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 甲組 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、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%)

三、 X理論和Y理論是管理控制的重要理論，A公司總經理為了解，何種理論較有效，隨機選擇了16位員工分成I、II組，其中I組施以X理論的環境；II組給予Y理論的環境，然在年終給予工績效評分如下：(20%)

	1	2	3	4	5	6	7	8	$\bar{x}_i$	S_i^2
I	86	82	84	83	84	83	85	87		2.786
II	83	81	84	72	79	85	78	86		21.143

①檢定兩種管理方式之效果有否差異？ $F(\substack{v_1=7,v_2=7\\ \alpha=0.025})=4.99$

②建立 $\mu_1-\mu_2$ 之95% 信賴區間。 $t(\substack{v=8\\ \alpha=0.025})=2.306$, $t(\substack{v=9\\ \alpha=0.025})=2.262$

參考用

四、 Sometimes experiments involving success or failure responses are run in a paired or before/after manner. Suppose that before a major policy speech by a political candidate, n individuals are selected and asked whether (S) or not (F) they favor the candidate. Then after the speech the same n people are asked the same question. The responses can be entered in a table as follows:

Before \ After	S	F
S	X_1	X_2
F	X_3	X_4

where $X_1 + X_2 + X_3 + X_4 = n$. Let p_1, p_2, p_3, and p_4 denote the four cell probabilities, so that $p_1 = P(S$ before and S after), and so on. We wish to test the hypothesis that the true proportion of supporters (S) after the speech has not increased against the alternative that it has increased.

5% a. State the two hypotheses of interest in terms of p_1, p_2, p_3, and p_4.

5% b. Construct an estimator for the after/before difference in success probabilities.

5% c. When n is large, it can be shown that the rv $(X_i - X_j)/n$ has approximately a normal distribution with variance given by $[p_i + p_j - (p_i - p_j)^2]/n$. Use this to construct a test statistic with approximately a standard normal distribution when H_0 is true.

5% d. If $x_1 = 350, x_2 = 150, x_3 = 200$, and $x_4 = 300$, what do you conclude?

五、 The weekly demand for propane gas (in 1000s of gallons) from a particular facility is an rv X with pdf

$$f(x) = \begin{cases} 2\left(1 - \frac{1}{x^2}\right) & 1 \le x \le 2 \\ 0 & \text{otherwise} \end{cases}$$

5% a. Compute the cdf of X.

5% b. Obtain an expression for the $(100p)$th percentile. What is the value of $\tilde{\mu}$?

5% c. Compute $E(X)$ and $V(X)$.

5% d. If 1.5 thousand gallons is in stock at the beginning of the week and no new supply is due in during the week, how much of the 1.5 thousand gallons is expected to be left at the end of the week?

六、 A toll bridge charges \$1.00 for passenger cars and \$2.50 for other vehicles. Suppose that during daytime hours, 60% of all vehicles are passenger cars. If 25 vehicles cross the bridge during a particular daytime period, what is the resulting expected toll revenue? 10%