

Problem 4.

4. Fitted function: $f(x) = a + bx$

$$\text{where } a = \frac{\bar{y} \sum x_i^2 - \bar{x} \sum x_i y_i}{\sum x_i^2 - \frac{1}{N} (\sum x_i)^2}$$

$$b = \frac{\sum x_i y_i - \frac{1}{N} \sum x_i \sum y_i}{\sum x_i^2 - \frac{1}{N} (\sum x_i)^2}$$

Want to prove that $f(\bar{x}) = \bar{y}$

$$f(\bar{x}) = \frac{\bar{y} \sum x_i^2 - \bar{x} \sum x_i y_i + \bar{x} (\sum x_i y_i - \frac{1}{N} \sum x_i \sum y_i)}{\sum x_i^2 - \frac{1}{N} (\sum x_i)^2}$$

$$= \frac{\bar{y} \sum x_i^2 - \frac{1}{N} \sum x_i \cdot \frac{1}{N} \sum x_i \sum y_i}{\sum x_i^2 - \frac{1}{N} (\sum x_i)^2} = \bar{y}$$