

# 國立交通大學 97 學年度碩士班考試入學試題

科目：統計學(5023)

考試日期：97 年 3 月 8 日 第 3 節

系所班別：經營管理研究所

組別：經管所一般生

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【可使用計算機】\*作答前請先核對試題、答案卷(試卷)與准考證之所組別與考科是否相符！！

## 注意事項：

- 各題配分標示於題後，總分 100 分。請依題目順序作答。
- 答案中特殊符號之意義須說明清楚。

1. 解釋名詞：(共 12 小題，每小題 5%，合計 60%)

- (1) random sample
- (2) Poisson distribution
- (3) chi-square distribution
- (4) Bernoulli process
- (5) partial correlation
- (6) collinearity
- (7) paired  $t$  test
- (8) analysis of covariance
- (9) contingency table
- (10) Neyman-Pearson theorem
- (11) likelihood ratio test
- (12) Monte-Carlo simulation

2. Let the p.d.f. of  $X$  be  $f(x) = \frac{1}{b-a}$ ,  $a \leq x \leq b$ , zero elsewhere. Find the distribution function of  $X$ .  
(10%)

3. Let  $X_1, X_2, \dots, X_n$  constitute a random sample of size  $n$  from  $N(\mu, \sigma^2)$ . Find the maximum likelihood estimator for  $\sigma^2$  and its expected value. (10%)

4. Let the joint distribution of  $X$  and  $Y$  be bivariate normal  $N(\mu_X, \mu_Y, \sigma_X^2, \sigma_Y^2, \rho_{XY})$ .  
Find  $E(Y|x)$  and  $\text{Var}(Y|x)$ . (10%)

5. Suppose you fit the regression model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

to a set of data containing 50 observations. State how to test  $H_0: \beta_1 = \beta_2 = \beta_3 = 0$ . (10%)