



**FACULTY OF MANAGEMENT AND ADMINISTRATION
CONVENTIONAL PROGRAMME**

COURSE TITLE: MEC 303 – INTRODUCTION TO ECONOMETRICS

SEMESTER 1: FINAL EXAMINATION – NOV/DEC, 2014

LECTURER: MR G. MANDEWO

TIME: 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 section.

Show all your workings.

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

- 1 (a) Make a distinction between type one error and type two error [4 marks]
- (b) Explain how you can test the significance of a parameter using the confidence interval approach [4 marks]
- (c) Demonstrate the schematic building blocks of econometrics. [4 marks]
- (d) Consider a Simple Linear Regression Function of the form:

$$Y_i = \alpha + \beta X_i + \mu_i$$

Where Y_i is the explained variable

X_i is the explanatory variable

Using the Ordinary Least squares method prove that

i. $\hat{\alpha} = \frac{1}{n} \sum Y_i - \hat{\beta} \frac{1}{n} \sum X_i$ [4 marks]

ii. $\hat{\beta} = \frac{\sum XY - \frac{(\sum X)(\sum Y)}{n}}{\sum X^2 - \frac{(\sum X)^2}{n}}$ [4 marks]

- (e) Explicitly differentiate between homoscedasticity and heteroscedasticity [4 marks]

- (f) Given a model of the form

$$\text{Estimated Tax} = -0.221 + 0.142 \text{ Income}$$

$$N=28 \quad R^2=0.997 \quad \hat{\sigma} = 0.687$$

- i. Do the observed signs agree with your *a priori* expectations [Justify your response] [2 marks]
- ii. What is the interpretation for the above regression function [4 marks]
- iii. Test for the significance of individual parameters at 95% Level of Significance. [4 marks]
- iv. Test the significance of the whole model. [4 marks]

- (g) Propose reasons why the coefficient of determination may not be a sufficient statistic to justify that a model is valid. [4 marks]

- (h) I overheard the class president, Mr David Nhunhama, warning Marian that a high coefficient of determination does not imply a good model. Comment. [4 marks]

2. (a) What is the difference between asymptotic properties of a good estimator and other properties? [4]

- (c) Chimwemwe was contracted to study the performance of econometrics students in University wide courses. The class consists of 28 students.

$$P = 10.2 + 0.5H - 0.75I + 2.3SLB$$

$$(2.42)$$

$$(0.12)$$

$$(4.22)$$

$$(1.33)$$

 $R^2 = 0.967$

Given that P is for performance

H denotes the number of study hours

I is the IQ intelligence Quotient

SLB is the student language base

- i. Test the significance of individual parameters at 95% LOS. [4]
 - ii. Interpret the regression equation and appeal to practical intuition [2]
 - iii. Test for the significance of the whole model [4]
 - iv. Compute the adjusted R square and interpret it. [4]
3. (a) What are the three forms of data, explain giving examples? [4]
 (b) What is econometrics? [2]
 (c) Why is it critical to determine the direction of causality before any regression analysis? [4]
 (d) What do you understand by the term Ordinary Least Squares (OLS)? [4]
 (e) What is the fundamental difference between multiple linear regression model and single linear regression model? [4]
 (f) What is a dummy variable and give 3 examples where it is appropriate to use it? [4]

4. Given the following data on Consumption (C) and Income (M)

C	50	55	55	60	75	80	85	90	90	100
M	120	130	150	150	180	180	200	210	250	260

- (a) Plot a scatter diagram and ascertain *a priori* expectations. [4]
- (b) Estimate the regression function and interpret the findings. [4]
- (c) Fit the estimated regression function in the scatter diagram. [2]
- (d) Use the regression function to forecast the change in Consumption if income falls to 100 [2]
- (e) Compute the coefficient of determination and interpret it. [4]
- (f) Panashe argued that Income does not affect Consumption. Demonstrate how you could prove him right or wrong. [2]

5. A relationship between loanable funds and the lending rate is currently being explored by Mr. Pascal, a third year student doing econometrics,

Interest rate	50	60	70	80	90
loans	180	140	120	100	80

- (a) Appealing to economic theory justify your estimated regression equation. [2]
- (b) Calculate the coefficient of determination and interpret it. [2]
- (c) What is the variance estimated parameter of $\hat{\beta}$; where the estimator of σ_u^2 is $\frac{\sum e^2}{n-2}$ and $\sum e^2 = \sum y^2 - \hat{\beta}^2 \sum x^2$ [2]
- (d). The term BLUE describes a good estimator. How can we demonstrate the estimator is best? [2]
- (e) Given a regression equation of the form $y = \alpha + \beta x + \mu$ Where $x = X - \bar{X}$ and $y = Y - \bar{Y}$ deduce the formula for $\hat{\beta}$ [4]
- (f) Deduce the variance of the estimated parameter $\hat{\beta}$ [4]

6. The following regression results were obtained from Malawi annual data 1963 – 1989

Modeling Savings by OLS (using data.in7)				
The estimation sample is: 1963 - 1989				
	Coefficient	Std.Error		
Constant	18455	0.071		
INFL	-450	220		
R	1220	340		
Y _t	-750	810		
R^2	0.795			
log-likelihood	-317.128		DW	2.03

Where INFL is inflation, R is interest rates, Y_t is the average income

- Express the results in standard notation. [4]
- What are the a priori expectations? [4]
- Test the significance of individual parameters using the confidence interval for a two tailed test at 95% Level of Significance. [4]
- Test the significance of the whole model? [6]

7. The following set of models for the demand for holidays abroad by Egyptian residents produced the estimates.

	1	11	111
EXCH	0.226 (0.19)	0.338 (0.40)	1.127 (0.95)
RDISPY	0.240 (8.65)	0.232 (10.46)	0.147 (2.60)
HOL ₋₁			0.86 (3.20)
TEMP		-0.792 (1.61)	-0.592 (1.11)
RAIN		0.0045 (1.61)	0.0042 (2.37)
Constant	19.436 (2.11)	26.43 (2.74)	-461.91 (0.91)
R ²	0.60	0.67	0.68
\bar{R}^2	0.57	0.65	0.65
DW	0.71	1.71	2.25
N	19	19	19

(Figures in brackets are t values) and where

HOL is the number of overseas holidays taken by Egyptian residents in the current year.

EXCH is the average exchange rate

RDISPY is the real disposable income at 1980 prices

HOL₋₁ is the number of holidays taken by Egyptian residents in the previous year

TEMP is the mean daily temperature in Egypt the previous year

RAIN is the annual rainfall level in Egypt in the previous year

N is the sample size

DW is the Durbin- Watson statistic

- Interpret the estimated equations. [4]
- The coefficient on RAIN is very small. Does this suggest that RAIN is not important? Explain your answer. [4]
- Which of the three models do you prefer as an explanation of the demand for holidays abroad and why? [6]
- In model 3, the general assertion is the all the coefficients are equal to zero. Illustrate how this can be approved or denied. [4]

[END OF EXAMINATION]