

## ASSIGNMENT 2

18K-565

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

Step 1:-  $x = -1, y = 1, \eta = 0.1$  epochs = 2

Step 2:-  $itr = 1$

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

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

Step 4:-  $\Delta x = -\eta \frac{\partial f}{\partial x} = -2(-0.1) = 0.2$

$$\Delta y = -\eta \frac{\partial f}{\partial y} = -(0.1)(2) = -0.2$$

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

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

Step 6:-  $itr = itr + 1 = 1 + 1 = 2$

Step 7:- if ( $itr > epochs$ )

goto step 8

else

goto step 3

$$\text{Step 3: } \frac{\partial f}{\partial x} = 2x = +2(-0.8) = -1.6$$

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

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

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

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

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

$$\text{Step 5: } x = x + \Delta x$$

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

$$y = y + \Delta y$$

$$= 0.8 - 0.16 \Rightarrow 0.64$$

$$\text{Step 6: } \text{itr} = \text{itr} + 1 = 2 + 1 = 3$$

$$\text{Step 7: } \text{if}(\text{epochs} < \text{itr})$$

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go to step 8

else: go to step 3

$$\text{Step 8: } x = -0.64, y = 0.64$$

$$f(x, y) = x^2 + y^2 + 10 = (-0.64)^2 + (0.64)^2 + 10$$

$$= 0.4 + 0.4 + 10 = 10.8 //$$