國立臺灣師範大學 113 學年度碩士班招生考試試題

科目：統計學　　　　　　　　　　　　　　適用系所：全球經營與策略研究所
注意：1.本試題共 3　頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則依規定扣
分。(註：可以使用電子計算機)

1. A sample of 50 complaints concerning carpet installation of a company was selected last year. The following data represent the number of days between the receipt of the complaint and the resolution of the complaint.

54	5	35	137	31	27	152	2	123	81	74	27
11	19	126	110	110	29	61	35	94	31	26	5
12	4	165	32	29	28	29	26	25	1	14	13
13	10	5	27	4	52	30	22	36	26	20	23
33	68										

   (a) Compute the arithmetic mean and median. **(4 points)**
   (b) Compute the first quartile and third quartile. **(4 points)**
   (c) Compute the interquartile range and the coefficient of variation. **(4 points)**
   (d) Construct a box-and-whisker plot. **(3 points)**

2. There are four people being considered for the position of chief executive officer of Shi-Da Enterprise. Three of the applicants are over 60 years of age. Two are female, of which only one is over 60.
   (a) What is the probability that a candidate is over 60 and female? **(5 points)**
   (b) Given that the candidate is male, what is the probability that he is less than 60? **(5 points)**
   (c) Given that the person is over 60, what is the probability the person is female? **(5 points)**

3. Cathay Auto Insurance company classifies drivers as good, medium, or poor risks. Drivers who apply to them for insurance fall into these three groups in the proportions: 30 percent, 50 percent, and 20 percent, respectively. The probability a "good" driver will have an accident is 0.01, the probability a "medium" risk driver will have an accident is 0.03, and the probability a "poor" drive will have an accident is 0.10. A customer with this insurance policy is randomly selected from the company's data base. Please answer the following questions:
   (a) What is the probability that this customer used to have an accident? **(5 points)**
   (b) What is the probability that the company classifies him as a "good" driver if he used to have an accident? **(5 points)**
   (c) What is the probability that the company classifies him as a "poor" driver if he used to have an accident? **(5 points)**

4. A mail-order catalog business that sells personal computer supplies, software, and hardware maintains a centralized warehouse for the distribution of products ordered. Data have been collected over the past several months to study the relationship between monthly distribution cost and number of monthly orders. The regression equation is *Number of orders = 660.457 + 52.378(Distribution cost)*. Some additional output is:

Predictor	Coef	S.E. Coef	t	p-value	
Constant	660.457	347.215	1.902	0.070	
Distribution Cost	52.378	4.797	10.918	2.3851E-10	
Analysis of Variance					
Source	Degree of freedom	SS	MS	F	p-value
Regression	1	10548817.1	10548817.1	119.207	2.385E-10
Residual Error	22	1946808.88	88491.3128		
Total	23	12495626			

(a) How many months of data were in the sample (sample size)? **(3 points)**

(b) Determine the coefficient of determination. **(3 points)**

(c) Determine the correlation coefficient between monthly distribution cost and number of monthly orders. **(3 points)**

(d) At the 0.05 significance level does the evidence suggest there is a positive association between monthly distribution cost and number of monthly orders? Provide your reason. **(3 points)**

(e) Suppose that the distribution cost in certain month is 74.50. Please provide both a point estimate and a 95% confidence interval estimate for number of orders for that month. The average of sample distribution cost $\bar{X} = 71.262$ **(3 points)**

Note: $t_{22,0.025}=2.074$, $t_{22,0.05}=1.717$

5. The following is a partial ANOVA table. Complete the table and answer the following questions. Use the 0.05 significance level.

Source	Sum of Squares	Degree of freedom	Mean square	F
Treatment		2		
Error			20	
Total	500	11		

(a) How many treatments are there? **(2 points)**

(b) What are the sums of squares for treatments and error, respectively? **(4 points)**

(c) What are the mean squares for treatments and error, respectively? **(4 points)**

(d) What is the total sample size? **(2 points)**

(e) What is the critical value of F? **(2 points)**

(f) Write out the null and alternate hypotheses. **(4 points)**

(g) What is your conclusion regarding the null hypothesis? **(2 points)**

Note: $F_{2,9,0.975}=5.715$, $F_{2,9,0.95}=4.256$

6. A study regarding the relationship between age and the amount of pressure sales person feel in relation to their jobs revealed the following sample information. At the 0.01 significance level, we'd like to conclude the relationship between job pressure and age. Please the following questions.

Age (years)	Degree of Job Pressure		
	Low	Medium	High
Less than 25	20	18	22
25 up to 40	50	46	44
40 up to 60	58	63	59
60 and older	34	43	43

(a) Write out the null and alternate hypotheses. **(8 points)**

(b) What hypothesis test statistics should we use? And what is its value based on the sample information? **(8 points)**

(c) What is your conclusion regarding the null hypothesis? **(4 points)**

Note: $t_{2,0.01}=2.718$, $\chi^2_{6,0.01} = 16.812$, $Z_{0.01}=2.326$