KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF SCIENCE IN ECONOMICS AND MATHEMATICS

COURSE CODE: ECON 322

COURSE TITLE: ECONOMETRICS II

STREAM: Y4S2

DAY: TUESDAY

TIME: 2:00 – 4:00A.M.

DATE: 01/12/2009

INSTRUCTIONS:

Answer any Question ONE and any other Two Questions

PLEASE TURN OVER

1. The table below contains observations on the Quantity demanded (y) of a certain commodity its price (x_1) and consumers' income (x_2)

n	**y (Quantity demanded)**	**x_1 (price)**	**x_2 (Income)**
1	100	5	1,000
2	75	7	600
3	80	6	1,200
4	70	6	500
5	50	8	300
6	65	7	400
7	90	5	1,300
8	100	4	1,100
9	110	3	1,300
10	60	9	300

(i) State the assumptions of the multiple regression model (8mks)

(ii) Estimate the parameters of the classical linear regression model stated below
$y = b_o + b_1x_1 + b_2x_2 + u$ (8mks)

(iii) Test whether the parameters are significant or not (6mks)

(iv) Calculate the co-efficient of determination for this regression (4mks)

(v) Calculate the adjusted co-efficient of determination (4mks)

2. (a) Differentiate between a stationary and a non-stationary series (4mks)

(b) What are the characteristics of a stationary time series (3mks)

(c) Using relevant examples explain the implication behind the AR and MA models (4mks)

(d) Discuss analytically the three stages that are involved in the Box-Jenkins process for ARIMA model selection (9mks)

3. (a) The model $y=\beta_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \epsilon$ is to be estimated from 24 observations, for which, when the variables are measured in deviation form,

$$(x^1x)^{-1} = \begin{bmatrix} 0.8 & 0.1 & -0.6 \\ 0.1 & 0.6 & -0.8 \\ -0.6 & -0.8 & 1.4 \end{bmatrix}$$

$\Sigma x_2y = 21$
$\Sigma x_3y = 42$
$\Sigma x_4y = 34$
$\Sigma y^2 = 78$

Required

(i) Obtain the OLS estimates of $\beta 2$, $\beta 3$ and β_4 and calculate the co-efficient of determination (6mks)

(ii) Interpret the value of $\Re^2$ (2mks)

(b) Consider the following model:

$$y = x\hat{\beta} + a$$

Where: $\hat{\beta} = \begin{bmatrix} \hat{\beta}_1 \\ \hat{\beta}_2 \\ \hat{\beta}_3 \\ . \\ . \\ . \\ \hat{\beta}_\kappa \end{bmatrix}$, $a = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ . \\ . \\ . \\ e_n \end{bmatrix}$

$\hat{\beta}$ is a key k x 1 column vector of the $\hat{\beta}j$ estimator, a is an n x 1 column vector of residuals.

Required

Show that $\hat{\beta}$ is an unbiased estimator of β (6mks)

(c) Write short notes on the following terms:

(i) Maximum likelihood estimation (3mks)

(ii) Cointegration (3mks)

4. (a) (i) With an example explain the term simultaneous equations bias (2mks)

(ii) Identify the solutions to the simultaneous equation bias (2mks)

(b) Given the simple Keynesian model of income determination

$C_t = \alpha 0 + \alpha_1 y_t + u_1$

$I_t = b_0 + b_1 y_t + b_2 y_{t-1} + u_2$

$Y_t = C_t + I_t + G_t$

(i) Derive the reduced form coefficients of the behavioural equations (6mks)

(ii) Show that the reduced form parameters measure the total effect, direct effect and indirect effect, of a change in the exogenous variable on the endogenous variable. Use as an example the reduced form of the above investment function. (2mks)

(c) Identify two conditions which must be fulfilled for an equation to be identified (2mks)

(d) Examine the identification state of the following models of demand and supply

(i) $q = \alpha_1 + b_1p + c_1y + u_1$ (demand function)
$q = \alpha_2 + b_2p + C_{2\,R} + u_2$ (supply function)

(ii) $q = \alpha_1 + b_1p + c_1y + u_1$ (demand function)
$q = \alpha_2 + b_2p + u_2$ (supply function)

(iii) $q = \alpha_1 + b_{1P} + c_1y + d_1R + u_1$ (Demand function)
$q = \alpha_2 + b_2p + u_2$ (supply function)

(where q is quantity, p the price, y the income, R the rainfall, u_1 and u_2 are the error terms). (6 mks)

5. (a) Explain the advantages of using the dummy variable approach when testing for structural stability (4mks)

(b) Explain how we can use dummy variables to quantify qualitative information in a regression model. Use appropriate examples from the economic theory. (5mks)

(c) Describe the steps involved in conducting the chow test for structural stability. Is the show test preferable to the dummy variables approach? Explain why or why not (11mks)