淡江大學 104 學年度日間部轉學生招生考試試題

系別：統計學系三年級　　　　科目：統計與機率

考試日期：7月26日(星期日) 第1節　　　　本試題共 4 大題， 1 頁

1. 是非題<10%>(計算題精確至小數第三位)

(1).＿＿＿ 若回歸模式之判定係數為 0.81,則樣本相關係數為 0.90.

(2).＿＿＿ 檢定力是正確拒絕虛無假設的機率

(3).＿＿＿一假設檢定在顯著水準.05 下拒絕虛無假設，則在顯著水準.01 下，更不易拒絕虛無假設

(4)＿＿＿ 回歸模式中估計回歸參數之最小平方法需有常態分配之假設

2. Consider a random sample $X_1, \cdots, X_n$ from an exponential distribution with probability density function (pdf)

$$f(x) = \frac{1}{\sigma} \exp\left(-\frac{x}{\sigma}\right), \quad x > 0, \sigma > 0,$$

(1) Find the maximum likelihood estimator of σ. <10%>

(2) Find the unbiased estimator of σ and verify it is unbiased. <10%>

3. In a comparative study of two new drugs, A and B,(兩種新藥之比較研究), 120 patients were treated with drug A and 150 patients with drug B, and the following results were obtained.<20%>

	Cured(治癒人數)	Not cured(沒治癒人數)
Drug A	50	70
Drug B	80	70
Total(總人數)	130	140

(1) Are the types of drug independent with the curing results? <10%>

(2) Do these results demonstrate a significantly higher cure rate with drug B than drug A? Test with α=0.05.(是否 B 藥治癒率顯著高於 A 藥)<10%>

4. 某房仲公司欲分析新北市影響豪宅房價的因素，過去 10 筆成交記錄的豪宅坪數(變數 X 單位：坪)和成交價(變數 Y 單位：百萬元)如下

$$\overline{X} = 74, \overline{Y} = 82, \sum_{i=1}^{10} X_i^2 = 58000, \sum_{i=1}^{10} Y_i^2 = 69650, \sum_{i=1}^{10} X_i Y_i = 63200$$

(1)Find the best linear regression model. <10%>

(2)檢定豪宅坪數與成交價是否呈正線性相關(α=0.05)(需設虛無和對立假設) <10%>

(3)Set up ANOVA table and do a F test. <10%>

(4)Find the coefficient of determination. <10%>

(5) 在 95%信心水準下，豪宅坪數為 75 坪時，平均成交價會是多少？ <10%>

查表值：$Z_{.025} = 1.96, Z_{.05} = 1.645, Z_{0.1} = 1.282, \chi^2_{.05}(1) = 3.84, \chi^2_{.05}(2) = 5.99, t_{.025}(8) = 2.306,$

$t_{.05}(8) = 1.86, t_{.025}(9) = 2.262, t_{.05}(9) = 1.833, F_{.05}(1,8) = 5.318, F_{.05}(1,9) = 5.117$