

本試題是否可以使用計算機: 可使用, 不可使用 (請命題老師勾選)

***注意:** 在回答下列問題時, 請注意各題的配分, 並將你(妳)的答案作適當的分段, 與用條列式的方式作答。

1. Suppose that X and Y are continuous random variables with the joint distribution function as follows: (25%)

$$f(x, y) = k(x+y), \quad \text{for } 0 \leq x \leq 1, 0 \leq y \leq 2 \\ = 0, \quad \text{otherwise}$$

- (1) Find k , $E(X)$, $E(Y)$, $V(X)$, $V(Y)$ (10%)
- (2) Find $\text{cov}(X, Y)$. Are X and Y independent? (10%)
- (2) Find the marginal densities of X and Y . (5%)

2. We always assume the multiple regression equation we are estimating includes all the relevant explanatory variables. In practice, this is rarely the case. Sometimes some relevant variables are not included due to lack of measurement. At other times some irrelevant variables are included. (20%)

- (1) What are the consequences? (Hint: are the estimates still unbiased and efficient when we omit some relevant variables or include some irrelevant variables? Why?). (10%)
- (2) One student says: "it is better to include variables (when in doubt) rather than exclude them". Do you agree him? Why? (10%)

(背面仍有題目, 請繼續作答)

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3. When we run the regression equation, we always assume the errors are independent. (40%)

(1) In practice, is the assumption reasonable? Please provide an example. (5%)

(2) The Durbin-Watson (DW) test is the simplest and most commonly test for the errors. Please provide a detail description to it. (5%)

(3) If the DW test statistics is significant, could we conclude the errors are not independent? Why? (10%)

(4) If the errors are not independent, what are the consequences? (10%)

(5) Following with (4), what are the solutions? (10%)

4. There are some probability distributions for which the probabilities have been tabulated and which are considered suitable descriptions for a wide variety of phenomena. These are the normal distribution, and the X^2 , t, and F distributions. (15%)

(1) Please describe the normal distribution in detail. (5%)

(2) As is well known, the X^2 , t, and F distributions could be derived from the normal distribution. Please describe the procedures in detail. (10%)