

## Assignment 2

Find the global minimum point and value for 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: 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)

$$2 > 2$$

True go to next step

False go to step 2

iter=2

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

$$\frac{\partial f}{\partial y} = 2y = 2(0.6) = 1.6$$

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:  $x = x + \Delta x$

$$= -0.8 + 0.16 = -0.64$$

step 6:  $\text{iter} = \text{iter} + 1$

$$2 + 1 = 3$$

step 7:  $\text{if}(\text{iter} > \text{epochs})$

$$3 > 2$$

True go to next step

False go to step 3

step 8:  $x = -0.64, y = 0.64$

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

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

$$= 0.4 + 0.4 + 10$$

$$= 10.8$$