LINEAR REGRESSION ASSIGNMENT – PART II QUESTION 2.2.

GRADIENT DESCENT ALGORITHM – BIVARIATE FUNCTION. ~~ANALYTIC~~.

$J(x,y) = x^2 + 2xy + y^2$, $\eta = 0.1$, $(x_0, y_0) = (1, 1)$

SOLUTION = $J(x,y) = x^2 + 2xy + y^2$

$= 1x^2 + 2yx + y^2$

$a \quad b \quad c$

$$x = \frac{-b}{2a} = \frac{-2y}{2 \times 1} = -y$$

$\boxed{x = -y}$ MINIMA.

1st ITERATION

$$\begin{bmatrix} x_{new} \\ y_{new} \end{bmatrix} = \begin{bmatrix} x_{old} \\ y_{old} \end{bmatrix} - \eta \begin{bmatrix} \partial J/\partial x \\ \partial J/\partial y \end{bmatrix}$$

$$= \begin{bmatrix} 1 \\ 1 \end{bmatrix} - 0.1 \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 \\ 1 \end{bmatrix} - \begin{bmatrix} 0.1 \\ -0.1 \end{bmatrix}$$

$$= \begin{bmatrix} 0.9 \\ 1.1 \end{bmatrix}$$

2nd ITERATION.

$$= \begin{bmatrix} 0.9 \\ 1.1 \end{bmatrix} - 0.1 \begin{bmatrix} 0.9 \\ 1.1 \end{bmatrix}$$

$$= \begin{bmatrix} 0.9 \\ 1.1 \end{bmatrix} - \begin{bmatrix} 0.09 \\ 0.11 \end{bmatrix}$$

$$= \begin{bmatrix} 0.81 \\ 0.99 \end{bmatrix}$$