

國立高雄第一科技大學 100 學年度 碩士班 招生考試 試題紙

系 所 別：風險管理與保險系

組 別：風險管理組、計量財務組

考科代碼：1421、1425

考 科：統計學

注意事項：

- 1、本科目得使用本校提供之電子計算器。
- 2、請於答案卷上規定之範圍作答，違者該題不予計分。

請寫出詳細計算過程並依序作答。

1. In a dice game, the player independently rolls a fair yellow die and a blue die. The player wins if and only if the yellow die shows 1, 3, or 5, or if the total on the 2 dice is 7. What is the probability the player will win? (10 points)
2. Let  $P(A \cap B) = 0.3$ ,  $P(A) = 0.6$ ,  $P(B) = 0.5$ . Find  $P(A' \cap B')$ . (10 points)
3. Let  $X_1, X_2, \dots, X_n$  be a random sample from a distribution with density function  $f(x) = 3\theta x^2 e^{-\theta x^3}$  for  $0 < x < \infty$ , and 0 otherwise.
  - (1) Find  $E[X^3]$  and  $E[X^6]$ . (10 points)
  - (2) What is the Rao-Cramer lower bound for the variance of unbiased estimators of  $\theta$ ? (10 points)
4. Let  $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$  be pairs of observations. The curve  $y = \theta \ln x$  is to be fitted to this data set. What is the least squares estimate for  $\theta$ ? (10 points)
5. Let the random variable have the p.d.f.
$$f(x) = \sqrt{\frac{2}{\pi}} e^{-\frac{x^2}{2}}, \text{ when } 0 < x < \infty, \text{ and zero elsewhere.}$$
  - (1) Find the mean. (10 points)
  - (2) Find the variance. (10 points)

6. A tax preparation firm is interested in comparing the quality of work at two of its regional offices. By randomly selecting samples of tax returns prepared at each office and verifying the sample returns' accuracy, the firm will be able to estimate the proportion of erroneous returns prepared at each office. The independent random samples from the two offices provide the following information.

Office 1:  $n_1 = 250$  and number of returns with error = 35.

Office 2:  $n_2 = 300$  and number of returns with error = 27.

- (1) Construct a 90% confidence interval of the difference between the two population proportions. (10 points)
- (2) Test if the error proportion of office 1 is higher than 10%? Use  $\alpha = 0.1$  as the level of significance. (10 points)
- (3) Construct a hypothesis test to determine whether the error proportions differ between the two offices, use  $\alpha = 0.1$  as the level of significance. (10 points)

$P(0 < Z < 1.282) = 0.40$ ,  $P(0 < Z < 1.645) = 0.45$ ,  $P(0 < Z < 1.85) = 0.4678$ ,

$P(0 < Z < 1.96) = 0.475$ ,  $P(0 < Z < 2.15) = 0.4842$ ,  $P(0 < Z < 2.33) = 0.49$ .