國立政治大學 113 學年度第 2 學期 Quiz (2) 考試命題紙

Subject： 統計學 (二)　　開課班別： 統計學整合開課　　Teacher: Han-Ming Wu

Date：22 May (Thur) 15:10-16:00	※Allowed:「O」, Prohibited:「×」				1. 需加發計算紙或答案紙請在試題內封袋備註。 2. 為環保節能減碳，試題一律採雙面印刷，有特殊印製需求，請註記：B 卷
Pages: 2，Copies: 45	Calculator	Textbook	Class notes	3C product	
備註：注意事項要看!! (ch14.1∼14.4)	O	×	×	×	

Notes:

(1) Fill in the student ID number and name on the answer sheet。Write down the exam sheet number you take on the top right corner of the answer sheet : **A** (default) or **B**.

(2) Answer all questions in English (ignore the grammar and spelling)。

(3) Answer each question in the order it appears。The total score is 120.

(4) It is recommended to use a dark ballpoint pen。(pencil is allowed)

(5) The calculation process (for parts **IV** and **V**) is required (calculate to 4 decimal places)。

(6) Return both the answer sheet and the question sheet.

(-) Declaration (0%): Please transcribe the following oath onto the first page of the answer sheet in either Chinese or English. (複寫下列宣誓詞至答案卷的第一頁上)。(10 points will be deducted if not written.)(不寫扣 10 分)

0. ” 本人姓名 恪遵各項考試規則，若如違反，願受校方最嚴厲處罰，謹誓。”

”I (your name here) will strictly adhere to all examination rules. If I break this oath, I am willing to accept the most severe punishment imposed by the school. Solemnly sworn.”

(I) Multiple choice (30%); select one correct answer.

1. (7%)In regression analysis, which of the following assumptions is not true about the error term ϵ? (A). The expected value of the error term is the same for all values of x. (B). The variance of the error term is the same for all values of x. (C). Some values of the error term are independent. (D). The error term is normally distributed.

2. (7%) In regression analysis, the model in the form $y = \beta_0+\beta_1 x+\epsilon$ is called the (A). regression equation. (B). fitted regression model. (C). estimated regression equation. (D). regression model

3. (8%)In regression analysis, if the independent variable is measured in pounds, the dependent variable (A). must also be in pounds. (B). must be in some unit of weight. (C). cannot be in pounds. (D). can be measured in any units.

4. (8%)In a simple linear regression analysis (where y is a dependent and x an independent variable), if the y-intercept is positive, then (A). there is a positive correlation between x and y. (B). the estimated regression line intercepts the positive y-axis. (C). if x is increased, y must also increase. (D). if y is increased, x must also increase.

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考試科目： 統計學 (二)　　開課班別： 統計學整合開課　　命題教授: Han-Ming Wu

考試日期：22 May (Thur) 15:10-16:00	※准帶項目打「O」，否則打「×」					1. 需加發計算紙或答案紙請在試題內封袋備註。 2. 為環保節能減碳，試題一律採雙面印刷，有特殊印製需求，請註記：B 卷
本試題共2頁，印刷份數: 45 份	計算機	課本	筆記	字典	手機平板筆電	
備註：注意事項要看!! (ch14.1∼14.4)	O	×	×	×	×	

(II) Fill-in-the-blank (Correct spelling should be used if possible.) (20%, 10% each)

5. An important step in determining whether the assumed model is appropriate involves testing for the _____ of the relationship. The tests of _____ in regression analysis are based on the four assumptions about the error term ϵ.

6. For the estimated regression equation$\hat{y} = f(x)$ fitted to the dataset $\{y_i, x_i\}_{i=1}^n$, what are the mathematical formulas for the sum of squares due to error, and the sum of squares due to regression? _____, and _____.

(III) Short answer (20%, 10% each)(write down the statement (or definition), formula if any, interpretation)

7. Consider the coefficient of determination in a simple linear regression model. What are its *definition* and *interpretation*?

8. There are some misunderstanding of R^2. One of them is "a high R^2 indicates that the estimated regression line is a good fit". Please explain why this statement is not necessarily correct.

(IV) Calculation (30%, 10% each)

9. Given are five observations ($i = 1, 2, \cdots, 5$) collected in a regression study on two variables. x_i : $2, 6, 9, 13, 20$ and $y_i : 7, 18, 9, 26, 23$. ($\sum x_i = 50, \sum y_i = 83, \sum x_i^2 = 690, \sum y_i^2 = 1659$)

   (a) Develop a scatter diagram for these data.

   (b) Develop the estimated regression equation for these data.

   (c) Use the estimated regression equation to predict the values of y when $x = 6$ and $x = 8$.

(V) Bonus (20%)

10. Derive the parameter estimates for a simple linear regression model using the least squares method.

<The blank pages at the back can be used as scratch paper. (後面空白頁可當計算紙)>