

國立中央大學98學年度碩士班考試入學試題卷

所別：資訊管理學系碩士班 甲組 科目：統計學 共    頁 第    頁

乙組

\*請在試卷答案卷(卡)內作答

1. (15%) A survey of investors with Internet access classified these investors by their age and attitude toward the market. Suppose that a cross-classification of the age of the trader and attitude toward the market resulted in the following cross-classification table. Please answer the following questions.

Age	Attitude			Total
	Bearish	Neutral	Bullish	
18-35	9	5	18	32
36-45	17	8	28	53
46 and older	<u>18</u>	<u>6</u>	<u>7</u>	<u>31</u>
Total	44	19	53	116

- (1) (3%) Please state the null hypothesis.
- (2) (8%) Please calculate the  $\chi^2$  test statistic.
- (3) (2%) The upper-tail critical value of  $\chi^2$  (4) is 13.277 ( $\alpha = .01$ ), what is your decision on the null hypothesis testing?
- (4) (2%) What would be your answer to (3) if the 0.05 level of significance were used?
2. (14%) One of the ANOVA assumptions is "homogeneity of variance", please answer:
- (1) (4%) Please explain the meaning of "homogeneity of variance".
- (2) (4%) Why is it important?
- (3) (6%) Please describe the procedure of performing the "Levene's Test for Homogeneity of Variance".
3. (10%) Please answer the following questions.
- (1) (5%) What is(are) the difference(s) between  $r^2$  and  $r^2_{adj}$ ?
- (2) (3%) When should we use  $r^2_{adj}$  instead of  $r^2$  and why?
- (3) (2%) In what situation the value of  $r^2_{adj}$  is exactly the same as  $r^2$ ?
4. (6%) Discuss the differences among the three measures of centrality.
5. (9%) Let  $\bar{X}$  denote the mean of a random sample of size 25 from a Gamma distribution with  $\alpha = 4$  and  $\beta > 0$ . Use the central limit theorem to find an approximate 0.954 confidence interval for  $\mu$ , the mean of the gamma distribution.

參考用

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所別：資訊管理學系碩士班 甲組 科目：統計學 共 2 頁 第 2 頁

乙組

\*請在試卷答案卷(卡)內作答

6. (9%) What are the concepts of  $H_0$  and  $H_1$  underlying hypothesis testing? Please also explain how to identify  $H_0$  and  $H_1$  and how to make conclusion of the hypothesis testing via the example of *Presumption of Innocence* (無罪推定原則) for defending human rights in any criminal trial.
7. (9%) 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 1100, 56% indicated that they would vote for this politician. This month, another survey of 800 voters revealed that 46% now support the leader. At the 5% significance level, can we infer that the national leader's popularity has decreased by more than 5%? ( $Z_{0.05}=1.645$ ,  $Z_{0.025}=1.96$ ,  $Z_{0.005}=2.57$ )
8. (12%) The following questions are on the binomial distribution.
- (1) (2%) Describe the conditions that could generate a binomial distribution.
  - (2) (4%) Generate a generalized equation for a binomial distribution. You have to define the symbols in the equation in details.
  - (3) (2%) Find the expected value and the variance of the binomial distribution.
  - (4) (4%) Draw a relative probability diagram to illustrate a sample with sample size 5 and a binomial distribution which has a success probability of 0.5.
9. (8%) Please answer the following questions.
- (1) (4%) Compare a sample distribution with a sampling distribution.
  - (2) (4%) In case you are performing statistical inference on the expected value, describe how to apply the CLM (central limit theorem) to either or both of the above distributions.
10. (8%) Please answer the following questions.
- (1) (4%) When you use grouped data of a sample ( $k$  groups,  $k>4$ ) with the unknown population parameters to test the goodness of fit for a normal distribution, how many degrees of freedom you are to suggest? Describe the reason.
  - (2) (4%) In case you are performing statistical inference on the expected value for a small-sized sample (e.g. a sample size of 10) with non-normal distribution, you may use a signed test or a signed rank sum test. Compare the two tests and make your suggestion.

參考用

注意：背面有試題