

# 大同大學 99 學年度研究所碩士班入學考試試題

考試科目：統計學

所別：事業經營研究所

第 1/1 頁

註：本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 可以使用計算器。

1. How to describe the characteristics for the following sample of data?  
{7, 7, 5, 7, 8, 4, 3, 6}. (10 points)

2. The joint probabilities of X and Y are listed in the following table. (15 points)

y	x	
	1	2
1	0.5	0.1
2	0.1	0.3

- a. Find the marginal probabilities.      b. Find the means for X and Y.  
c. Calculate the conditional probabilities.      d. Are X and Y independent?
3. What is Central Limit Theorem? If samples of size 100 are drawn from a normally distributed population with  $\mu = 40$  and  $\sigma = 12$ , what does Central Limit Theorem say about the sampling distribution of the sample means? (10 points)
4. Answer with examples for following questions.  
a. What is good estimator?  
b. What is p-value of a test of hypothesis?  
c. How to calculate the probability of a Type II error? (15 points)
5. Surveys have been widely used by politicians around the world as a way of monitoring the opinions of the electorate. Six months ago, a survey was undertaken to determine the degree of support for a national party leader. Of a sample of 800, 56% indicated that they would vote for this politician. This month, another survey of 600 voters revealed that 45% now support the leader. At the 5% significance level, can we infer that the national leader's popularity has decreased? (15 points)
6. Many people who own digital cameras prefer to have pictures printed. In a preliminary study to determine spending patterns, a random sample of 10 digital camera owners and 10 standard camera owners were surveyed and asked how many pictures they printed in the past month. The results are presented here. At the 5% significance level, can we infer that the two groups differ in number of pictures that are printed, given that the critical value  $t = 2.10$ ? Assume that the population variances are equal. (15 points)

Digital	33	23	30	16	21	25	21	30	28	29
Standard	34	17	28	28	26	29	26	34	36	24

7. Spam is the price we pay to be capable of easily communicating using e-mail. Does spam affect everyone equally? In a preliminary study, university professors, administrators, and students were randomly sampled. Each person was asked to count the number of spam messages received that day. The results follow. Can we infer at the 2.5% significance level that the differing university communities differ in the amount of spam they receive in their e-mails, given that the critical value  $F = 5.10$ ? (20 points)

Professors	Administrators	Students
5	8	7
20	12	15
10	15	6
5	13	14
7	5	11