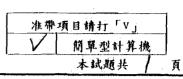
## 淡江大學 95 學年度碩士班招生考試試題

系別:經濟學系

科目:統 計 學



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1 Two random variables X and Y have the following means, variances, and covariance:

$$E(X) = 5$$
,  $Var(Y) = 10$ ,  $E(Y) = 2$ ,  $Var(Y) = 20$ ,  $Cov(X, Y) = 5$ 

If A = 2X+Y, and B = X-2Y, find the means and variances of A and B. Show that

 $E(AB) = 2E(X^2) - 2E(Y^2) - 3E(XY)$ . Hence find the covariance between A and B

- 2. Let  $X_1, X_2, ..., X_n$  be a random sample drawn from a population with mean  $\mu$  and variance  $\sigma^2$ . Let  $\overline{X} = \frac{1}{n} \sum_{i=1}^n X_i$  be the sample mean. Show that  $E(\overline{X}) = \mu$  and  $Var(\overline{X}) = \frac{\sigma^2}{n}$ . Next let  $Y = \frac{1}{n} \sum a_i X_i$ , where the  $a_i$ 's are fixed constants. Derived E(Y) and Var(Y).
- 3. The following data refers to the demand for apples, Y, in kg, and the price of apples, X, in pence per kg, on 10 different market stalls:

(1) 
$$\sum y^2 = \sum (Y - \overline{Y})^2 = 7$$
  $\sum x^2 = \sum (X - \overline{X})^2 = 7$   $\sum xy = ?$ 

- (2) Assuming  $Y = \alpha + \beta X + \varepsilon$ , obtain the OLS estimators of  $\alpha$  and  $\beta$ , and their estimated standard errors.
- (3) Obtalil R2, litterpret your results.
- 4. Suppose the regression equation  $Y_1 = \beta_1 + \beta_2 X_1 + \varepsilon$  is to be estimated, but the disturbance follows a first-order autoregressive process

$$\varepsilon_1 = \rho_1 + \rho \varepsilon_{1:1} + u_1$$

- (1) Find  $E(\varepsilon)$ ? and  $Var(\varepsilon)$ ?
- (2) Are OLS estimators BLUE? Why?
- (3) Explain how would you estimate this equation?