國立屏東商業技術學院九十三學年度碩士班入學考試試題

國際企業研究所＜在職生＞

統計學

注意：
1. 本試題共有五大題，每大題各二十分。請依序並標明題號作答於答案卷上。
2. 本試題未附有機率分配表。
3. 試題隨答案卷一併繳回。

一、（本大題包括四個小題，每小題各爲五分。）
解釋下列名詞：
1. Central Limit Theorem (CLT)
2. The Method of Ordinary Least Square (OLS)
3. Best Linear Unbiased Estimator (BLUE).
4. Type II Error

二、已知一組隨機樣本$\{X_1,...,X_n\}$抽自一平均數爲μ，變異數爲σ^2的常態母體，今採用最大概似法 (Maximum Likelihood) 來估計未知的平均數與變異數，若自然對數 (ln) 概似函數如下：

$$\ln L(\mu,\sigma^2)=-\frac{n}{2}\ln(2\pi)-\frac{n}{2}\ln\sigma^2-\frac{1}{2}\sum_{i=1}^{n}\left[\frac{(x_i-\mu)^2}{\sigma^2}\right]$$

請求出μ與σ^2之最大概似估計式。

三、（本大題包括四個小題，每小題各爲五分。）

The capital asset pricing model (CAPM) can be written as

$$E(R_i)=R_f+\beta_i\left[E(R_m)-R_f\right]$$

where, R_i and R_f are the return for security i and the risk-free rate, respectively; R_m is the return for the market portfolio, and β_i is the i'th security *beta* value. A stock's *beta* is important to investors because it reveals the stock's volatility. It measures the sensitivity of security i's return to variation in the whole stock market. As such, values of *beta* less than one indicate that the stock is "defensive", since its variation is less than the market's. A *beta* greater than one indicates an "aggressive" stock. Investors usually want an estimate of a

stock's *beta* before purchasing it. The CAPM model can be written as a regression model,

$$R_i - R_f = \alpha_i + \beta_i (R_m - R_f) + u$$

where, u is an iid random disturbance.

A market analyst has told you that this security closely follows the market, but that it is no more risky, on average, than the market. This statement can be tested by using the statistical hypothesis test. Suppose there were 62 observations and you had estimated the above model by using OLS (Ordinary Least Square) method to find that the estimated value of *beta* for a stock i was 1.147. The standard error associated with this coefficient is estimated to be 0.0548.

Please answer the following questions:

1. Write down the null hypothesis and the alternative hypothesis.
2. Test the hypothesis at 5% level of significance.
3. What is your conclusion about this test?
4. Is the market analyst's statement empirically verified?

四、（本大題包括四個小題，每小題各爲五分。）

設有一母體之機率分配如下：

X	2	6	9
f(X)	0.3	0.2	0.5

若自該母體以抽出放回之方式隨機抽出兩個樣本，表示爲(X_1, X_2)。請回答下列問題：

1. 求$\overline{X} = \frac{X_1 + X_2}{2}$之抽樣分配。
2. 求$\overline{X}$之期望值。
3. 求$\overline{X}$之變異數。
4. $\overline{X}$之期望值與母體之平均數有何關係？又問$\overline{X}$之變異數與母體之變異數有何關係？

五、（本大題包括兩個小題，每小題各爲十分。）

爲了檢定 A 和 B 兩種產品之銷售量是否相同，隨機選出 10 家自營分店。先讓每一自營分店賣 A 產品，記錄每一自營分店 A 產品之銷售量，再讓每一自營分店賣 B 產品，記錄每一自營分店之 B 產品銷售量。成對樣本記錄資料如下：

A 產品銷售量	14	21	10	11	15	16	8	32	37	10
B 產品銷售量	16	24	20	15	17	19	10	33	19	11

請回答下列問題：

1. 在成對樣本且α=0.05 情況下，利用 t 分配檢定 A 產品和 B 產品之銷售量是否相同？
2. A 產品和 B 產品之銷售量是否相同的問題如果用變異數分析(ANOVA)進行檢定，是屬於何種實驗設計？並且在α=0.05 情況下，利用變異數分析檢定 A 產品和 B 產品之銷售量是否相同？

【背面有附表】