Assignment - 2

⇒ Find global min. point and value for function $f(x,y) = x^2 + y^2 + 10$ (manual calculations for two iterations).

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

Step-2: iter = 1

Step-3: $\frac{\partial f}{\partial x} = 2x = 2(-1) = -2$

$\frac{\partial f}{\partial y} = 2y = 2(1) = 2$

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: iter = iter + 1 = 1 + 1 = 2

Step 7: if (iter > epochs) go to ~~next~~ step

$2 > 2$ false.

else go to step 3 (step3)

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

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

Step-4: $\Delta x = -\eta \frac{\partial f}{\partial x} = -0.1(-1.6) = 0.16$

$\Delta y = -\eta \frac{\partial f}{\partial y} = -0.1(1.6) = -0.16$

Step-5: $x = \Delta x + x = -0.8 + 0.16 = -0.64$

$y = y + \Delta x = 0.8 - 0.16 = 0.64$

Step-6: iter = iter + 1 = 2 + 1 = 3

Step-7: if (iter > epoch) 3 > 2 (True)

next step

else

step3

Step-8: $x = -0.64$

$y = 0.64$

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

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

$= 0.4 + 0.4 + 10$

$f(x,y) = 10.8$