

**ROYAL HOLLOWAY COLLEGE, UNIVERSITY OF LONDON  
DEPARTMENT OF ECONOMICS**

**EC5040 QUANTITATIVE AND ECONOMETRIC ANALYSIS**

**MID-TERM TEST NO. 1  
22<sup>ND</sup> NOVEMBER 2002**

**INSTRUCTIONS**

**TIME ALLOWED 55 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. The following is the output from a regression of the log of hourly wages on years of education,(yearsd), years of work experience (xper) and its square, (xpersq) on a sample of 6225 individuals.

Source	SS	df	MS	Number of obs = 6225		
Model	457.732594	3	152.577531	F( 3, 6221)	=	512.58
Residual	1851.79026	6221	.297667619	Prob > F	=	0.0000
Total	2309.52285	6224	.371067296	R-squared	=	0.1982
				Adj R-squared	=	0.1978
				Root MSE	=	.54559

  

lnhpay	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
yearsd	.0740664	.0023269	31.830	0.000	.0695048	.0786279
xper	.0160000	.002000	8.000	0.000	.0200000	.0120000
xpersq	-.0005000	.000100	5.000	0.000	-.000700	-.000300
_cons	.5000000	.0372179	16.552	0.000	.5430626	.6889826

Interpret the regression output

(20 marks)

**2. Say whether the following statements are ALWAYS TRUE, SOMETIMES TRUE or ALWAYS FALSE. Give a (short) justification for each answer.**

a) The OLS estimator  $\hat{\mathbf{b}} = (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{y}$  is an unbiased estimator of the true parameters.

(10 marks)

b) Adding another variable to a regression will never reduce the adjusted  $R^2$  value

(10 marks)

3. Outline a test you might use to for the presence of outliers and leverage in your data.

(10 marks)

4. Given the model  $y_t = b_0 + b_1x_{1t} + b_2x_{2t} + e_t$

is estimated in mean deviation form,  $y_t = b_1x_{1t} + b_2x_{2t} + e_t$   
(lower case letters in this example denote variables measured in mean deviation form)

with  $(x'x) = \begin{bmatrix} 10 & 10 \\ 10 & 30 \end{bmatrix}$        $x'y = \begin{bmatrix} 5 \\ -5 \end{bmatrix}$        $y'y = 37.5$

using a sample of 63 observations, find the OLS estimates of  $b_1$  and  $b_2$ .

Test the hypotheses that

- i)  $b_1 = 0$
- ii)  $b_1 + b_2 = 0$

(30 marks)

5. Consider the multiple regression model  $y = XB + u$

Suppose that just one of the  $X$  variables,  $X_1$ , was subject to a linear transformation  $z = X_1\lambda$  where  $\lambda$  is a constant. Show the consequences for OLS estimation of the coefficients in the model.

(20 marks)