Assignment 3

→ Given, $f(x,y) = 3x^2 + 5e^{-y} + 10$

Iteration ①

① Initialize: $x=1$, $y=1$, $\eta = 0.01$.

② Gradient calculation:

$$\frac{\partial f(x,y)}{\partial x} = 6x = 6(1) = 6$$

$$\frac{\partial f(x,y)}{\partial y} = -5e^{-y} = -5(e^{-1}) = -1.8$$

③ Step length

$$\Delta x = -\eta \left(\frac{\partial f(x,y)}{\partial x}\right) = -(0.1)(6)$$
$$= -0.6$$

$$\Delta y = -\eta \left(\frac{\partial f(x,y)}{\partial y}\right) = -(0.1)(-1.8)$$
$$= 0.18.$$

④ update x, y values.

$$x = x + \Delta x = 1 - 0.6 = 0.4$$
$$y = y + \Delta y = 1 + 0.18 = 1.18.$$

Iteration ②

① Gradient calculation:

$$\frac{\partial f(x,y)}{\partial x} = 6x = 6(0.4) = 2.4$$

$$\frac{\partial f(x,y)}{\partial y} = -5e^{-y} = -5(e^{-0.18}) = -4.17$$