Assignment-2

Step 1: $f(x, y) = x^2 + y^2 + 10$

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

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

Step 2: Initialising parameters

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

Step 3: $\left.\frac{\partial f}{\partial x}\right|_{x=1} = 2(1) = 2$, $\left.\frac{\partial f}{\partial y}\right|_{y=1} = 2(-1) = -2$

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

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

Step 5: $x = x + \Delta x$ $y = y + \Delta y$

$1 + (-0.2)$ $-1 + (0.2)$

$= 0.8$ $= -0.8$

Iteration = Iteration + 1 = 1 + 1 = 2 < epochs go to Step 7

Step 7: $\left.\frac{\partial f}{\partial x}\right|_{x=0.8} = 2(0.8)$

$= 1.6$

$\left.\frac{\partial f}{\partial y}\right|_{y=-0.5} = 2(-0.8) = -1.6$

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

$= +0.16$

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

$= 0.16$

Step 9

$x = x + \Delta x$

$= 0.8 + 0.16$

$= 0.64$

$y = y + \Delta y$

$= -0.8 + 0.16$

$= -0.64$

Step 10:

Iteration = Iterations + 1

$2 + 1 = 3$ cycles

go to step 7

$f(x, y) \Rightarrow (0.16)^2 + (-0.16)^2 + 10$

$= 10.0512$