

Project 1 - Nick Patemostro

1.4 Theory

$$\{x_1, \dots, x_n\}$$

$$\sum_{i=1}^n (x_i - c)^2$$

Since we want to minimize the above equation, we will take the derivative and find the critical points

$$S = \sum_{i=1}^n (x_i - c)^2$$

$$S' = \sum_{i=1}^n 2(x_i - c)(-1)$$

$$S' = -2 \sum_{i=1}^n (x_i - c)$$

$$-2 \sum_{i=1}^n (x_i - c) = 0$$

$$\sum_{i=1}^n (x_i - c) = 0$$

$$\sum_{i=1}^n x_i - \sum_{i=1}^n c = 0$$

$$\sum_{i=1}^n x_i - \underbrace{nc}_{\text{from total number of steps}} = 0$$

$$c = \frac{\sum_{i=1}^n x_i}{n} = \bar{x}$$