"Investing in Africa's Future"

COLLEGE OF BUSINESS, PEACE, LEADERSHIP, AND GOVERNANCE

NMEC 407: ECONOMETRICS 11

END OF SECOND SEMESTER EXAMINATIONS

MAY/JUNE 2023

LECTURER: MR G. MANDEWO
DURATION: 3 HOURS

INSTRUCTIONS

Answer **Question number 1 and Any other THREE questions.** Total possible mark is **100.**

Start **each** question on a new page in your answer booklet.

The marks allocated to **each** question are shown at the end of the question.

Show all your workings.

Credit will be awarded for logical, systematic and neat presentations.

1. (a) A researcher applies Multivariate Regression Analysis to important characteristics that can influence the amount of customers of a company. For the study, the researcher has at disposal data from 92 customers in 4 metric variables:

X8 – Technical Support X11 – Product Line

X15 – New Products X19 – Satisfaction

Each variable is measured on an integer scale with points from 1 to 10, with 1 being "Poor" and 10 being "Excellent". The researcher considers variable X19 as representative of the customer satisfaction with respect to the overall company's activity, while she considers variables X8, X11, and X15 as representative of the customer satisfaction with respect to just a specific part of the company activities, as explained by the variable names. Therefore, the researcher tries to explain the variation in X19 by means of the variation in X8, X11, and X15.

(i) Set the Population Regression Function (Informed by *apriori* expectation). **[5 Marks]**

(ii) Interpret the regression equation with reference to the information given above. Explain in detail the procedures you will undertake to test for the significance of individual estimated parameters. **[5 Marks]**

(iii) What is the statistical use of the Multivariate regression analysis? **[5 Marks]**

(iv) Sometimes models are wrongly specified, explain the two major model specification problems **[5 Marks]**

(v) How would you undertake the direction of causality test for the above variable (Hint: pair wise procedure)? **[5 Marks]**

(b) Suppose you want to estimate a linear regression model. What are the differences between the maximum likelihood approach and the ordinary least squares (OLS) approach? **[5 Marks]**

(c) Make a clear distinction between probit models and logit models. **[5 Marks]**

(d) Why do we test for stationarity? **[5 Marks]**

2. The problem of autocorrelation in econometrics may hinder the estimation of regression equations. You are required to fully conceptualise the problem, discuss the causes, demonstrate a detection METHOD and suggest possible solutions to the problem. In your responses you are supposed to give concrete examples.

[20 Marks]

3. There are many functional forms of an econometric model. Demonstrate the various functional forms and show how you would carry out regression analysis using an example of your own. What are the methods you would use to test for model specifications? **[20 Marks]**

4. Reference is made to the schematic building blocks of an empirical study. Using a practical example of your own show how you will implement the steps of an empirical study in econometrics **[20 Marks]**

5. The problem of multicollinearity in econometrics may hinder the estimation of regression equations. You are required to fully conceptualise the problem, illustrate the effects and suggest possible solutions to the problem. In your responses you are supposed to give concrete examples **[20 Marks]**

6. The following are results are for a linear model and non linear Model

	Linear		Non-Linear	
	Estimate	Std. Error	Estimate	Std. Error
α	11.1458	9.64	187.899	38.946
β	0.898530	0.00586	0.246004	0.07947
γ	1.00000	-	1.15640	0.03927
$e'e$		12.068		8420
σ		18.309		15.294
R^2		0.99856		0.99899

(a) The above results in standard notation **[5 Marks]**
(b) In terms of the coefficient of determination which model is more powerful and why? If you are given that the sample size is 30 test for the significance of the whole model **[5 Marks]**
(c) Explain the different functional forms that an econometrician may adopt in modelling relationships between variables **[10 Marks]**

7. The problem of Heteroscedasticity in econometrics may hinder the estimation of regression equations. You are required to fully conceptualise the problem, discuss the causes, illustrate the effects and demonstrate one detection method. In your responses you are supposed to give concrete examples **[20 Marks]**

End of Examination