

EASTERN UNIVERSITY, SRI LANKA
FACULTY OF COMMERCE AND MANAGEMENT

3rd YEAR 1st SEMESTER EXAMINATION IN B.COM HONOURS
IN BUSINESS ECONOMICS 2021 / 2022
Proper / Repeat (February / March 2024)

ECN 3043: ECONOMETRICS

Answer all questions.

Calculator Allowed.

Time: 3 Hours

01. a) What are the steps in the methodology of Econometrics? (4 Marks)
- b) Define nominal and ordinal variables, and provide examples for each in an economic context. (4 Marks)
- c) What are the differences between primary and secondary data collection methods? (6 Marks)
- d) Briefly explain the following. (6 Marks)
- i). Time series data
 - ii). Descriptive statistics
 - iii). Kurtosis
- (Total 20 Marks)**

02. a) Below is a dataset indicating the use of computers in the ICT lab by students and instructors, distinguishing between instances where computers were used and instances where they were not used.

Instructors \ Students	Used	Did not use	Total
Used	130	95	225
Did not use	84	142	226
Total	214	237	451

Find the probabilities on the following using the table above.

- i) "Did not use" by Students. (2 Marks)
- ii) "Used" by Students and Instructors. (2 Marks)
- iii) Students utilized computers in the ICT lab, and instructors also engaged in computer use. (2 Marks)

- b) Imagine you have data on the hours spent (X) by employees on training sessions and the subsequent performance ratings (Y) on a 5-point scale. The dataset for 8 employees yields the following summary statistics:

$$\Sigma X = 78$$

$$\Sigma Y = 73$$

$$\Sigma XY = 752$$

$$\Sigma X^2 = 792$$

$$\Sigma Y^2 = 735$$

- i). Investigate the relationship between training hours and performance ratings by computing the correlation coefficient.

(6 Marks)

- ii). Construct a linear regression model to understand the impact of training hours on performance ratings.

(5 Marks)

- iii). Utilizing the regression model, predict the performance rating for an employee who participated in 3 hours of training.

(3 Marks)

(20 Marks)

03. a) Sampling is the process of learning about population on the basis of sample drawn from

- i). List out the non-probability and probability sampling methods.

(4 Marks)

- ii). Write two merits and demerits of simple random sampling?

(4 Marks)

- b) The mean score of a random sample of 50 final year who took the mid-test of Econometrics subject is calculated to be 80. The population variance is known to be 0.36.

- i). Find the margin of error E.

(3 Marks)

- ii). Find the 95 per cent confidence interval for the mean of the entire final year 50 students.

(3 Marks)

- iii). Find the lower and upper confidence limits.

(2 Marks)

- c) Create a table that illustrates the concepts of Type I and Type II errors.

(4 Marks)

(20 Marks)

04. a) Suppose you are analysing a dataset with three independent variables (X1, X2, and X3) using a multiple linear regression model, and the resulting STATA output is as follows:

Source	SS	df	MS
Model	5649.47979	3	1883.15993
Residual	143.950985	16	8.99693654
Total	5793.43077	19	304.917409

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
y					
x1	.9286648	.1175349	7.90	0.000	.6795019 1.177828
x2	-2.337473	.0941676	-24.82	0.000	-2.537099 -2.137846
x3	2.018029	1.416239	1.42	0.173	-.9842643 5.020323
_cons	25.7459	2.067968	12.45	0.000	21.362 30.12979

Utilising the provided STATA output from the multiple linear regression model, answer the following questions:

i). Interpret the coefficients of the model with respect to variables X1, X2, and X3. (3 Marks)

ii). Calculate the value of R^2 and explain it. (3 Marks)

iii). Conduct a hypothesis test for the significance level (5%) of the slope coefficients of X1, X2, and X3. (3 Marks)

iv). Test the overall significance of the model. (5 Marks)

b) Consider the log-log model $\ln Q = \ln 2.43 + 0.23 \ln L + 0.32 \ln K$

i). Interpret the slope coefficients. (3 Marks)

ii). Transform the above log-log model into the Cobb-Douglas production function and determine the type of returns to scale. (3 Marks)
(20 Marks)

05. a) How can multicollinearity be detected in a regression analysis, and what are the recommended remedial measures to address it? (6 Marks)

b) What factors contribute to heteroskedasticity in a regression model, and what formal tests are available for detecting it? (6 Marks)

- c) Suppose you conducted a linear regression analysis with profit (Y), marketing expenses (X1), and production cost (X2) as variables. The Durbin-Watson statistic is calculated to be $DW = 1.38$. Given a significance level of 1% and a sample size of 80, what conclusion can be drawn regarding the existence of autocorrelation?

(Note: k represents the number of parameters in the model, including the intercept term.)
(4 Marks)

- d) Define specification error and enumerate the two types of errors that are prone to occur when choosing explanatory variables.

(4 Marks)
(20 Marks)

(Total 100 Marks)