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Assignment-2

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

Sol) Manual Calculations:

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

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

Step-7: if (1 > 2)

goto step-8

else

goto step-3

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

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

Step-6: $itr = itr + 1 = 2 + 1 = 3$

Step-7: if $(3 > 2)$

goto step8

Step-8: $x = -0.64$

$y = 0.64$

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

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

$= 0.4 + 0.4 + 10$

$= 10.8$