

國立臺灣科技大學

九十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、企業管理系丙組、企業管理系丁組

科目：統計學

1. How do we use one-way ANOVA? Address this question from three perspectives:
- What kind(s) of problem can we apply one-way ANOVA to? Explain it in writing and also express it in statistical form; (8 points)
 - What are the assumptions in using one-way ANOVA? (9 points)
 - After calculating different kinds of sum of squares, what do we do with them to finish the analysis? (8 points)
2. (a) Determine the annual premium for a \$10,000 insurance policy covering an event that, over a long period of time, occurs at the rate of 3 times in 100. How much must an insurance company charge for an annual premium if the company is to break even in the long run? (To this figure the company would add administrative charges and profit.) (10%)
- (b) A realtor wishes to estimate the mean cost of new homes in different parts of the country. In order to do this, the realtor will take a random sample of single-family dwellings in Taipei and record the purchase price for each. Then a second sample of single-family dwellings, equal in size but independent of the first, will be taken in Kaushiung, and the purchase price recorded. If the realtor desires the estimate to be within \$350.00 of the true difference with 99% confidence, how many single-family homes should be sampled in each state? (Assume standard deviation of price for both city is approx. \$14,000.) Due to such factors as lack of time, money, and/or manpower, the realtor may be unable to take a random sample of this large size in city. How could he reduce the sample size required? (15%)
3. 假設由母體 $N(\mu, 16)$ 中隨機抽取二組獨立的樣本 X_1, X_2, \dots, X_n 與 Y_1, Y_2, \dots, Y_m ，請分別回答下列獨立的兩小題：
- 若 $\hat{\mu} = a\bar{X} + (1-a)\bar{Y}$ 為 μ 的不偏誤估計式， $0 < a < 1$ ，求 a 之值使 $\hat{\mu}$ 之變異數為最小。(10分)
 - 若估計式 $\tilde{\mu}_1 = b\bar{X} \sum (X_i - \bar{X})^2$ ， $\tilde{\mu}_2 = c\bar{X} \sum (Y_i - \bar{Y})^2$ ， $\tilde{\mu}_3 = d\bar{Y} \sum (X_i - \bar{X})^2$ 以及 $\tilde{\mu}_4 = e\bar{Y} \sum (Y_i - \bar{Y})^2$ 皆為 μ 的不偏誤估計式，試求 b 、 c 、 d 、 e 之值。(15分)



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4. Suppose that a certain examination is to be taken by five students independently of one another, and that the number of minutes required by any particular student to complete the examination has an exponential distribution for which the mean is 80. Suppose that the examination begins at 9:00 A.M.
- (a) Determine the probability that at least one of the students will complete the examination before 9:30 A.M. (12 points)
- (b) Determine the probability that no two students will complete the examination within 10 minutes of each other. (13 points)



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