

# 國立臺北科技大學 102 學年度碩士班招生考試

系所組別：4200 經營管理系碩士班

## 第二節 統計學 試題

第一頁 共一頁

### 注意事項：

1. 本試題共 5 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

**Please show all your work/calculation in every question or no points will be granted.**

1. (20%) Please explain the following terms of a regression model in detail.
  - (a) Power of test (4%)
  - (b) Coefficient of determination (4%)
  - (c) Randomized block design (4%)
  - (d) Coefficient of correlation (4%)
  - (e) Standard deviation (4%)
2. (30%) The table below shows the results of a simple regression analysis with 50 observations for the dependent variable Y and independent variable X. Assuming that the first-order regression model is appropriate, please answer the following questions in detail:

Variable	Coefficient	Std. Error
Constant	-0.197	3.563
X	14.731	0.609

$t_{0.1,48}=1.299; t_{0.05,48}=1.677; t_{0.025,48}=2.011$   
 $t_{0.1,49}=1.299; t_{0.05,49}=1.677; t_{0.025,49}=2.010$   
 $t_{0.1,50}=1.299; t_{0.05,50}=1.676; t_{0.025,50}=2.009$

- (a) Please use the results shown in the table above to write the regression model. (6%)
- (b) Please estimate the change in Y when X is increased by one. Please use 90 percent confidence interval and interpret your confidence interval. (6%)
- (c) Please conduct a t test to determine whether there is a linear association between X and Y when the  $\alpha$  risk is at 0.10. Please state the alternatives, the decision rule, and the

conclusion in detail. (6%)

(d) Are the results in part (b) and (c) consistent? Please explain in detail. (6%)

(e) Please conduct a test to determine whether the coefficient of X is more than 13 when the risk of type I error is at 0.05. Please state the alternatives, the decision rule, and the conclusion in detail. (6%)

3. (10%) When asked to state the multiple regression model, a student wrote:

$$E(Y_i) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \varepsilon_i.$$

Do you agree with the student's perspective? Please explain in detail.

4. (34%) A brand new product is going to launch. In order to see whether consumers will like this product, 3 different packages (A1, A2, A3) and 3 different promotions (B1, B2, B3) were used in 36 supermarkets. Therefore, there were 3x3 ways of marketing strategies (each package has 3 different promotions). Randomization was used in assigning 4 supermarkets to each of the 9 marketing strategies. The ANOVA analysis result is as follows.

Source	SS	Df	MS
Packages (A)	220.020	(1)	(4)
Promotions (B)	123.660	(2)	(5)
Interaction (AxB)	29.425	(3)	(6)
Errors	1.625	27	(7)
Total	374.730	35	

$F_{0.05,5,27}=2.57; F_{0.05,4,27}=2.73; F_{0.05,3,27}=2.96; F_{0.05,2,27}=3.35;$   
 $F_{0.05,1,27}=4.21$

- (a) Please complete the missing data of the above table [(1), (2), (3)... (7)]. (14%)
- (b) Please test whether A and B interact (use  $\alpha = 0.05$ ). Please state the alternatives, the decision rule, and the conclusion in detail. (10%)
- (c) Please test whether there are main effects for A and B (use  $\alpha = 0.05$ ). Please state the alternatives, the decision rule, and the conclusion in detail. (10%)

5. (6%) Please calculate the expected value of the weeks of unemployment using the table below.

weeks of unemployment	0	1	2	3	4	5	6
probability	0.22	0.18	0.16	0.13	0.11	0.1	0.1