

國立中央大學101學年度碩士班考試入學試題卷

所別：財務金融學系碩士班 甲組(一般生) 科目：統計 共 2 頁 第 1 頁
財務金融學系碩士班 乙組(一般生)

本科考試禁用計算器

*請在試卷答案卷(卡)內作答

A. True/False/Uncertain Questions 是非不定題 (5% × 6 = 30%)

State with reasons whether the following statements are true, false or uncertain. Be precise and concise. No point will be graded if no explanation is provided. (不論你認為題意正確、錯誤或不一定皆須提示理由，否則不計分。) You will get 2 points off for each irrelevant point that appears in your answers.

1. A Gaussian random variable with a bigger variance is generally exhibiting higher (excess) kurtosis.
2. The Sharpe ratios from buying two shares of TSMC stock within one day, and holding a TSMC equity share for two days are exactly the same.
3. Doubling the sample size used to fit a regression can be expected to reduce the standard error of the slope by about 30%.
4. Pooling the two samples to estimate a common variance, σ_p^2 , when comparing two sample means avoids complications due to confounding.
5. The least square fitted line from a simple linear regression model without an intercept term goes through the point (\bar{x}, \bar{y}) .
6. Other things being equal, a significant coefficient estimate, (b_1) , in a linear regression suggests that changing x causes changes in y .

B. Answering Problems (Total 70%)

1. Let A and B be independent random variables each having the uniform distribution on $[0, 1]$. Let $U = \min\{A, B\}$ and $V = \max\{A, B\}$.
 - (a) Find the mean values of U and V . (10%)
 - (b) Find the covariance of U and V . (10%)
2. Suppose $\{X_1, X_2, \dots, X_n\}$ is a random sample drawn from an identical distribution

$$X_i = \begin{cases} x_1 & \text{with probability } p_1 \\ x_2 & \text{with probability } p_2 \\ x_3 & \text{with probability } 1 - p_1 - p_2 \end{cases}, i = 1, \dots, n,$$

where p_1 and p_2 are the unknown parameters. Find the maximum likelihood estimators for the parameters. (10%)

注意：背面有試題

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3. A miner is trapped (困住) in a mine (礦坑) containing three doors. The first door leads to a tunnel (地道) that takes him to safety after two-hour's travel. The second door leads to a tunnel that returns him to the mine after three-hour's travel. The third door leads to a tunnel that returns him to his mine after five hours. Assuming that the miner is at all times equally likely to choose any one the doors.
- (a) What is the expected value and standard deviation of the length of time until the miner reaches safety? (10%)
- (b) What will be the difference in the above answers if assuming rationality (path recognition ability) instead of memoryless of the miner? (5%)
4. John and Bill each pays \$100 to play a zero-sum winner-takes-all (零和且贏者全拿) dice game as that follows. For each throw of a pair of fair dice, John wins if the sum of the spots is dividable (整除) by 6 whereas Bill wins in the case where the sum of the spots is dividable by 5. Find the probability that Bill takes the pot of \$200 first. (10%)
5. Explain the meaning of the following statistical terms. (15%)
- (a) Sample Selection Bias
- (b) Bool's Inequality
- (c) Dummy Variable Trap

注意：背面有試題