

淡江大學 96 學年度碩士班招生考試試題

系別：經濟學系

科目：統計學

准帶項目請打「V」

√	簡單型計算機
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Problems (1) ~ (12), 7 points each. (13) ~ (14), 8 points each.

f. 1

I.

A. Given the following table representing the joint PDF (Probability Density Function) of the discrete random variables X and Y.

		X			
		-2	0	2	3
Y	3	0.27	0.08	0.16	0
	6	0	0.04	0.10	0.35

- (1) Estimate $E(2X-3Y+5)$. (Note: The symbol E here represents the expectation operator).
- (2) Estimate the coefficient of correlation for the above data.
- (3) Compute $\text{Var}(Y|X=0)$ for the above data (Note: The symbol Var here represents the variance operator).

B. Consider an experiment where a fair coin is tossed 4 times. The sample space for this experiment consists of 16 possible outcomes, each outcome has a probability $\frac{1}{16}$ of occurring on any given trial of the experiment.

We now define two discrete random variables as follows:

X = number of tails obtained on the first 3 tosses of the coin

Y = number of tails obtained on all 4 tosses the coin

For example, an outcome (TTHH) in the sample space represents $X=2$ and $Y=2$, where T stands for "tails" and H for "heads".

(4) Establish a table that gives the joint PDF of X and Y using the following format

		Y			
X					

- (5) Find the conditional probability distribution for Y given X.
- (6) Find the variance-covariance matrix of X and Y.
- (7) Compute $\text{Var}(X|Y=2)$.

本試題雙面印製

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(8) Let $\Pr(|X - Y| = 1)$ be the probability that X and Y differ by exactly 1.
Find $\Pr(|X - Y| = 1) + \Pr(|X - Y| = 2)$.

β, z

II.

C. If we assume that consumption expenditure (Y,\$) is linearly related to income(\$) and wealth(\$), we obtained the following STATA output of a least squares regression

Source	SS	df	MS			
Model	8565.55407	2	4282.77704	Number of obs =	(b)	
Residual	324.445926	7	46.349418	F(2, 7) =	92.40	
Total	8890	(a)	987.77778	Prob > F =	0.0000	
				R-squared =	0.9635	
				Adj R-squared =	(c)	
				Root MSE =	6.808	

Y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
income	.9415373	(d)	1.14	0.290	-1.004308	2.887383
wealth	(e)	.0806645	-0.53	0.615	-.2331757	.1483067
_cons	24.77473	6.7525	(f)	0.008	8.807609	40.74186

- (9) Fill in the missing spaces (a) – (f) in the STATA output.
- (10) State the economic interpretation of the estimated partial slope coefficients. Are the sign of the coefficients what you would expect from economic theory?
- (11) Do you suspect that there is multicollinearity in the data? Why?
- (12) Test at the 1% level of significance the hypothesis that income and wealth jointly have no influence on consumption expenditure.

D. (13) Let Y_1, \dots, Y_n be random variables such that $E(Y_i) = 1 + \beta x_i$,

$i = 1, \dots, n$. Given observations $(x_1, y_1), \dots, (x_n, y_n)$, find the

least squares estimate for β .

(14) Suppose that we have specified and estimated the regression

$$\text{model } y_i = \beta_1 + \beta_2 x_{2i} + \beta_3 x_{3i} + \varepsilon_i$$

Let (a, b, c) be the least squares estimates and let

$$\hat{y}_i = a + bx_{2i} + cx_{3i}$$

What will \hat{y}_i be, if assume now that $x_{3i} = 1 + 2x_{2i}$?