

國立中正大學
109 學年度碩士班招生考試
試題

[第 3 節]

科目名稱	統計學
系所組別	經濟學系國際經濟學- 甲組 乙組

—作答注意事項—

※作答前請先核對「試題」、「試卷」與「准考證」之系所組別、科目名稱是否相符。

1. 預備鈴響時即可入場，但至考試開始鈴響前，不得翻閱試題，並不得書寫、畫記、作答。
2. 考試開始鈴響時，即可開始作答；考試結束鈴響畢，應即停止作答。
3. 入場後於考試開始 40 分鐘內不得離場。
4. 全部答題均須在試卷（答案卷）作答區內完成。
5. 試卷作答限用藍色或黑色筆（含鉛筆）書寫。
6. 試題須隨試卷繳還。

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科目名稱：統計學

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系所組別：經濟學系國際經濟學-甲組、乙組

Part I：填空題（每格5分，共50分）

注意事項：

- (1) 此部分不須計算過程。
- (2) 請不要使用「選擇題作答區」作答。
- (3) 請自行於作答區第一頁「選擇題作答區」的下面製作如下的填空題作答區：

(a)	(b)	(c)	(d)	(e)
(f)	(g)	(h)	(i)	(j)

1. (30%) Let X and Y be continuous random variables with the joint probability density function $f_{XY}(x, y) = ce^{-x-y}$, $0 \leq x < \infty, 0 \leq y < \infty$, where c is a constant. Then $c =$ (a), $E(XY^2) =$ (b), and $\text{cov}(X, Y) =$ (c). Given the information that $X = x$, the conditional probability density function of Y is $f_{Y|X=x}(y) =$ (d). Now we let $Z = X + Y$ with $f_Z(z)$ the probability density function and $M_Z(t)$ the corresponding moment generating function. Then $f_Z(z) =$ (e) and $M_Z(t) =$ (f).
2. (20%) Let $\{X_1, X_2, \dots, X_n\}$ be a random sample with the common probability density function $f_X(x; \theta) = (2\pi)^{-1/2} e^{-(x-\theta)^2/2}$, $-\infty < x < \infty$, where θ is an unknown parameter. Given the moment condition $E[X - \theta] = 0$, we let $\tilde{\theta}_n$ be the corresponding method of moments estimator for θ . Then $\tilde{\theta}_n =$ (g) and $E(\tilde{\theta}_n) =$ (h). Let CRLB be the Cramér-Rao lower bound for every unbiased estimator of θ . Then CRLB = (i). To test the null hypothesis $H_0: \theta = 1$ versus the alternative hypothesis $H_1: \theta \neq 1$, we may employ the test statistic $T_n = \sqrt{n}(\tilde{\theta}_n - 1)$. Let $f_{T_n, H_0}(z)$ be the probability density function of T_n under H_0 . Then $f_{T_n, H_0}(z) =$ (j).

Part II：計算問答說明題（50分）

3. (20%) Suppose you estimate the consumption function

$$Y_i = \alpha_1 + \alpha_2 X_i + u_i$$

and the savings function

$$Z_i = \beta_1 + \beta_2 X_i + v_i$$

where $Y =$ consumption, $Z =$ savings $X =$ income. It is known the relationship $X = Y + Z$, i.e., income is equal to consumption plus savings.

- (a) What is the relationship, if any, between α_1 and β_1 ? and also α_2 and β_2 ? Show your calculation. (10%)
- (b) Will the residual sum of squares (RSS) be the same for the two models? Explain. (10%)

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科目名稱：統計學

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系所組別：經濟學系國際經濟學-甲組、乙組

4. (30%) Table 1 summarizes the output of a multiple regression analysis is based on 26 observations.

Table 1: Multiple regression of Y on X_1, X_2, X_3, X_4 and X_5

Predictor	Coefficient	Standard Error
Constant	1.0	1.5
X_1	2.0	3.0
X_2	3.0	0.2
X_3	0.2	0.05
X_4	-2.5	1.0
X_5	3.0	1.5

Table 2: ANOVA

Source	SS	DF	MS	F statistic ¹
Regression	100	B	E	G
Error	A	C	F	
Total	140	D		

Note: 1. Test for the overall significance of the regression

Use the information in Tables 1 and 2 to answer the following questions:

- Complete Table 2, the ANOVA table. In other words, fill in "A" to "G" for the regression analysis. (14%)
- Compute the determination of coefficient R^2 , and interpret it. (8%)
- Compute the value of adjusted- R^2 , and interpret what the difference between R^2 and adjusted- R^2 is. (8%)