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V	簡單型計算機

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1. Consider the simple regression model $y_i = \alpha + \beta x_i^* + u_i$.

   In practice, we measure x_i^* by x_i such that

   (1) $x_i = x_i^* + 5$

   (2) $x_i = 3x_i^*$

   (3) $x_i = x_i^* + \varepsilon_i$, where ε_i is a purely random term with the usual properties.

   What will be the effect of these measurement errors on estimates of true α and β?

2. Consider the model:
   $$y_i = \alpha + \beta x_i + u_i$$
   where $u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + \varepsilon_t$, that is, the error term follows an AR(2) scheme, and where ε_t is a white noise error term.
   (1) Will u_t still satisfy classical assumptions such that OLS estimators are BLUE. Please justify your answers.
   (2) Outline the steps you would take to estimate the model taking into account the second-order autocorrelation.

3. Considering the following models:

   $$\ln y_i^* = \alpha_1 + \alpha_2 \ln x_i^* + u_i^*$$

   $$\ln y_i = \alpha_1 + \alpha_2 \ln x_i + u_i$$

   where $y_i^* = w_1 y_i$ and $x_i^* = w_2 x_i$, the $w's$ being constants.

   (1) Establish the relationships between the two sets of regression coefficients and their standard errors.

   (2) Is R^2 different between the two models? Why?

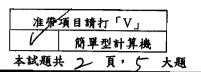| 准帶項目請打「∨」 |
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4. Suppose y_i is distributed i.i.d. $N(0, \sigma^2)$ for $i = 1, 2, \ldots, n$.

(1) Show that $E(y_i^2 / \sigma^2) = 1$.

(2) Show that $w = \dfrac{1}{\sigma^2} \sum_{i=1}^{n} y_i^2$ is distributed x_n^2.

(3) Show that $E(w) = n$.

(4) Show that $v = \dfrac{y_1}{\sqrt{\dfrac{\sum_{i=1}^{n} y_i^2}{n-1}}}$ is distributed t_{n-1}.

5. Let $y_1, y_2, \ldots, y_n$ be i.i.d. draws from a distribution with mean μ. A test of $H_0 : \mu = 5$ versus $H_1 : \mu \neq 5$ using the usual t-statistic yields a p-value of 0.03.

(1) Does the 95% confidence interval contain $\mu = 5$? Explain.

(2) Can you determine if $\mu = 6$ is contained in the 95% confidence interval Explain.