KABARAK   **UNIVERSITY**

EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF ECONOMICS AND MATHEMATICS

COURSE CODE: **ECON 312**

COURSE TITLE: **ECONOMETRICS I**

STREAM: **Y3S1**

DAY: **MONDAY**

TIME: **11.00-1.00 P.M**

DATE: **15/12/2008**

INSTRUCTIONS:

1.   Answer Question ONE and any other TWO questions.
2.   Question ONE carries 30 marks while the other questions carry 20 marks each.
3.   Illustrate where possible.

PLEASE TURN OVER

1. a)   Write short notes on the following.

    i)   Significance level   **(3 Marks)**
    ii)   Error term (stochastic variable)   **(3 Marks)**
    iii) Time series data   **(3 Marks)**
    iv)   Cross-section data   **(3 Marks)**
    v)   Dummy variables   **(3 Marks)**
    vi)   Autoregressive lag models   **(3 Marks)**
    vii) Distributed lag models   **(3 Marks)**

    b)   i)   What is a hypothesis   **(2 Marks)**
         ii)   Given a demand function estimated from a sample of 25 as

         $$Y_t = 40 - 0.8 X_t \qquad\qquad R^2 = 0.89$$
         SE (30)   (0.2)

    Where;

    Y_t = quantity demanded
    X_t = Price of the commodity

    Test the null hypothesis that price has no effect on the quantity demanded against
    an alternative hypothesis that follows the law of demand.   **(7 Marks)**

2. a)   A random sample of five college students is selected and their grades in
         theory and statistics taken and presented as:

Theory	Statistics
85	93
60	75
73	65
40	50
90	80

    i)   Calculate the correlation coefficient and interprete what it means
                                                                   (7 Marks)
    ii)   What are the problems of using correlation coefficient in data analysis
                                                                   (3 Marks)

    b)   i)   Explain any three causes of serial correlation   **(3 Marks)**

ii)   Given the estimated model below

$$Y_t = 4.11 + 0.72\, X_1 + 0.54\, X_2 + 0.42 X_3 + 0.55\, Y_{t-1}$$

t-ratios   (0.94) (2.72)   (3.42)   (1.66)   (5.55)

$$\bar{R}^2 = 0.984, \quad DW = 1.9, \quad Var\,(B_5) = 0.005, \quad N = 100$$

Where Y_t = output, X_1 = Capital, X_2 = Labour, X_3 = raw material and Y_{t-1} = Previous period's output.

Test for serial correlation (recall $U_t = \rho\, U_{t-1} + X_t$ i.e. AR (1)   **(7 marks)**

3. a) i)   What is multicollinearity?   **(2 marks)**

    ii)   How is the problem of multicollinearity detected?   **(6marks)**

    iii)   Give the following model
    $$C_t = 0.55 + 0.163\, Y^d + 1.66\, W_t + 1.14\, R_t$$
    $\qquad$ (2.44)   (1.34)   (1.16)   (0.71) t = ratios

Where:

C_t = consumption at time t
Y^d = Dispossable income
W_t = Wealth at time t
R_t = nominal interest rate at time t

Do you think multicollinearity exists according to the results above? Explain.
    (3 marks)

iv) Explain how to eliminate multicollinearity   **(6marks)**

b) Consider the following estimated models (standard errors appear in parentheses)

A: $Q_t = 9.51 - 4.74\, P_t + 1.49\, Y_t$ SSE = 325.3

$\qquad$ (10.27) (2.08)   (0.44) $\bar{R}^2 = 0.84$ N=20

B: $Q_t = 3.13 + 3.43\, P_t + 1.49\, Y_t + 0.24\, P_{st}$ SSE = 325.1

$\qquad$ (10.98)   (4.01)   (0.41)   (2.64) $\bar{R}^2 = 0.89$ N=20

Where; Q_t = quantity demanded, P_t = price of the good, Y_t = income, P_{st} = price of substitutes and t = time t.

Which model would you prefer for analysis? Give reasons   (3 marks)

4   A researcher who is trying to establish the relationship between food expenditure (Y_t) income (X_t) sets up the following model:

$$Y_t = \beta_1 + \beta_2 X_t + u_t$$

The analyst is suspicious that the variance of the stochastic disturbance term is proportional to X (i.e. $6_i^2 = 6^2 X_t$) . He then arranges the 40 observations in ascending order but eliminates the middle 12 values. He applies OLS separately to the first group and the second ground and obtains the following results.

1st group of observations

$\hat{Y}_t = 2.347 +$ 0.330 X_t $\bar{R}^2 = 0.405$
       (5.245)   (0.094) $RSS_1 = 22.377$
                                            $6_1^2 = 1.492$

$\hat{Y}_t =$ 8.723 +   0.213X_t $\bar{R}^2 = 0.104$
       (12.717) (0.148) $RSS_2 = 74.933$
                                            $6_2^2 = 4.996$

(Values in parentheses are t-ratios)

a)   What is the name given to an error term with the characteristics described above (i.e. $6_i^2 = 6^2 X_t$) ?   **(2 marks)**

b)   Give the name of the method used by the analyst to detect the econometric problem in this case.   **(2 marks)**

c)   What econometric problem is associated to the use of the method in (b) above.   **(2 marks)**

d)   Test for the existence of the econometric problem indicated by the relationship in (a) above using 5 percent level of significance. **(6 marks)**

e)   Explain the causes and consequences of the problem detected in (d) above   **(6 marks)**

f)   In the presence of this ecometric problem how would you advise the researcher to proceed and re-estimate β_1 and β_2?   **(2 marks)**

5. a) Clearly explain the classical assumptions of the least squares estimators
        (OLS)   **(6 marks)**

    b) The following table gives the quantities of a commodity and its
        corresponding prices for the period 1991-2000.

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Quantity:	770	785	790	795	800	805	810	820	840	850
Price	20	16	16	15	12	10	10	7	9	6

    i)   Estimate the linear function   **(6 marks)**
    ii) Is it a demand or supply function? Give reason(s)   **(1 mark)**
    iii) Calculate and interpret the associated average elasticity   **(2 marks)**
    iv) Calculate and interprete the explained variation in the dependent variable (i.e R^2)
                                                                          (4 marks)
    v)   Why is adjusted R^2 preferred to R^2 **(1 mark)**