淡江大學97學年度碩士班招生考試試題

124-1

系別：企業管理學系　　科目：統　計　學

准帶項目請打「V」	
V	簡單型計算機

本試題共 2 頁，8 大題

※請依題號順序作答，並詳列求解過程

1. A machine has probability 5% to have trouble in one day. If it works OK in 3 days, it makes a profit of 1,000 dollars. If it has trouble in one of the 3 days, there is still a profit of 500 dollars. If it does not work 2 or 3 days, we will lose 15,000 dollars. Find the average profit in the 3 days. **(8%)**

2. If the joint density function of X and Y is given by

$$f(x,y)=\begin{cases} x^2+\dfrac{xy}{3}, & 0<x<1, 0<y<2 \\ 0, & elsewhere \end{cases}$$

Find (1) $P(X>1/2)$; (2) $P(Y<X)$。 **(10%)**

3. The moment generating function of X is $M_x(t)=\frac{1}{4}\left(e^t+e^{2t}+e^{3t}+e^{4t}\right)$; the moment generating function of Y is $M_Y(t)=\frac{1}{3}\left(e^t+e^{2t}+e^{3t}\right)$. X and Y are independent variable. Let W=X+Y
   (1) Find the moment generating function of W.
   (2) Give the probability density function of W.
   (3) The expected value of W, i.e. E(W). **(12%)**

4. Suppose we plan to select a random sample from a normal distribution known to have a standard deviation of 8. We know that the population mean is either 42 or 50, and we wish to test $H_0:\mu=42$ against $H_1:\mu=50$. Determine the sample size n and a critical region such that $\alpha=0.05$ and $\beta=0.1$ (Note: $Z_{0.05}=1.645; Z_{0.1}=1.282$)。 **(10%)**

5. The following partially completed ANOVA (Analysis of Variance) table resulted from a study involving 4 treatments with a sample of 5 observations for each treatment. All the assumptions required for the analysis are satisfied. Fill in blanks in the following ANOVA table. **(14%)**

Source of Variability	Degrees of Freedom	Sum of Squares	Mean Squares	F-ratio
Treatments	?	30	?	?
Error	?	?	?	
Total	?	70		

本試題雙面印製

◀注意背面尚有試題▶

淡江大學 97 學年度碩士班招生考試試題

124-2

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本試題共 7 頁，8 大題

6. We have a data set as follows:

X	1	2	3	4	5
Y	130	145	150	165	170

Please answer the following questions:

(1) Compute the regression line Y on X (i.e., Y=a+bX)。 **(4%)**

(2) Compute the t values for the parameter estimates $\hat{a}$ and $\hat{b}$. Are they significant? **(16%)**

(3) Compute the coefficient of determination (R^2) for the regression? **(4%)**

7. 假設有 N 個人出席會議，每人名牌上號碼依次為 $1,2,\cdots,N$，為了估計與會人數 N，隨機抽取 5 張名牌，其號碼分別為 $\{37, 16, 44, 43, 22\}$。試以動差法(Method of moment)估計 N，並問所求之估計式(Estimator)滿足不偏性(Unbiased estimator)嗎？理由，加以證明之。**(10%)**

8. 兩位評審委員對 12 個參加選美比賽的候選人進行評分，其評分係主觀偏好給予 0—10 分，而評分結果如下表：

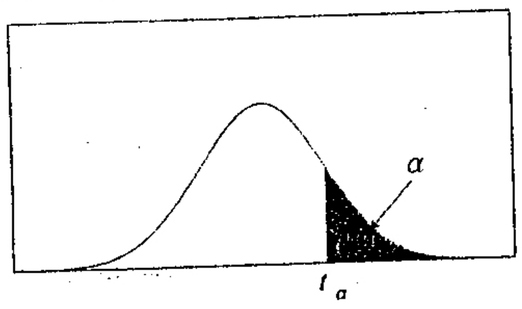
	候選人											
	1	2	3	4	5	6	7	8	9	10	11	12
評審員 I	5	6	10	7	0	9	7	10	9	6	9	9
評審員 II	4	1	7	5	8	5	5	6	8	10	5	4
I—II 的符號	+	+	+	+	−	+	+	+	+	−	+	+

請以 Sign test 檢定兩位評審委員在評分上是否有顯著差異，亦即，

檢定 $\begin{cases} H_0 : p = 0.5 \\ H_1 : p \neq 0.5 \end{cases}$，其中 p 為出現一個 "+"號的機率（顯著水準 $\alpha = 0.05$）**(12%)**

t 分配臨界值表

$P(t > t_\alpha) = \alpha$



d.f.	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$	*d.f.*
1	3.078	6.314	12.706	31.821	63.656	*1*
2	1.886	2.920	4.303	6.965	9.925	*2*
3	1.638	2.353	3.182	4.541	5.841	*3*
4	1.533	2.132	2.776	3.747	4.604	*4*
5	1.476	2.015	2.571	3.365	4.032	*5*
6	1.440	1.943	2.447	3.143	3.707	*6*
7	1.415	1.895	2.365	2.998	3.499	*7*
8	1.397	1.860	2.306	2.896	3.355	*8*
9	1.383	1.833	2.262	2.821	3.250	*9*
10	1.372	1.812	2.228	2.764	3.169	*10*