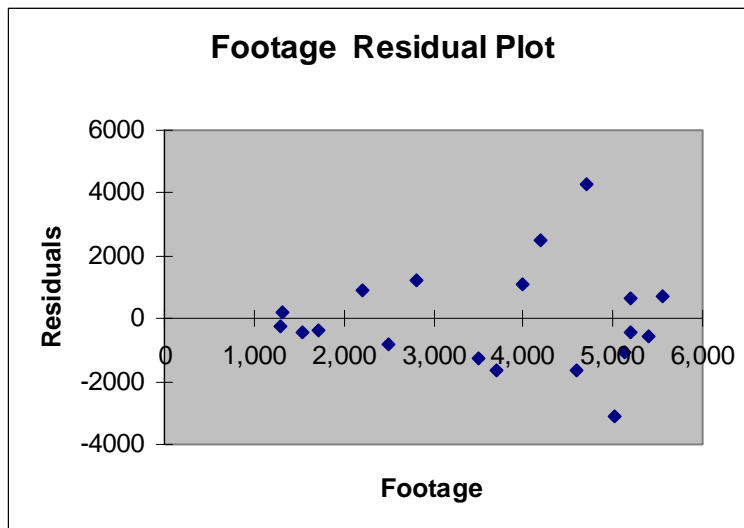# 國立彰化師範大學 98 學年度<u>碩</u>士班招生考試試題

PART Ⅰ.選擇題，每題 5 分，共 25 分。

1. A study published in the *American Journal of Public Health* was conducted to determine whether the use of seat belts in motor vehicles depends on ethnic status in San Diego County. A sample of 792 children treated for injuries sustained from motor vehicle accidents was obtained, and each child was classified according to (1) ethnic status (Hispanic or Non-Hispanic) and (2) seat belt usage (worn or not worn) during the accident. The number of children in each category is given in the table below.

	Hispanic	Non-Hispanic
Seat belts worn	31	148
Seat belts not worn	283	330

   Which test would be used to properly analyze the data in this experiment?

   (a)test for independence.　　　　　　(b)test for difference between proportions.

   (c)ANOVA *F* test for interaction in a 2 x 2 factorial design.　　(d)test for goodness of fit.

2. Based on the residual plot below (in regression analysis), you will conclude that there might be a violation of which of the following assumptions?

   (a)linearity of the relationship　　　(b)normality of errors

   (c)homoscedasticity　　　　　　　　(d)independence of errors

3. In a multiple regression model, which of the following is correct regarding the value of the adjusted r^2?

   (a)It can be negative.　　(b)It has to be positive.

   (c)It has to be larger than the coefficient of multiple determination.　(d)It can be larger than 1.

4. A real estate builder wishes to determine how house size (House) is influenced by family income (Income), family size (Size), and education of the head of household (School). House size is measured in hundreds of square feet, income is measured in thousands of dollars, and education is measured in years. The builder randomly selects 50 families and runs the multiple regression. The business literature involving human capital shows that education influences an individual's annual income. Combined, these may influence family size. With this in mind, what should the real estate builder be particularly concerned with when analyzing the multiple regression model?

(a)randomness of error terms　　　(b)collinearity

(c)normality of residuals　　　　　(d)missing observations

5. In selecting an appropriate forecasting model, the following approaches are suggested:

(a)Perform a residual analysis.　　(b)Measure the size of the forecasting error.

(c)Use the principle of parsimony.　(d)all of the above

PART Ⅱ.計算題，共 75 分。

1. 某一體育協會針對一般民眾對球類的喜好情形作一調查,在北中南三區隨機抽出部份民眾作為訪問對象，調查結果如下表：

	北區		中區		南區		總數
	男	女	男	女	男	女	
棒球	90	110	60	80	50	70	460
羽球	50	30	40	40	54	46	260
籃球	70	50	44	36	40	40	280
樣本數	210	190	144	156	144	156	1000

試問：在顯著水準為 $\alpha = 0.05$ 之下，不同地區的民眾對於球類運動之喜好是否有差異？（ $\chi^2_{0.05}(4) = 9.48773$ ）(5%)

2. 變異數分析中，若資料 y_{ij} 表示 3 片晶片及每片晶片的上、中、下 3 個位置 $(i = 1,2,3, j = 1,2,3)$ 的複晶矽層之厚度，

試證明 $\sum_{i=1}^{3}\sum_{j=1}^{3}(y_{ij} - \bar{y}_{..})^2 = \sum_{i=1}^{3}\sum_{j=1}^{3}(\bar{y}_{i.} - \bar{y}_{..})^2 + \sum_{i=1}^{3}\sum_{j=1}^{3}(\bar{y}_{ij} - \bar{y}_{i.})^2$ ，式中 $\bar{y}_{i.}$ 表示第 i 片晶片的 3 個厚度平均值。$\bar{y}_{..}$ 表示所有晶片厚度的平均值。(10%)

系所：行銷與流通管理研究所　　　　　　　　　　　　　　科目：統計學

☆☆請在答案紙上作答☆☆　　　　　　　　　　　　　　　　共 3 頁，第 3 頁

3. 以下為 6 位裁判對甲、乙兩位體操選手打的分數：

裁判	1	2	3	4	5	6
甲	9.1	8.8	9.2	8.5	8.6	9.0
乙	8.4	8.9	8.7	9.1	8.3	8.8

   在顯著水準 $\alpha = 0.05$ 下，試以 Wilcoxon 符號等級檢定方法檢定甲的分數是否高於乙？
   (Wilcoxon 符號等級檢定臨界值 $T_{0.05,6} = 2$) (10%)

4. 自由度為 b 之「t-分配」與自由度為 1 及 b 之「F-分配」間具有何種關係？(10%)

5. 何謂中央極限定理？(10%)

6. 由一副撲克牌中抽取 3 張牌，求算拿到 2 張紅心的機率。(15%)

7. 叮噹五金行中有兩個品牌的燈泡，其中品牌 A 佔了 60%，其餘為品牌 B，品牌 A 的不良率為 1%，品牌 B 的不良率為 5%，定義
   「事件」E_A=在五金行內隨機抽取的燈泡為品牌 A，即 $P(E_A)$=60%
   「事件」E_B=在五金行內隨機抽取的燈泡為品牌 A，即 $P(E_B)$=40%
   「事件」D=在五金行內隨機抽取的燈泡是不良品
   $P(D|E_A)$=1%，$P(D|E_B)$= 3.5%，
   請問買到一不良燈泡的情況下，它是品牌 A 的機率為何？(15%)