

Problem Set 3

Preparatory Course in Statistics and Econometrics

Exercise 1

Given the following data points:

$$(x_1, y_1) = (1, 2), \quad (x_2, y_2) = (2, 4), \quad (x_3, y_3) = (3, 5), \quad (x_4, y_4) = (4, 4)$$

Estimate the slope (b_1) and intercept (b_0) of the simple linear regression model.

Exercise 2

Consider a simple linear regression model where the estimated slope is 2.5. Given a standard error of 0.5 for the slope, calculate the t-statistic and test the two-sided hypothesis that this coefficient is equal to 2. Moreover, check how your answer would change if the alternative hypothesis is that the coefficient is greater than 2. Use a significance level of 0.05 and assume that the sample size is large.

Exercise 3

Consider a simple linear regression model in which the sum of squared residuals is 10 and the total sum of squares is 50. How much of the variability in the dependent variable is explained by the model?

Exercise 4

For the regression model in Exercise 2, given a standard error of 0.5 for the slope, calculate the 95% confidence interval for the slope.