NTIT 國立臺中技術學院 系所：流通管理系碩士班 准考證號碼：

97 學年度碩士班考試入學暨碩士在職專班試題 科目：統計學

注意事項：

1.答案卷書寫題號依序作答，不必抄題。

2.答案卷不可書寫任何可辨別個人姓名或特殊標記，違反者以零分計算。

3.請於試題紙上填寫准考證號，繳卷時「試題」、「答案卷」一併繳回。

一、單選題(10%)

1. (5%)The adjusted multiple coefficient of determination is adjusted for
   (1) the number of dependent variables.
   (2) the number of independent variables.
   (3) the number of equations.
   (4) detrimental situations.
   (5) none of the above answers are correct.

2. (5%)When doing a hypothesis test, $H_0 : \mu \le 30$ v.s. $H_1 : \mu > 30$. Which of the following statement is/are correct?
   ⓐ the maximal value of the probability of making a type I error occurs when $\mu = 30$.
   ⓑ when the p-value of the sample result is smaller than the significance level, the H_0 is rejected.
   ⓒ if the significance level is larger, then the power of the test is larger also.
   (1) ⓐ; (2) ⓑ; (3) ⓒ; (4) ⓐ,ⓑ; (5) ⓐ,ⓑ,ⓒ.

二、計算題(90%)(除第 7 題外，未寫計算過程不予給分)

1. (10%)假設一隨機變數 X 之機率質量函數(probability mass function)為 $f(x) = c\binom{2}{x}\cdot\binom{3}{3-x}$, x=0,1,2，試求 c 值。

2. (10%)假設一隨機變數 X 符合下列條件： $E[(X-1)^2]=10$ 與 $E[(X-2)^2]=6$，試求 X 之平均數(μ)與變異數(σ^2)。

3. (10%)Lots of 40 components each are called unacceptable if they contain as many as 3 defectives or more. The procedure for sampling the lot is to select 5 components at random and to reject the lot if a defective is found. What is the probability that exactly 1 defective is found in the sample if there are 3 defectives in the entire lot?

4. (10%)根據醫學研究結果顯示，病人感染某種罕見血液疾病後能倖存之機率為 0.4。假設今有 100 位病患感染此種疾病，試問倖存人數低於 30 人的機率為何？（需計算出近似值）。

5. (10%)在一項估計台灣地區家庭每月飲食平均支出的研究中，假設研究者從台灣地區所有家庭中抽出 100 戶，分別紀錄其每月飲食支出。經計算，此 100 戶家庭平均支出為 8000 元，標準差為 1,600 元。請問在 95%信賴水準(confidence level)下，母體平均數的信賴區間(confidence interval)為何？

6. (10%)An experiment was performed to compare the abrasive wear of two different laminated materials. Twelve pieces of material 1 were tested by exposing each piece to a machine measuring wear. Ten pieces of material 2 were similarly tested. In each case, the depth of wear was observed. The samples of material 1 gave an average (coded) wear of 85 units with a sample standard deviation of 4, while the sample of material 2 gave an average of 81 and a sample standard deviation of 5. Can we conclude at the 0.05 level of significance that the abrasive wear of material 1 exceeds that of material 2 by more than 2 units? Assume the populations to be approximately normal with equal variances.

7. (5%) 假設一通過原點的線性迴歸方程式為：$\mu_{y|x} = \beta x$。試寫出此方程式中參數β之最小平方估計式。

8. (15%) 試以下列資料，建立一通過原點之線性迴歸式。

x	0.5	1.5	3.2	4.2	5.1	6.5
y	1.3	3.4	6.7	8.0	10.0	13.2

9. (10%)Let X_1 and X_2 be two continuous random variables with joint probability distribution

$$f(x_1,x_2)=\begin{cases}4x_1x_2 & 0<x_1,x_2<1\\ 0 & \text{elsewhere.}\end{cases}$$

Find the joint probability distribution of $Y_1=X_1^2$ and $Y_2=X_1X_2$.

註：

$t_{0.05,19}=1.729$; $t_{0.05,20}=1.725$; $t_{0.05,21}=1.721$; $t_{0.025,19}=2.093$; $t_{0.025,20}=2.086$; $t_{0.025,21}=2.080$; $\Pr(Z<2.14)=0.9838$;

$\Pr(Z<1.42)=0.9222$; $\Pr(Z<1.645)=0.95$; $\Pr(Z<1.96)=0.975$.