

系所組別： 企業管理學系丙組

考試科目： 統計學

考試日期： 0219，節次： 3

※ 考生請注意：本試題 可 不可 使用計算機

Please show all your work.

Notes:

You may find the following critical values useful in answering questions.

Right-tailed probabilities: $Z_{0.05} = 1.645$; $Z_{0.025} = 1.96$; $Z_{0.01} = 2.33$; $t_{0.025, 26} = 2.056$ Left-tailed probabilities: $\chi^2_{0.95, 1} = 3.84$; $\chi^2_{0.95, 4} = 9.49$

1. (10%) According to a statistics study, 9 of 199 males receiving medicine *A* and 13 of 97 males in the control group died within 12 months. Use the normal theory method to test for significant differences in 12-month mortality between the two groups at the significant level of 5%.
2. (10%) Refer to the previous question (Question 1). Perform the test using the contingency table method using the Yates-corrected *Chi-square* statistic.
3. (10%) Show your understanding of the standardized normal distribution.
4. (10%) The predictive value positive of a screening test is defined as the probability that a person has disease given that the test is positive. Suppose that 84% of hypertensives and 23% of normotensives are classified as hypertensive by an automated blood-pressure machine. What is the predictive value positive of the machine, assuming that 20% of the adult population is hypertensive?
5. (10%) The zero-order correlations among variables *X*, *Y*, and *Z* are displayed in the following table. (1) (5%) Calculate the partial correlation coefficient that measures the relationship between *X* and *Y* while controlling for *Z*. (2) (5%) Interpret the result you have obtained in (1).

	Y	X	Z
Y	1.00	0.50	-0.30
X		1.00	-0.47
Z			1.00

(背面仍有題目,請繼續作答)

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6. (10%) Assume that random samples of male and female citizens have been selected, and each person has been classified as being tall or short in terms of their height. The proportions of male and females citizens are classified as being "tall" are 0.34 and 0.25 respectively. The male sample and the female sample have 83 and 103 persons respectively. Is there a statistically significant difference in the height (tall/short) by gender? Make a decision at the significance level of 0.05.
7. (10%) Consider the test of $H_0: p=1/3$, when actually $p=1/2$, against $H_1: p \neq 1/3$, using a significant level of 0.05. Suppose an experiment plans to use $n=116$ people. A type II error occurs if $\alpha < \hat{p} < \beta$. Show α and β .
8. (10%) It has been known that the results are not necessarily the same if bacteriuria is measured on the same woman at two different points in time. Assume that 1/5 of all women who are bacteriuric at time 0 are again bacteriuric at time 1 (one year later), whereas only 4.2% of women who were not bacteriuric at time 0 are bacteriuric at time 1. Let X be the random variable representing the number of bacteriuric events over the two time periods for one woman and still assume that the probability that a woman will be positive for bacteriuria at any one exam is 5%. What is the probability distribution of X ?
9. (10%) An insurer sells a policy to airline passengers for NT\$1,000. If a passenger dies on a given flight from a plane crash, the insurer will pay NT\$1,000,000 to the chosen beneficiary. Otherwise, there is no return. Suppose that a passenger has about a 1 in a million chance of dying on any given flight. You buy a policy for your next flight. (1) (5%) What is the probability distribution of the amount of money the beneficiary makes from your policy? (2) (5%) Explain why the insurer is very likely to make a profit in the long run.
10. (10%) What are the upper and lower 2.5th percentiles for a *Chi-square* distribution with a degree of freedom of 140?