淡江大學 95 學年度碩士班招生考試試題

95

系別：財務金融學系 A 組　　科目：統　計　學

准帶項目請打「V」	
	簡單型計算機

本試題共　　頁

請寫出過程, 否則以零分計算!

1. Let Y_1 and Y_2 be discrete random variables with bivariate probability mass (or density) function as

$$f(y_1, y_2) = \begin{cases} (y_1 + y_2)/9, & y_1 = 0, 1, 2 \text{ and } y_2 = 0, 1. \\ 0, & \text{otherwise.} \end{cases}$$

   A. (15%) Please find the **marginal** probability mass functions of Y_1 and Y_2.

   B. (10%) Please find the **conditional** probability mass functions of Y_1 given $Y_2 = y_2$ and Y_2 given $Y_1 = y_1$.

2. Consider two random variables Y and X with joint probability density function

$$f(y, x) = \begin{cases} y + x, & \text{if } 0 \le y \le 1 \text{ and } 0 \le x \le 1. \\ 0, & \text{otherwise.} \end{cases}$$

   A. (15%) Are Y and X independent or dependent?

   B. (10%) Obtain the conditional mean of Y given $X = x$, i.e., $E(Y|X = x)$.

   C. (10%) Obtain the conditional variance of Y given $X = x$, i.e., $Var(Y|X = x)$.

3. Under standard classical assumptions, consider the following regression,

$$y_i = \beta x_i + \epsilon_i, \quad i = 1, 2, \cdots, n.$$

   where the error term ϵ_i has mean 0 and variance σ^2, and is uncorrelated with x_i.

   A. (15%) Obtain the least squares estimator of β.

   B. (10%) Is this estimator unbiased?

4. (15%) In the following multiple regression,

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \epsilon_i, \quad i = 1, 2, \cdots, n.$$

   Explain in details how you test $\beta_1 = 0$ and $\beta_2 = 1$? In particular, state the hypothesis, the testing procedures, the test statistic (with corresponding degrees of freedom), and so on.