

編號: 60

系所: 統計學系學士班

科目: 統計學

注意: 檢定問題答案須列出虛無假設和對立假設、檢定統計量、決策規則和結論

1. (7%) 某人隨機調查 500 位成人之性別和對電視某新聞內容的看法, 資料如下:

對某新聞內容的看法

	相信	不相信	沒意見
男性	16	77	157
女性	24	53	173

請在 $\alpha=0.05$ 下, 檢定男女生對該新聞內容的看法是否有顯著差異?

2. 某人想了解甲、乙、丙三位國文老師對學測作文評分是否有顯著差異, 隨機選取 30 位考生答案卷, 令其各評 10 位學生之作文, 資料如下:

國文老師	作文分數之樣本平均數	作文分數之樣本變異數
甲	74	25.7
乙	66	36.9
丙	70	35.4

試問: (7%) (1) 甲、乙兩人評分的標準差是否有顯著差異? ($\alpha=0.05$)

(7%) (2) 甲、乙兩人評分平均分數差距的 95% 信賴區間?

(7%) (3) 甲、乙兩人評分平均分數的差值是否顯著大於 3 分? ($\alpha=0.05$)

(7%) (4) 甲、乙、丙三位老師評分的平均分數是否有顯著差異? ($\alpha=0.05$)

3. (7%) 一檢驗某種疾病的儀器, 如病人真的有此種疾病, 儀器可以檢驗出有病的機會為 95%, 但有時病人真的沒有此種疾病, 儀器也可能出錯驗出有病的機會為 5%, 若已知此種疾病的罹患率為 10%, 試問某人被儀器驗出有病情形下, 他真的有病的機會是多少?

4. 某公司在廣告前一個月和廣告後一個月紀錄其產品在 10 個地區銷售量資料如下:

廣告前	215	231	206	211	217	232	214	200	232	215
廣告後	216	241	212	208	225	231	221	203	227	209

(7%) (1) 請在 $\alpha=0.05$ 下, 檢定此廣告是否顯著有效?

(5%) (2) 求廣告前後平均銷售量差值的 95% 信賴區間?

5. 某人研究 4 種不同包裝(因子 A)和 3 種不同行銷策略(因子 B)對某種產品銷售量是否有影響。今隨機抽取 60 家便利商店, 對包裝和行銷策略的每種組合各在 5 家便利商店做銷售實驗, 兩週後記錄其銷售量, 得到下列報表:

(背面仍有題目, 請繼續作答)

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變異來源	自由度	平方和	均方和	F 值
包裝(A 因子)				
策略(B 因子)		6.2		
AxB 交互作用		3.6		
殘差			0.9	
總差		72.4		

(8%) (1) 寫出完整的 ANOVA 表?

(8%) (2) 若不考慮交互作用，以行銷策略當作集區，試寫出其 ANOVA 表?

(6%) (3) 若不考慮行銷策略的差異，只討論包裝的單一因子變異數分析，試寫出其 ANOVA 表?

6. 若有 30 筆 (x, y) 資料，其迴歸式為 $y=20+0.8x$ 而且 x 的樣本標準差 $S_x = 2.4$ ， y 的樣本標準差 $S_y = 3.0$ ，試求(5%) (1) x, y 的相關係數?(5%) (2) 若 $\bar{x}=30$ ，求 $\bar{y}=?$ (7%) (3) 寫出檢定 $H_0: \beta_1 = 0$ 的 ANOVA 表?(7%) (4) 若再增加一筆資料 $(30, 44)$ 變成 31 筆資料，寫出檢定 $H_0: \beta_1 = 0$ 的 ANOVA 表?附註： $z_{0.01}=2.33$ ， $z_{0.025}=1.96$ ， $z_{0.05}=1.645$ ， $z_{0.10}=1.28$

$$t_{7,0.025}=2.365, t_{8,0.025}=2.306, t_{9,0.025}=2.262, t_{10,0.025}=2.228, t_{11,0.025}=2.201$$

$$t_{7,0.05}=1.895, t_{8,0.05}=1.860, t_{9,0.05}=1.833, t_{10,0.05}=1.813, t_{11,0.05}=1.796$$

$$t_{17,0.025}=2.110, t_{18,0.025}=2.101, t_{19,0.025}=2.093, t_{20,0.025}=2.086$$

$$t_{17,0.05}=1.740, t_{18,0.05}=1.734, t_{19,0.05}=1.729, t_{20,0.05}=1.725$$

$$\chi_{1,0.05}^2 = 3.84, \chi_{2,0.05}^2 = 5.99, \chi_{3,0.05}^2 = 7.81, \chi_{4,0.05}^2 = 9.49, \chi_{5,0.05}^2 = 11.07$$

$$F_{8,8,0.025}=4.433, F_{9,9,0.025}=4.026, F_{8,8,0.05}=3.438, F_{9,9,0.05}=3.179, F_{10,10,0.05}=2.978$$

$$F_{2,26,0.05}=3.369, F_{2,27,0.05}=3.354, F_{2,28,0.05}=3.340, F_{2,29,0.05}=3.328, F_{2,30,0.05}=3.316$$

$$F_{3,26,0.05}=2.975, F_{3,27,0.05}=2.960, F_{3,28,0.05}=2.947, F_{3,29,0.05}=2.934, F_{3,30,0.05}=2.922$$