系別：產業經濟學系　　　　　　科目：計 量 經 濟 學

本試題雙面印製

1. Suppose you estimated the following regression (standard error in parentheses):

$$\hat{Y}_t = 300 + 6W_t \qquad R^2 = 0.85$$

$$(25) \quad (1.1)$$

where $W_t = X_t / X_{t-1}$. If you replaced W_t by $W_t^* = 100 (X_t - X_{t-1})/X_{t-1}$, what results would you obtain? (20%)

2. The following equation was obtained by OLS:

$$\hat{rd\,intens} = 2.613 + 0.00030\,sales - 0.0000000070\,sales^2$$

$$(0.429) \quad (0.00014) \qquad (0.0000000037)$$

$$n = 32, R^2 = 0.1484$$

where *sales* is the total volume of sales (millions of dollar) and *rdintens* is the R&D intensity.

(i) At what point does the marginal effect of *sales* on *rdintens* become negative? (5%)

(ii) Would you keep the quadratic term in the model? Explain. (5%)

(iii) Define *salesbil* as sales measured in billions of dollars: *salesbil = sales*/1,000. Rewrite the estimated equation with *salesbil* and *salesbil²* as the independent variables. Be sure to report standard errors and the R-squared.
[Hint: Note that *salesbil²= sales²/* (1000)².] (5%)

(iv) For the purpose of reporting the results, which equation do you prefer? (5%)

3. The following two regression results are obtained from the same data set:

Model 1: $\hat{Y}_t = 2.6911 - 0.4795X_t,$ $R^2 = 0.6628$

Model 2: $\ln(\hat{Y}_t) = 0.7774 - 0.2530\ln(X_t),$ $R^2 = 0.7448$

Where Y is the cups of coffee consumed per person per day and X is the price of coffee in dollars per pound.

(i) Interpret the slope coefficients in the two models. (5%)

(ii) You are told that $\bar{Y} = 2.43$ and $\bar{X} = 1.11$. At these mean values, estimate the price elasticity for Model 1. (5%)

(iii) What is the price elasticity for Model 2? (5%)

(iv) How would you interpret the intercept in Model 2? (5%)

4. Consider the relationship between the expenditure on travel (E_t) and total income (Y_t), given by $E_t = \beta_1 + \beta_2 Y_t + u_t$. You are certain that the error term is heteroscedastic

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with $\text{Var}(u_i) = \sigma_i^2 = \alpha_1 + \alpha_2 P_i + \alpha_3 P_i^2$, where P is the population.　You have data on E, Y and P.

(i) State the null and alternative hypotheses for no heteroscedasticity.　(4%)

(ii) Describe the regressions to be run for carrying out the test.　(4%)

(iii) How would you compute the test statistics?　(4%)

(iv) What is its distribution and degree of freedom?　(4%)

(v) Suppose there is significant heteroscedasticity and you do not want to ignore it. Describe the step by step how you would use the weighted least squares regression, assuming that you did run into the negative variance problem when using the above relation for σ_i^2.　(4%)

5. Let C be total consumption expenditures of a family, Y is the total income of the family, and N is the size of the family.

(i) Formulate an econometric model that incorporates the following assumptions: (a) the marginal propensity to consume decreases as income increases, and (b) the marginal effect of family size on consumption decreases as N increases (because of economies of scale in cooking, rents, and so on).　(10%)

(ii) And also describe how you would test the hypothesis implicit in these statements.　(10%)