

8. Suppose that the random variables Y_1, \dots, Y_n satisfy

$$Y_i = \beta x_i + \epsilon_i, \quad i = 1, 2, \dots, n$$

where x_1, \dots, x_n are fixed constants and $\epsilon_i, i = 1, \dots, n$ are IID $N(0, \sigma^2)$, where $\sigma^2 > 0$ is unknown.

- (a) Find a two-dimensional sufficient statistic for (β, σ^2) .
- (b) Find the MLE of β assuming the value σ^2 is known.