KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF ECONOMICS AND MATHEMATICS

COURSE CODE: **ECON 322**

COURSE TITLE: **ECOMETRICS II**

STREAM: **Y3S2**

DAY: **WEDNESDAY**

TIME: **9:00 – 11:00 A.M.**

DATE: **24/03/2010**

INSTRUCTIONS:

1. Answer question ONE and ANY OTHER TWO questions

PLEASE TURNOVER

QUESTION 1

a) State the assumptions of the multiple regression model. (8 marks)

b) The following data contains observations on the quantity demanded (Y) of a certain commodity, its price (X_1) and consumers income (X_2).

N	**Y(**quantity demand)	**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

Required

i. Estimate the parameters of the classical linear regression model stated below.
$Y= b_0 + b_1x_1 + b_2x_2 + u$. (8 marks)

ii. Test whether the parameters are significant or not. (6 marks)

iii. Calculate the co-efficient of determination for this regression. (4 marks)

iv. Calculate the adjusted co-efficient of determination. (4 marks)

QUESTION 2

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

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

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

QUESTION 3

a) A population regression line is believed to have the form.
$E(y) = \beta_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$.
This equation is estimated from a random sample
of size n = 25, for which, in terms of deviations from means,

$$(X'X)^{-1} = \begin{bmatrix} 0.03 & 0.004 & -0.031 \\ 0.004 & 0.028 & 0.015 \\ -0.031 & 0.015 & 0.275 \end{bmatrix}$$

$\Sigma x_{2i} y_i = 226.2$
$\Sigma x_{3i} y_i = 259.1$
$\Sigma x_{4i} y_i = -48.3$
$\Sigma y_i^2 = 6733$

Required:

i. Calculate the OLS estimates of β_2, β_3 and β_4. (6 marks)

ii. Compute R^2 and interpret your answer. (2 marks)

b) Consider the following model: $y = x\beta + e$.

$$\text{Where: } \beta = \begin{pmatrix} \beta_1 \\ B_2 \\ B_3 \\ . \\ . \\ . \\ . \\ \beta_k \end{pmatrix} \qquad e = \begin{pmatrix} e_1 \\ e_2 \\ e_3 \\ . \\ . \\ . \\ . \\ e_n \end{pmatrix}$$

β is a $k*1$ column vector of the βj estimator, e is an nx1 column vector of residuals.

Required:

Show that β is an unbiased estimator of β. (6 marks)

c) Consider the classical linear regression model:
$yi = \beta_1 + \beta_2 x_{2i} + \beta_3 x_{3i} + \text{---} + \beta_k x_{ki} + u_i$

If the error term u_i in this equation is known to be heteroskedastic.

Required:
State briefly the consequences on the OLS estimators βs (or β). (6 marks)

QUESTION 4

a) Differentiate between a stationary and a non-stationary series. (4 marks)
b) What are the characteristics of a stationary time series? (3 marks)
c) Using relevant examples explain the implication behind the AR and MA models. (4 marks)
d) Discuss annalistically the three stages that are involved in the box – Jenkins process for ARIMA model selection. (9 marks)

QUESTION 5

a) (i) With an example explain the term simultaneous equations bias. (2 marks)
   (ii) Identify the solutions to the simultaneous equation bias. (2 marks)
b) Given the simple keynesian model of income determination.
   $C_t = x_0 + x_1y_t + u_1$
   $It = b_0 + b_1y_t + b_2y_{t-1} + u_2$
   $yt = C_t + I_t + G_t$
   (i) De rive the reduced form coefficients of the behavioral equations. (6 marks)
   (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 example the reduced form of the above investment function. (2 marks)
c) Identify two conditions which must be fulfilled for an equation to be identified. (2 marks)
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)
   $q = \alpha_2 + b_2p + c_2R + u_2$ (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). (6mks)