Name_____

UNIVERSITY OF LONDON

BSc EXAMINATION 2003

For Internal Students of
Royal Holloway

DO NOT TURN OVER UNTIL TOLD TO BEGIN

EC2203 : QUANTITATIVE METHODS 2

MID-TERM TEST 4
MARCH 2003

Answer all 4 questions **Time Allowed: 1 hour**

Write all your answers and workings on the paper provided.
Statistical tables are provided.

1. You have data on age, AGE, its square, AGE2, years of education, EDUC, and the level of hourly wages, WAGE, measured in £, for 104 people.

You estimate the following regressions:

(1) $$\widehat{WAGE} = \underset{(1.50)}{1.00} + \underset{(0.25)}{0.50}*EDUC + \underset{(25.0)}{1.00}*AGE - \underset{(0.005)}{0.01}*AGE^2$$

$R^2 = 0.25$ TSS = 100

(2) $$\widehat{WAGE} = \underset{(1.50)}{2.00} + \underset{(0.35)}{0.80}*EDUC$$ $R^2 = 0.20$ TSS = 100

where the numbers in brackets are estimated standard errors

i) Comment on and interpret the results of equation (1). At what age level of are wages maximised?

(6 marks)

ii) Test the hypothesis that the coefficients on age and age squared are jointly significant in the model

(8 marks)

iii) What would be the consequences for the OLS estimate on EDUC of omitting age and age squared from the regression?

(5 marks)

iv) Outline how you would test the hypothesis that there were omitted variables in your regression model.

(6 marks)

2. Given the following model,

$$Numcigs_i = b_0 + b_1 Income_i + u_I \qquad (1)$$

a) you suspect the presence of measurement error in the left hand side (dependent) variable on the number of cigarettes smoked, (Numcigs).

ie $Numcigs^{observed} = Numcigs^{true} + e$

where e is a (random) error term

Given the following information outline and work out the consequences of this type of measurement error for OLS estimation of (1)

(6 marks)

N=100	$Cov(Numcigs, Income^{true}) = 5$	
	$Cov(Numcigs, Income^{observed}) = 1$	
	$Var(Income^{true}) = 5$	
	$Var(Numcigs) = 200$	$Var(u) = 100$
	$Var(e) = 100$	$Cov(e, u) = 0$
	$E(u) = 0$	$E(e) = 0$

b) you are given new information that says that it is the right hand side variable that is measured with error

ie $income^{observed} = income^{true} + w$

where w is a random error

Find

i) the true (unobserved) OLS estimate of the effect of income on food expenditure and income in the absence of measurement error

(4 marks)

ii) the OLS estimate in the presence of this type of measurement error

(4 marks)

iii) Why do the results change like this?

(4 marks)

c) If measurement error is a problem among right hand side variables what can you do about it?

(7 marks)

3. Given the following demand and supply equations estimated over 200 quarterly observations

Demand: $Price_t = a_0 + a_1 Output_t + a_2 Wages_t + a_3 Income_t + e_t$ (1)
Supply: $Output_t = b_0 + b_1 Price_t + u_t$ (2)

a) What would happen if you estimated (1) or (2) by OLS? Why?
(6 marks)

b) Find the order condition for identification of equations (1) and (2)
(8 marks)

c) What instruments, if any, could you use for IV estimation of either equation? Which would be the most efficient solution?
(5 marks)

d) Outline a test to check on the endogeneity of right hand side variables
(6 marks)

4. You have quarterly data on the level of national income, Y_t , and consumption , C_t, for the period 1950-1999 and fit the following:

(1) an ordinary least squares (OLS) regression of Y_t on C_t
(2) An OLS regression of Y_t , C_t and C lagged by one year, C_{t-1}

The table gives the estimated regression coefficients. Standard errors are given in brackets.

Dependent Variable: National Income, Y_t		
	OLS (1)	OLS (2)
C_t	0.900	0.250
	(0.005)	(0.200)
Y_{t-1}		0.500
		(0.300)
Constant	10.000	12.000
	(0.500)	(6.000)
R^2	0.905	0.995
DurbinWatson	1.250	1.900

i) What is autocorrelation, what might cause autocorrelation and what are the consequences for OLS estimation?

(8 marks)

ii) Interpret the estimates in column 1 and explain why you might be dissatisfied with the first equation.

(5 marks)

iii) Has the specification in (2) solved the problem? Why might you be suspicious of this equation?

(5 marks)

iv) Outline the form of a test for autocorrelation that is not affected by this problem

(7 marks)

End of Test