

Assignment 2

18K41A05E4

Find the global minimum point and value for the function $f(x, y) = x^2 + y^2 + 10$

⇒ Do manual calculations for 2 iterations.

Step 1 : $x = -1, y = +1, \eta = 0.1, \text{epochs} = 2$

Step 2 : $itn = 1$

Step 3 : $\frac{\partial f}{\partial x} = 2x = -2$

$$\frac{\partial f}{\partial y} = 2y = 2$$

Step 4 : $\Delta x = -\eta \frac{\partial f}{\partial x}$

$$= -(0.1)(-2)$$

$$= 0.2$$

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

$$= -(0.1)(2)$$

$$= -0.2$$

Step 5 : $x = x + \Delta x = -1 + 0.2 = -0.8$

$$y = y + \Delta y = 1 - 0.2 = 0.8$$

Step 6 : $itn = itn + 1$

$$= 1 + 1$$

$$= 2$$

Step 7 : if ($i_{ku} > Epochs$)

goto step 8

else

goto step 3

Step 3:-

$$\frac{\partial t}{\partial x} = 2x = 2(-0.8) = -1.6$$

$$\frac{\partial t}{\partial y} = 2y = 2(0.8) = 1.6$$

Step 4 :-

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

$$= -(0.1)(-1.6) = 0.16$$

$$\Delta y = -\eta \frac{\partial t}{\partial y}$$

$$= -(0.1)(1.6) = -0.16$$

step 5 : $x = x + \Delta x$

$$= -0.8 + 0.16 \Rightarrow -0.64$$

$$y = y + \Delta y$$

$$= 0.8 - 0.16 \Rightarrow 0.64$$

step 6 : $iter = iter + 1 = 2 + 1 = 3$

step 7 : if ($iter > epochs$)
 $3 > 2$

goto step 8

else : goto step 5

step 8 : $x = -0.64$

$$y = 0.64$$

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

$$= (-0.64)^2 + (0.64)^2 + 10$$

$$= 0.4 + 0.4 + 10$$

$$= 10.8$$

$$(1 + 0.01(10.8 - 10)) = 1.0108$$