

國立臺灣科技大學

八十九學年度碩士班招生考試試題

系所組別：企業管理系甲組、企業管理系乙組、管理研究所甲組、管理研究所乙組
 科目：統計學

1. The reliability of a manufacturing process is defined to be the proportion of nondefective items which are produced. An electronics firm manufacturing transistors claims that their reliability is 0.98. A random sample of 1000 transistors is tested. Suppose that computation yields a probability of 0.3669 that 22 or more defectives are in the sample if the claim is correct. If, in fact, they actually observed 22 defectives, what can be concluded or inferred? Please explain why?
- (1) The reliability of the manufacturing process is near $1 - 0.3669 = 0.6331$. (5分)
- (2) Since $22/1000 = 0.022$, the proportion of defectives in the population must be greater than 0.02. (5分)
- (3) The reliability of the manufacturing process is near 0.3669. (5分)
- (4) Observing 22 defectives is not inconsistent with a claimed reliability of 0.98. (5分)
- (5) Either a rare event was observed or the proportion of defectives is more than 0.02. (5分)
2. (1) (15分) In a certain city, 30 percent of the people are Conservatives, 50 percent are Liberals, and 20 percent are Independents. Records show that in a particular election, 65 percent of the Conservatives voted, 82 percent of the Liberals voted, and 50 percent of the Independents voted. If a person in the city is selected at random and it is learned that he did not vote in the last election, what is the probability that he is a Liberal?
- (2) (10分) Two students A and B are both registered for a certain course. If student A attends class 80 percent of the time and student B attends class 60 percent of the time, and the absences of the two students are independent, what is the probability that at least one of the two students will be in class on a given day?
3. A manager was interested in using experimental design to evaluate the effects of two reinforcement contingencies (a_1, a_2) and three types of reward (b_1, b_2, b_3) on the production level. (25 points)
- (1) What is "reinforcement contingencies" described as in experimental design terminology? Please identify other experimental design terms which apply to this problem. For each term you specify, give a corresponding example from the above problem description. (13分)
- (2) What hypotheses can you test for this problem? Write down the H_0 and H_1 for each test. (12分)



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4. 設 x_1, x_2, \dots, x_n 是從常態母體 $N(\mu, \sigma^2)$ 所抽出的一組隨機樣本，試推導出下列各變數的分配名稱及自由度，並求出其相關的平均數及變異數。

(註： $x_i \stackrel{iid}{\sim} N(\mu, \sigma^2)$, $i = 1, 2, \dots, n$)

$$(1) \frac{\left(\sum_{i=1}^n x_i - n\mu\right)^2}{n\sigma^2} \quad (8 \text{ 分})$$

$$(2) \frac{\sum_{i=1}^3 x_{i+1} - 3\mu}{\sqrt{\sum_{j=17}^{19} (x_j - \mu)^2}} \quad (8 \text{ 分})$$

$$(3) \frac{\sum_{i=1}^5 (x_{2i} - x_{2i+1})^2}{\sum_{j=3}^7 (x_{3j+1} - x_{3j+2})^2} \quad (9 \text{ 分})$$

