

LAIKIPIA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

THIRD YEAR EXAMINATION FOR THE DEGREE
OF SCIENCE IN ECONOMICS & STATISTICS

ECON 311: ECONOMETRICS I

STREAM: *BSC (ECON STAT)*

TIME: *2 HRS*

DAY: *THURSDAY [14.30 P.M-16.30 P.M]*

DATE: *29/01/2026*

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS: Answer QUESTION ONE and other TWO QUESTIONS**QUESTION ONE**

- a) Differentiate between exact relationship and stochastic relationship **(2 Marks)**
- b) (i) Derive the normal regression equations for a bivariate regression model given below: **(8 Marks)**
- $$Y = b_0 + b_1X_1 + b_2X_2 + e_i$$
- (ii) Hence, solve for OLS estimators using matrix inverse method **(4 Marks)**
- (iii) State the assumptions which must hold for the results in (ii) above to be non-spurious **(5 Marks)**
- c) The following data is given relating dependent variable Y_i and explanatory variable X_i , OLS estimators and the necessary details for testing of significance of parameters.

Year	Y_i	X_i	$\hat{Y}_i = 15.529 + 0.7572X_i$	e_i	e_i^2	X_i^2	x_i^2
1	102	114	100.34				
2	106	118	103.78				
3	108	126	110.66				
4	110	130	114.10				
5	122	136	119.26				
6	124	140	122.70				
7	128	148	129.58				
8	130	156	136.46				
9	142	160	139.90				
10	148	164	143.34				
11	130	170	148.50				
12	154	178	155.38				
				$\sum e_i =$	$\sum e_i^2 =$	$\sum X_i^2 =$	$\sum x_i^2 =$

- i) Fill in the table by computing the values on the columns left blank **(5 Marks)**
- ii) Find the value of the following measures:
- Variance of the error term **(2 Marks)**
 - The standard error and t ratio for the intercept **(4 Marks)**

QUESTION TWO

- a) Distinguish clearly between economic theory, econometrics and economic statistics within the context of the scope of econometrics **(6 Marks)**
- b) Briefly discuss the methodology of econometrics **(8 Marks)**
- c) Discuss the Gauss-Markov Theorem **(6 Marks)**

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QUESTION THREE

- a) Distinguish between Multicollinearity, Heteroscedasticity and Autocorrelation (6 Marks)
- b) What are the consequences of Heteroscedasticity in regression model? (4 Marks)
- c) Explain how Durbin-Watson statistic can be used to test for no correlation, perfect positive and perfect negative correlation (10 Marks)

QUESTION FOUR

Laikipia University has been supplying Wheat to Kenya Seed for several years. You have been commissioned by the University to analyze the supply behaviour relating sales to prices and costs of production. You have been provided with following information

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Sum of Squares (MSS)
Due to Regression (ESS)	23.08	-	-
Due to Residual (RSS)	-	-	-
Total Variation (TSS)	23.20	4	

- i) What is the name attributed to the table above (1 Mark)
- ii) Find the number of years considered in the data provided (2 Marks)
- iii) Compute RSS (3 Marks)
- iv) Find the degrees of freedom for ESS and RSS (4 Marks)
- v) Find the MSS for ESS and RSS (4 Marks)
- vi) Find the R^2 and adjusted R^2 (6 Marks)

QUESTION FIVE

- a) Differentiate between deterministic model and stochastic model (3 Marks)
- b) Justify the inclusion of an error term in econometric analysis (3 Marks)
- c) The following data relates to the prices of Pineapples in Kenya Shillings from 10 different markets

Price 1	6	5	8	8	7	6	10	4	7	9
Price 2	8	7	7	10	5	8	10	6	6	8

- i) Compute the simple linear correlation coefficient between the two sets of prices and interpret the results (6 Marks)

- ii) Compute the Spearman's Rank correlation coefficient between the two sets of prices and interpret your results **(6 Marks)**
- iii) Compute the coefficient of determination for the two sets of prices and interpret your results **(2 Marks)**