 \times 10^{-5}$$

update x and y .

$$x = 2 - 0.012 \quad y = 5 + 3.3689 \times 10^{-5} \\ x = 1.988 \quad y = 5.000033.$$

Iteration-2

$$\text{Gradient at } x=1.988, \left. \frac{\partial f(x, y)}{\partial x} \right|_{x=1.988} = 6 \times 1.988 = 11.928$$

$$\text{Gradient at } y=5.000033, \left. \frac{\partial f(x, y)}{\partial y} \right|_{y=5.000033} = -5e^{-5.000033} = -0.033688$$

$$\Delta x = -0.001 \times 11.928 \quad \Delta y = -0.001 \times -0.033688 \\ = -0.011928 \quad = 3.3688 \times 10^{-5}$$

update x and y .

$$x = 1.988 - 0.011928 \quad y = 5.000033 + 3.3688 \times 10^{-5} \\ x = 1.9760 \quad y = 5.000066$$