CHUKA UNIVERSITY

COLLEGE

UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE (ECONOMICS & STATISTICS)

ECON 331: ECONOMETRICS I

STREAMS: B.SC (ECON. STATISTICS) Y3 **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 3/8/2011 **2.30 P.M. – 4.30 P.M.**

INSTRUCTIONS

ANSWER QUESTION ONE (1) AND ANY OTHER TWO QUESTIONS.

QUESTION ONE (1) CARRIES 30 MARKS AND THE REST 20 MARKS EACH.

DO NOT WRITE ON THE QUESTION PAPER.

1. (a) "Econometrics is a special type of economic analysis and research in which general economic theory, formulated in mathematical terms is combined with empirical measurement of economic phenomenon". Explain the goals of econometrics. [3 marks]

(b) The data in table 1 below reports the aggregate consumption (Y, in billions of US Dollars) and disposable income(X, also in billions of US dollars) for a developing economy for the 12 years from 1998 to 2009.

Table 1: Aggregate consumption (Y) and Disposable Income (X)

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Y_i	102	106	108	110	122	124	128	130	142	148	150	154
X_i	114	118	126	130	136	140	148	156	160	164	170	178

(i) State the general relationship between the consumption Y and disposable income X in the stochastic form and estimate the consumption regression equation. [5 marks]

(ii) What is the meaning of the estimator $\hat{b}_0$ and $\hat{b}_1$? Find the income elasticity of consumption. [3 marks]

(iii) For the aggregate consumption-income observation in table 1 above find standard errors; $S(u) = \hat{\sigma}_u$, $S(b_0)$ and $S(b_1)$. [6 marks]

(iv) State the null and alternative hypotheses; test the statistical significance of the parameters of the regression equation estimated in (i) above at 5% significance level, construct the 95% confidence intervals for the parameters and state the degrees of freedom. [10 marks]

(v) Find the R^2 for the estimated consumption regression in (i) above and interpret its value. [3 marks]

2. (a) Applied econometrics research is concerned with the measurement of the parameters of economics relationships and with the prediction of the values of economic variables. Discuss the stages of econometric research methodology. [8 marks]

(b) State each of the assumptions of the classical regression model and give an intuitive explanation of the meaning and need of each of them. [12 marks]

3. (a) The following result is an output of a multiple regression analysis from Minitab 14 (an Econometrics software) with 10 observation.

```
Predictor      Coef    SE  Coef         T     P-value
Constant       31.981     1.632       19.60   0.000
X1             0.6501    0.2502        2.60   0.036
X2             1.1099    0.2674        4.15   0.004

S  =  1.39747      R - Sq = 99.2%     R - Sq (adj) = 98.9%

Analysis of Variance

Source         DF      SS      MS      F       P - value
Regression      2  1620.33   810.15  414.85  0.000
Residual Error  7    13.67     1.95
Total           9  1634.00

Durbin-Watson statistic = 2.11409
```

(i) Write down the regression equation from the output and explain how X1 and X2 affect the Y.

(ii) Interpret the significance of each of the parameter estimates.

(iii) Using the analysis of variance interpret the overall significance of the regression equation.

(iv) Interpret the results of R-sq.

(v) What does the Durbin-Watson statistics test, interpret its value.
[16 marks]

(b) Prove that $r^2 = \hat{b}_1 . \frac{\sum xy}{\sum y^2}$ [4 marks]

4. (a) Consider the model $Y_i = \beta X_i + \varepsilon_i$ for which all the basic assumptions hold except that $Var(\varepsilon_i) = \sigma^2 X^2{}_i \quad (X_i > 0)$ derive the Best Linear Unbiased Estimator (BLUE) and its variance given a sample of *n* observations.
[4 marks]

(b) The least squared regression equation estimated from 22 observations is

$$Y_i = 10 + 5X_i + \varepsilon_i \ , \ R^2 = 0.8$$

Carry out the test for the existence of a relationship between X and Y by using; (i) the t-test [5 marks]
(ii) the F-test [5 marks]

(c) Discuss the criteria of evaluating the estimates in an econometric model.
[6 marks]

5. (a) Explain what is meant by a distributed lag model. Write the equation for a general distributed lag model with an infinite number of lags for one with k lags. [6 marks]

(b) Derive the Koyck distributed lag model. Explain the problems that arise in the estimation of this model. [9 marks]

(c) What is the lag structure in the Almon lag model and explain the advantages and disadvantages of the Almon lag model with respect to the Koyck model. [5 marks]
