

Assignment - 2

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Find the global minimum point and value for the function,

$$f(x, y) = x^2 + y^2 + 10.$$

→ Do manual calculations for two iterations

Step 1: $\eta = 0.01$, epochs = 2, $x = 2$, $y = 3$

Step 2, $it = 1$

$$\text{Step 3: } \left. \frac{\partial f}{\partial x} \right|_{x=2} = 2x = 4$$

$$\left. \frac{\partial f}{\partial y} \right|_{y=3} = 2y = 6$$

Step 4:

$$\Delta x \propto \frac{\partial f}{\partial x}$$

$$\Delta x = -\eta \frac{\partial f}{\partial x}$$

$$\Delta x = -(0.01)(4)$$

$$= -0.04$$

$$\Delta y = -(0.01)(6)$$

$$= -0.06$$

Steps: $x = x + \Delta x$

$$= 2 + (-0.04)$$

$$= 1.96$$

$$y = y + \Delta y$$

$$= 3 - 0.06$$

$$= 2.94$$

Steps: $it = it + 1$

Step 7: if ($it > \text{epoch}$) $= (2 > 2)$

next

else

Steps

Steps: $\left. \frac{\partial f}{\partial x} \right|_{x=1.96} = 2(1.96)$

$$= 3.92$$

$$\left. \frac{\partial f}{\partial y} \right|_{y=2.94}$$

$$= 2(2.94)$$

$$= 5.88$$

$$\text{Step 4 : } \Delta x = - (0.01) (3.92) \\ = -0.039$$

$$\Delta y = - (0.01) (5.88) \\ = -0.058$$

$$\text{Step 5 : } x = 1.96 - 0.039 \\ = 1.92$$

$$y = 2.94 - 0.058 \\ = 2.882$$

$$\text{Step 6 : } it = 3$$

$$\text{Step 7 : } \text{if } (3 > 2) \\ \text{next}$$

$$\therefore \overline{x = -2.08}, \quad \cup$$

$$x = 1.92 \quad \& \quad y = 2.882$$

at it 2.