

# 大同大學 96 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. Why should we examine the data before applying multiple regression analysis and how to do it? (10 points)
2. What is sampling distribution of the sample mean,  $\bar{X}$ ? How do you use it to make inferences about the population mean,  $\mu$ , if the population contains five values: {2, 4, 6, 8, 10} and sample size is 2? (10 points)
3. Define subjective probability and objective probability with examples? (10 points)
4. Describe any three criteria used in Statistics to evaluate a good estimator to estimate the population parameter of interest? (10 points)
5. What are the type I error and type II error in Statistics? How to decrease each of them? (10 points)
6. Suppose that a random variable  $Y$  has a probability density function given by  $f(y) = \begin{cases} ky^3 e^{-y/2}, & y > 0 \\ 0, & \text{elsewhere.} \end{cases}$  Find the value of  $k$  that makes  $f(y)$  a density function. (10 points)
7. The reaction of a consumer to a stimulus in an advertising experiment may take one of two forms, A or B. If an experimenter wishes to estimate the probability  $p$  that a consumer will react in manner A, how many people must be included in the experiment? Assume that the experimenter will be satisfied if the error of estimation is less than 0.04 with probability equal to 0.9. Assume also that he expects  $p$  to lie somewhere in the neighborhood of 0.6. (10 points)
8. Suppose that  $Y_1, Y_2, \dots, Y_n$  denote a random sample from the Poisson distribution with mean  $\lambda$ . (15 points)
  - a. Find the maximum-likelihood estimator  $\hat{\lambda}$  for  $\lambda$ .
  - b. Find  $E(\hat{\lambda})$  and  $V(\hat{\lambda})$ .
9. A psychological experiment was conducted to compare the lengths of response time (in seconds) for two different stimuli. To remove natural person-to-person variability in the responses, both stimuli were applied to each of nine subjects, thus permitting an analysis of the difference between response times within each person. The results are given in the following table.

Subject	Stimulus 1	Stimulus 2
1	9.4	10.3
2	7.8	8.9
3	5.6	4.1
4	12.1	14.7
5	6.9	8.7
6	4.2	7.1
7	8.8	11.3
8	7.7	5.2
9	6.4	7.8

Use the sign test and give the associated  $p$ -value to determine whether sufficient evidence exists to indicate a difference in mean response for the two stimuli with  $\alpha=0.05$ . (15 points)