

銘傳大學八十六學年度管理科學研究所博士班招生考試

應用統計 試題

請注意：

- 〈1〉本試卷可使用計算機。
 〈2〉題目僅需之統計表詳見本試卷「Table 1,2」，考生不得要求其他統計表。

1. The result of a study by the Taiwan Marketing Association to determine the relationship between the importance store owners attach to advertising and the size of store they own are shown in the table. At the 5 percent level of significance, would it seem that all store owners place the same emphasis on advertising? Also formulate the null hypothesis H_0 and the alternative hypothesis H_1 . (20%)

Size	Advertising		
	Important	Not Important	No Opinion
Small	20	50	30
Medium	50	50	30
Large	60	30	20

2. For a public opinion poll for a presidential election, let p denote the proportion of voters who favor candidate A. How large a sample should be taken if we want the maximum error of the estimate of p to be equal to
- (a) 0.04 with 95% confidence? (10%)
 (b) 0.04 with 95% confidence and $0.1 \leq p \leq 0.4$? (10%)
3. A poll of a random sample of 1600 voting-age Canadian citizens, 950 indicated approval of the Prime Minister's performance in office. Six months later, of these same 1600 people, 860 indicated approval. The result were as follows.

First Survey	Second Survey		
	Approve	Disapprove	Total
Approve	800	150	950
Disapprove	60	590	650
Total	860	740	1600

- (a) At the 0.05 level of significance, is there evidence that the proportion of approval was greater at the first survey? (10%)
 (b) Compute the p value in (a) and interpret its meaning. (10%)
4. The partially completed ANOVA table for a randomized block design is shown below

Source	df	SS	MS	F
Treatment	3	15	—	—
Blocks	—	20	—	—
Error	—	—	—	—

Total	11	44		
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(a) Complete the ANOVA table. (12%)

(b) Do the data present sufficient evidence to indicate differences among treatment means under the significant level $\alpha = 0.05$? (8%)

5. The observations Y_1, \dots, Y_n can be described by the relationship

$$Y_i = \alpha x_i + \varepsilon_i, \quad i = 1, \dots, n,$$

Where x_1, \dots, x_n are known constants.

(a) Derive the least squares estimator $\hat{\alpha}$ of α . (10%)

(b) What are the good properties for least squares estimator $\hat{\alpha}$ can be obtained if the error terms $\varepsilon_1, \dots, \varepsilon_n$ satisfy some assumptions? Interpret your answer. (10%)

Table 1. Critical Values of the χ^2 Distribution

$$P(\chi^2 > \chi) = \alpha$$

Degrees of Freedom	α					
	0.975	0.95	0.90	0.10	0.05	0.025
1	0.001	0.004	0.016	2.706	3.841	5.024
2	0.051	0.103	0.211	4.605	5.991	7.378
3	0.216	0.352	0.584	6.251	7.815	9.348
4	0.484	0.711	1.064	7.779	9.488	11.143
5	0.831	1.145	1.610	9.236	11.071	12.833
6	1.237	1.635	2.204	10.645	12.592	14.449

Table 2. Critical Values of the F-Distribution

$$P(F \geq F_{0.05}(v_1, v_2)) = 0.05$$

Den. df v_2	Numerator df v_1								
	1	2	3	4	5	6	7	8	9
	1	161	200	216	225	230	234	237	239
2	18.5	19.0	192	19.2	19.3	19.3	19.4	19.4	19.4
3	10.1	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90