

LINEAR REGRESSION ASSIGNMENT - PART II QUESTION 2 of 1

GRADIENT DESCENT ALGORITHM - UNIVARIATE FUNCTION

$$\boxed{J(x) = x^2 + x + 1}, \quad \eta = 0.1, \quad x_0 = 1$$

SOLUTION:

$$\begin{aligned} J(x) &= x^2 + x + 1 \\ &= \underset{\downarrow a}{1}x^2 + \underset{\downarrow b}{1}x + \underset{\downarrow c}{1} \end{aligned}$$

$$\begin{aligned} \text{So } x &= \frac{-b}{2a} \\ x &= \frac{-1}{2 \times 1} \end{aligned}$$

$$x = -\frac{1}{2} \Rightarrow \text{MINIMA} = \boxed{-0.5}$$

$$\theta_{\text{new}} = \theta_{\text{old}} - \eta \left. \frac{\partial J}{\partial \theta} \right|_{\theta = \theta_{\text{old}}}$$

$$\boxed{J'(x) = 2x + 1 = 0}$$

1ST ITERATION

$$\theta_{\text{new}} = \theta_{\text{old}} - \eta(2x + 1)$$

$$\begin{aligned} \theta_{\text{new}} &= 1 - 0.1(2 \times 1 + 1) \\ &= 1 - 0.1(3) \\ &= 1 - 0.3 \\ &= \boxed{0.7} \end{aligned}$$

2nd ITERATION

$$\begin{aligned} \theta_{\text{new}} &= 0.7 - \eta(2 \times 0.7 + 1) \\ &= 0.7 - 0.1(2.4) \\ &= 0.7 - 0.24 \\ &= \boxed{0.46} \end{aligned}$$

