



FACULTY OF HEALTH AND DEPARTMENT OF
PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY
APPLIED SCIENCES
ACCOUNTING,
ECONOMICS AND FINANCE

QUALIFICATION: BACHELOR OF ECONOMICS	
QUALIFICATION CODE: 07BECO	LEVEL: 7
COURSE CODE: ECM712s	COURSE NAME: ECONOMETRICS
SESSION: June 2022	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100
SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MR. PINEHAS NANGULA
MODERATOR:	Dr R. KAMATI
INSTRUCTIONS	
1. Answer ALL the questions in section A and B 2. Write clearly and neatly. 3. Number the answers clearly.	

PERMISSIBLE MATERIALS

1. Scientific calculator
2. Pen and Pencil
3. Ruler

THIS QUESTION PAPER CONSISTS OF _5_ PAGES (Including this front page)

SECTION A

[20 MARKS]

MULTIPLE CHOICE QUESTIONS

1. OLS stands for what in Econometrics?
 - a) Optimally Linearized Solution
 - b) There is no such thing in Econometrics
 - c) The only rock band that Econometricians are crazy about
 - d) Ordinary Least Squares

2. Data collected at a point in time is called
 - a) Cross-sectional data
 - b) Time series data
 - c) Pooled data
 - d) Panel data

3. Data collected for a variable over a period of time is called
 - a) Cross-sectional data
 - b) Time series data
 - c) Pooled data
 - d) Panel data

4. In the estimated model $\widehat{\log Q}_i = 2.25 - 0.7\log P_i + 0.02Y_i$, where p is the price and q is the quantity demanded of a certain good and Y is disposable income, what is the meaning of the coefficient on logP?
 - a) If the price increases by 1%, the demanded quantity will be 0.007% lower on average, ceteris paribus
 - b) If the price increases by 1%, the demanded quantity will be 70% lower on average, ceteris paribus
 - c) If the price increases by 1%, the demanded quantity will be 0.7% lower on average, ceteris paribus
 - d) None of the answers above is correct

5. In the estimated model $\widehat{\log Q_i} = 2.25 - 0.7 \log P_i + 0.02 Y_i$, where p is the price and q is the quantity demanded of a certain good and Y is disposable income, what is the meaning of the coefficient on $\log Y$?
- If disposable income increases by a thousand dollars, the demanded quantity will be 0.02% higher on average, ceteris paribus
 - If disposable income increases by a thousand dollars, the demanded quantity will be 0.0002% higher on average, ceteris paribus
 - If disposable income increases by a thousand dollars, the demanded quantity will be 2% higher on average, ceteris paribus
 - None of the answers above is correct
6. Which of the following are alternative names for the dependent variable (usually denoted by y) in linear regression analysis?
- The regressand
 - The regressor
 - The explanatory variable
 - None of the above
7. . Which of the following statements is TRUE concerning OLS estimation?
- OLS minimises the sum of the vertical distances from the points to the line
 - OLS minimises the sum of the squares of the vertical distances from the points to the line
 - OLS minimises the sum of the horizontal distances from the points to the line
 - OLS minimises the sum of the squares of the horizontal distances from the points to the line.
8. The residual from a standard regression model is defined as
- The difference between the actual value, y , and the mean, \bar{y}
 - The difference between the fitted value, \hat{y} , and the mean, \bar{y}
 - The difference between the actual value, y , and the fitted value, \hat{y}
 - The square of the difference between the fitted value, \hat{y} , and the mean, \bar{y}

9. Which one of the following statements best describes the algebraic representation of the fitted regression line?

- a) $\hat{y}_i = \hat{\alpha} + \hat{\beta}x_i + \hat{u}_i$
- b) $\hat{y}_i = \hat{\alpha} + \hat{\beta}x_i$
- c) $\hat{y}_i = \hat{\alpha} + \hat{\beta}x_i + u_i$
- d) $y_i = \hat{\alpha} + \hat{\beta}x_i + \hat{u}_i$

10. Which one of the following statements best describes a Type II error?

- a. It is the probability of incorrectly rejecting the null hypothesis
- b. It is equivalent to the power of the test
- c. It is equivalent to the size of the test
- d. It is the probability of failing to reject a null hypothesis that was wrong

SECTION B

[80 MARKS]

QUESTION ONE

[30 MARKS]

All questions pertain to the simple (two-variable) linear regression model for which the population regression equation can be written in conventional notation as:

$$Y_i = \beta_1 + \beta_2 X_i + u_i \text{ equation 1}$$

where Y_i and X_i are observable variables, β_1 and β_2 are unknown (constant) regression coefficients, and u_i is an unobservable random error term. The Ordinary Least Squares (OLS) sample regression equation corresponding to regression equation (1) is

$$Y_i = \hat{\beta}_1 + \hat{\beta}_2 X_i + \hat{u}_i \text{ equation 2}$$

where $\hat{\beta}_1$ is the OLS estimator of the intercept coefficient β_1 , $\hat{\beta}_2$ is the OLS estimator of the slope coefficient β_2 , u_i is the OLS residual for the i -th sample observation, and N is sample size (the number of observations in the sample).

- a) State the Ordinary Least Squares (OLS) estimation criterion. State the OLS normal equations. [5 marks]
- b) Derive the OLS normal equations from the OLS estimation criterion. [5 marks]
- c) Show that the OLS slope coefficient estimator $\hat{\beta}_1$, is a linear function of the Y_i , sample values. [10 marks]

- d) Stating explicitly all required assumptions, prove that the OLS slope coefficient estimator $\hat{\beta}_2$ is an unbiased estimator of the slope coefficient β_2 . [10 marks]

QUESTION TWO [20 MARKS]

- a) What do we mean by a linear regression model? [4 marks]
- b) The following are linear intrinsically linear regression models. You are required to transform them into linear regression models

i. $\ln Y_i = \frac{1}{1 + e^{\beta_1 + \beta_2 X_i + u_i}}$ [4 marks]

ii. $\ln Y_i = \frac{1}{\beta_1 + \beta_2 X_i + u_i}$ [4 marks]

iii. $Y_i = \frac{X_i^2}{\exp(\beta_1 + \beta_2 X_i + u_i)}$ [4 marks]

iv. $\ln Y_i = 1 + \exp(\beta_1 + \beta_2 X_i)$ [4 marks]

QUESTION TWO [20 MARKS]

The following is the econometric model which is presented in four different forms. You are required to interpret each of them.

a) $\hat{C} = -8.078 + 0.70641 \text{Income}$ [5 marks]



b) $\hat{C} = -18.072 + 22.73841 \text{LogIncome}$ [5 marks]

c) $\widehat{\text{Log}C} = 7.203 + 0.000218 \text{Income}$ [5 marks]

d) $\widehat{\text{Log}C} = -0.2957 + 1.0464 \text{LogIncome}$ [5 marks]

QUESTION FOUR [10 MARKS]

The data in the table below refer to a total population of 40 families in a hypothetical community and their weekly income (I) and weekly consumption expenditure (C), both in dollars. The 28 families are divided into 5 income groups (from N\$200 to N\$1000) and the weekly expenditures of each family in the various groups are as shown in the table below.

 Income I _i	200	400	600	800	1000
Consumption	150	300	573	698	890
	189	350	450	798	850
	123	287	470	700	950

	190	390	560	758	863
		300	498	766	
		396	564	788	
			497		
			500		

- a) Calculate the conditional mean and unconditional mean value of C_i [6 marks]
- b) Use the answer in part a) to draw the population regression line or population regression curve [4 marks]

All the best