

國立嘉義大學 99 學年度

企業管理學系碩士班(丙組)招生考試試題

科目：統計學

1. A construction company has submitted bids on two separate state contracts, A and B . The company feels that it has a 60% chance of winning contract A , and a 50% chance of winning contract B . Furthermore, the company believes that it has an 80% chance of winning contract A if it wins contract B .
 - (1) What is the probability that the company will win both contracts? (6%)
 - (2) What is the probability that the company will win at least one of the two contracts? (7%)
 - (3) If the company wins contract B , what is the probability that it will not win contract A ? (6%)
 - (4) What is the probability that the company will win at most one of the two contracts? (6%)
2. A *Wall Street Journal* article suggested that age bias was a growing problem in the corporate world (extracted from C. Hymowitz, "Top Executives Chase Youthful Appearance, but Miss Real Issue," *The Wall Street Journal*, February 17, 2004, p. B1). In 2001, an estimated 78% of executives believed that age bias was a serious problem. In a 2004 study by ExecuNet, 82% of the executives surveyed considered age bias a serious problem. The sample size for the 2004 study was not disclosed. Suppose 50 executives were surveyed.
 - (1) At the 0.05 level of significance, use hypothesis testing to try to prove that the 2004 proportion of executives who believed that age bias was a serious problem has increased. (5%)
 - (2) Use the p-value approach to interpret its meaning. (5%)
 - (3) Suppose that the sample size used was 1,000. Redo (1) and (2), and discuss the effect that sample size had on the outcome of this analysis. (15%)
3. Let X_1, X_2, \dots, X_n be a random sample from the normal distribution $N(\theta, \sigma^2)$, $-\infty < \theta < \infty$.
 - (1) Suppose $\sigma = 1$, derive the maximum likelihood estimator of θ . (10%)
 - (2) Following question (1), find the maximum likelihood estimator of $\frac{1}{2}\theta^2$. (5%)
 - (3) Suppose σ is unknown. Moreover, you are given that $n = 17$, $\bar{x} = 4.7$ and $s^2 = 5.76$. Find the shortest 90 percent confidence interval for θ . (10%)
4. Let the independent random variables X_1, X_2 and X_3 have the same distribution function $F(x)$. Let Y be the middle value of X_1, X_2, X_3 . To determine the distribution function of Y , say $G(y) = \Pr\{Y \leq y\}$, we note that $Y \leq y$ if and only if at least two of the random variables

X_1, X_2, X_3 are less than or equal to y .

(1) Suppose that $F(10) = 0.5$. Find $G(10) = ?$ (10%)

(2) Find $G(y)$ if y is arbitrary. (5%)

(3) If $F(x)$ is a continuous type of distribution function so that the p.d.f. of X is $F'(x) = f(x)$, find the p.d.f. of Y . (10%)

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