

Middle East Technical University
Department of Economics
Econ 206: Statistics for Economists-II

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Question 1

Suppose we have the following data to estimate the relationship between X and Y using the linear population model:

$$y_i = \beta_0 + \beta_1 x_i + \epsilon_i \quad (1)$$

Table 1: X and Y Series

y	X
4	1
5	4
7	5
12	6

Calculate $\hat{\beta}_0$ and $\hat{\beta}_1$ using the least squares estimators.

Question 2

Suppose the population regression function is $y_i = \beta_0 + \beta_1(x_i - \bar{x}) + \epsilon_i$. Derive the least squares estimator for β_0 . Note that for any random variable x_i , the sum of the deviation from its mean is zero, i.e. $\sum(x_i - \bar{x}) = 0$.

Question 3

Take the population model with no intercept; i.e. $y_i = \beta x_i + \epsilon_i$:

- (a) Find the least squares estimator for β .
- (b) Suppose that we have the same data points for y and x as in Question 1. Calculate $\hat{\beta}$ using the data.

Question 4

Inflation forecasts for the coming year were asked to economists in the business world, and it was observed that their answers have a normal distribution and show a standard deviation of 1.8. What is the percentage probability that the standard deviation of the forecasts of 15 selected economists is more than 2.60?

Question 5

Let X_1 , X_2 and X_3 be random observations belonging to a population with mean μ and variance σ^2 . Let the following be the point estimators of μ :

$$\mu_1 = \frac{1}{3}X_1 + \frac{1}{3}X_2 + \frac{1}{3}X_3, \quad \mu_2 = \frac{1}{2}X_1 + \frac{1}{2}X_2 \quad (2)$$

- **a-)** Show that each estimator is an unbiased estimator.
- **b-)** Which of these is the most efficient estimator?
- **c-)** Find the relative efficiency of the μ_1 estimator compared to the μ_2 estimator.