

# 國立暨南國際大學九十二學年度碩士班研究生入學考試試題

第 3 節統計學 適用:(財金所 343 )

(本試題共 3 頁, 第 壹 頁)

考生注意: 1. 依次序作答, 只要標明題號, 不必抄題。

2. 答案必須寫在答案卷上, 否則不予計分, 並限以藍黑色筆作答。

3. 試題隨卷繳回。(除請詳閱試場規則)

1. (15%) Suppose that the joint probability distribution of X and Y is given by the following table:

x \ y	2	4	6
1	0.2	0	0.2
2	0	0.2	0
3	0.2	0	0.2

(a) Are X and Y independent? Explain. (3%)

(b) Find the marginal distribution of X and Y. (2%)

(c) Find the conditional distribution of Y given X=1 and hence

$E(Y | X=1)$  and  $\text{var}(Y | X=1)$ . (5%)

(d) Repeat part (c) for  $X=2$  and  $X=3$  and hence verify the result that

$V(Y) = E(V(Y | X)) + V(E(Y | X))$ , that is the variance of a random variable is equal to the expectation of its conditional variance plus the variance of its conditional expectation. (5%)

2. (15%) Suppose that X and Y are continuous random variables with the joint probability density function

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

(a) Find k, E(X), E(Y), V(X), V(Y), and cov(X, Y). Are X and Y independent? (5%)

(b) Find the marginal densities of X and Y. (5%)

(c) Find the conditional density of X given Y=1/2 hence  $E(X | Y=1/2)$

and  $V(Y | X=1/2)$ . (5%)

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第 3 節統計學 適用:(財金所 343 )

(本試題共 4 頁,第 4 頁)

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3. 試題隨卷繳回。(餘詳詳閱試場規則)

3. (20%) The following are data on

$y$ =quit rate per 100 employees in manufacturing

$x$ =unemployment rate

The data are for the United States and cover the period 1960-1972

Year	y	x	Year	y	x
1960	1.3	6.2	1967	2.3	3.6
1961	1.2	7.8	1968	2.5	3.3
1962	1.4	5.8	1969	2.7	3.3
1963	1.4	5.7	1970	2.1	5.6
1964	1.5	5.0	1971	1.8	6.8
1965	1.9	4.0	1972	2.2	5.6
1966	2.6	3.2			

(a) Calculate a regression of  $y$  on  $x$ . (4%)

$$y = \alpha + \beta x + u$$

(b) Construct a 95% confidence interval for  $\beta$ . (4%)

(c) Test the hypothesis  $H_0: \beta = 0$  against the alternative  $\beta \neq 0$  at the 5% significance level. (4%)

(d) Construct a 90% confidence interval for  $\sigma^2 = \text{Var}(u)$ . (4%)

(e) What is likely to be wrong with the assumption of the classical normal linear model in this case? Discuss. (4%)

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(本試題共 叁 頁, 第 叁 頁)

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3. 試題隨卷繳回。(餘詳詳閱試場規則)

4. Consider the following problems:

(a). Given  $\bar{X} = 20$  for a random sample of size 25 from the

density  $f(x|\mu) = \frac{1}{\sqrt{2\pi}} \exp(-\frac{(x-\mu)^2}{32})$ , find a 90%

confidence interval for  $\mu$ . (Note that  $P(Z < 1.645) \approx 0.95$ , where

$Z$  obeys the standard normal distribution.) (5 %)

(b). How large a sample would be needed in (i) if the resulting confidence interval were to be half as long? (10 %)

5. Complete the following table:

Multiple R = (a)

R Square = (b)

Adjusted R Square = (c)

Standard Error: 0.03559

## Analysis of Variance

	DF	Sum of Square	Mean Square
Regression	3	(d)	(f)
Residual	16	(e)	(g)
Total	19	0.25214	
F = (h)	(12 %)		

6. Let  $X_1$  and  $X_2$  be independent and uniformly,  $U(0,1)$ , distributed. Let  $Y = \min(X_1, X_2)$ ,  $Z = \max(X_1, X_2)$ .

(a). Find the joint distribution of  $Y$  and  $Z$ . (10 %)

(b). Find the marginal density of  $Y$ . (5 %)

(c). Find the conditional density of  $Z$  given  $Y = y$  and calculate  $E(Z|Y)$ . (8 %)