

科目：迴歸分析

系所組：統計資訊學系應用統計碩士班

Suppose a general linear regression model

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_{p-1} X_{i(p-1)} + \varepsilon_i \quad \text{where } \varepsilon_i \underset{iid}{\sim} N(0, \sigma^2)$$

is adopted in a study. Please answer the following questions as detail as possible.

1. Please list three of the basic assumptions associated with this model. (15%)
2. What is the meaning of the regression parameter β_0 ? (10%)
3. What is the meaning of the regression parameter β_k , $k \in \{1, 2, \dots, p-1\}$? (10%)
4. Is the model $Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_{12} X_{i1} X_{i2} + \varepsilon_i$ where $\varepsilon_i \underset{iid}{\sim} N(0, \sigma^2)$ still a linear model? Write down your reason in detail. (10%)
5. Suppose we want to perform the analysis of variance approach to this regression model,
 - a. Write down the equation for defining the total sum of squares (SST). (10%)
 - b. Write down the equation for defining the regression sum of squares (SSR). (10%)
 - c. Write down the definition of the “coefficient of determination”. (10%)
 - d. Write down the meaning of the “coefficient of determination”. (10%)
 - e. Write down the null hypothesis (H_0) of the associated F test. (5%)
 - f. If we have a very small p-value (approximate to 0) in the F test, what is your conclusion? (10%)

※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部份可當稿紙使用。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。