國立中央大學八十六學年度碩士班研究生入學試題卷

所別: 企業管理研究所 乙 組 科目: 統計學 共 1 頁 第 1 頁

一、試述變異數分析(ANOVA)的前提，並說明如何判定該等前提是否成立？（15%）

二、請利用流程圖說明在各種不同情形下，檢定二個群體平均數相等假設的方法。（20%）

三、說明相關係數與迴歸係數的關係，並說明當相關係數為-1 和 0 時，迴歸直線與資料間的情形。（15%）

四、 20%

Aphid infestation of fruit trees can be controlled either by spraying with pesticide or by inundation with ladybugs. In a particular area, four different groves of fruit trees are selected for experimentation. The first three groves are sprayed with pesticides 1, 2, and 3, respectively, and the fourth is treated with ladybugs, with the following results on yield:

Treatment	n_i = *number of Trees*	$\bar{x}_i$ (*bushels/tree*)	s_i
1	100	10.5	1.5
2	90	10.0	1.3
3	100	10.1	1.8
4	120	10.7	1.6

Let μ_i = the true average yield (bushels/tree) after receiving the ith treatment. Then

$$\theta = \tfrac{1}{3}(\mu_1 + \mu_2 + \mu_3) - \mu_4$$

measures the difference in true average yields between treatment with pesticides and treatment with ladybugs. When n_1, n_2, n_3, and n_4 are all large, the estimator $\hat{\theta}$ obtained by replacing each μ_i by $\bar{X}_i$ is approximately normal. Use this to derive a large-sample $100(1-\alpha)\%$ CI for θ and compute the 95% interval for the given data.

五、 15%

Let $X_1, X_2, \ldots, X_n$ be random variables denoting n independent bids for an item that is for sale. Suppose each X_i is uniformly distributed on the interval [100, 200]. If the seller sells to the highest bidder, how much can he expect to earn on the sale?

六、 15%

A student who is trying to write a paper for a course has a choice of two topics, A and B. If topic A is chosen, the student will order two books through interlibrary loan, while if topic B is chosen, the student will order four books. The student believes that a good paper necessitates receiving and using at least half the books ordered for either topic chosen. If the probability that a book ordered through interlibrary loan actually arrives in time is .9 and books arrive independently of one another, which topic should the student choose to maximize the probability of writing a good paper? What if the arrival probability is only .5 instead of .9?