ROYAL HOLLOWAY COLLEGE, UNIVERSITY OF LONDON
DEPARTMENT OF ECONOMICS

EC5040 QUANTITATIVE AND ECONOMETRIC ANALYSIS

MID-TERM TEST NO. 2
10th JANUARY 2002

INSTRUCTIONS

TIME ALLOWED 60 MINUTES

ANSWER ALL 5 QUESTIONS

PRINT YOUR NAME ON THE FRONT OF THIS TEST PAPER WHERE INDICATED

WRITE ALL YOUR ANSWERS (INCLUDING ROUGH WORKING) ON THIS TEST PAPER. THERE ARE EXTRA BLANK SHEETS TOWARD THE BACK OF THE PAPER

STATISTICAL TABLES ARE PROVIDED

NAME_____

1. **Determine the rank and order conditions for identification of each of the equations in the following model:**

$$P_t + b_{12}W_t + g_{11}Q_t = u_{1t}$$
$$b_{21}P_t + W_t + g_{12}Q_t + g_{22}P_{t-1} + g_{23}W_{t-1} = u_{2t}$$

where P, W are endogenous, Q, and the lagged values of P and W are assumed to be exogenous.

(15 marks)

Does this mean you can estimate either equation of the original system using instrumental variables? If so what instruments would you use?

(5 marks)

2. The following output is taken from a regression of the log of per capita food expenditure on the log of per capita income and the log of the food price index for the period 1927-1941

```
. reg lfood linc lprice if year<=1941

  Source |       SS       df       MS         Number of obs =      15
---------+------------------------------      F(  2,    12) =   58.24
   Model |  .011174558     2  .005587279      Prob > F      =  0.0000
Residual |  .001151314    12  .000095943      R-squared     =  0.9066
---------+------------------------------      Adj R-squared =  0.8910
   Total |  .012325872    14  .000880419      Root MSE      =   .0098

------------------------------------------------------------------------------
   lfood |      Coef.   Std. Err.    t     P>|t| [95% Conf. Interval]
---------+--------------------------------------------------------------------
    linc |   .2432385   .0228913   10.626 0.000  .1933626    .2931143
  lprice |  -.2351958   .0533748   -4.406 0.001 -.3514894   -.1189022
   _cons |   4.554912   .2008869   22.674 0.000 4.117217    4.992607
```

a) Interpret the regression coefficients

(3 marks)

What is the out of sample forecast equation?

(2 marks)

What is the confidence interval associated with this prediction?
(7 marks)

Write down how you would test the hypothesis that the model parameters remain constant outside the sample period.

(8 marks)

3. Given the following model, you suspect that the second variable, X_2, is measured with error.

$$y_i = b_1X_1 + b_2X_2 + u_i$$

There are 2 exogenous variables in the system in total ie $Z = [X_1 : X_3]$ and the sample size is 100

Let X = [X1 : X2 : X3] and Y = [y : X_2] and the matrices of variances and covariances is given by

$$\text{X'X} = \begin{bmatrix} 5 & 4 & 0 \\ 4 & 2 & 10 \\ 0 & 10 & 3 \end{bmatrix} \quad \text{and Y'Y} = \begin{bmatrix} 20 & 10 \\ 10 & 1 \end{bmatrix} \quad \text{and Y'X} = \begin{bmatrix} 5 & 5 & 5 \\ 4 & 2 & 10 \end{bmatrix}$$

Find the IV estimate of the coefficients on X1 and X2

(20 marks)

4. Outline and comment on the form of 2 tests for the presence of heteroskedasticity in a data set.

(15 marks)

5. Given

$$y_{it} = b_0 + b_1x_{1it} + b_2x_{2it} + b_3a_i + u_{it} \qquad \begin{matrix} i = 1,\ldots.N \\ t = 1, \ldots.T \end{matrix}$$

where a_i is an unobserved fixed effect
and $u_{it} \sim$ iid $(0, \sigma^2_u)$

Show that 1st differencing away the fixed effect will introduce negative autocorrelation into the (differenced) error term with correlation coefficient $\rho = -0.5$

(20 marks)

Why will there be no autocorrelation in the error term if you use the within-groups estimator?

(5 marks)