



注意事項：

1. 答案依序書寫於答案卷上，不必抄題。
2. 答案卷不可書寫任何可辨別個人姓名或特殊標記，違者不予計算。
3. 請於試題紙上填寫准考證號碼，繳卷時「試題」、「答案卷」一併繳回。

1. 設 A 及 B 為某實驗可能發生的兩個事件，若 $P(A \cup B) = 0.7$ ， $P(A \cap B) = 0.2$ ，而 A 與 B 為獨立事件且 $P(A) > P(B)$ ，試求 $P(A)$ 及 $P(B)$ 。(10%)
2. 假設一個班級中男生人數與女生人數各佔一半，男生中有 1% 的人成績為 A，女生中則有 4% 的人成績為 A。現在這個班級中隨機挑選一個學生，若這個學生的成績為 A，試問這個學生是女生的機率為何？(10%)
3. Suppose that we have a random sample X_1, X_2, \dots, X_n from the normal distribution with mean μ and variance σ^2 . Derive the $100(1-\alpha)\%$ prediction interval for X_{n+1} . (10%)
4. A mobile phone manufacturer claims that 65% of the college students have their own mobile phones. A researcher wishes to test the claim and selects a random sample of 80 college students. She finds that 57 students have their own mobile phone. At $\alpha = 0.05$, should the claim be rejected? ($Z_{0.025} = 1.95$)(10%)

5. 假設在一個汽車燃油效率的研究中，其目的是為了找出汽車的車重(x_i)與行駛里程數(y_i)之間的關係，其模型為 $y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$ ，我們收集到以下八輛汽車的車重(千磅)及平均行駛距離(哩/加侖)的資料：

汽車(i)	1	2	3	4	5	6	7	8
車重(x_i)	21	24	23	21	22	18	20	26
里程數(y_i)	35	27	31	38	36	40	37	28

- (1) 請利用最小平方方法求出迴歸線。(10%)
 - (2) $\hat{\beta}_1$ 的標準差為多少？(5%)
 - (3) 請計算其判定係數(R^2)及相關係數。(10%)
6. A multinomial experiment with $k=3$ cells and $n=320$ produced the data shown as follows: $n_1 = 78$, $n_2 = 60$ and $n_3 = 182$, where n_i is the number of outcomes in cell i , $i=1,2,3$. Does these data provide sufficient evidence to contradict the null hypothesis that $p_1 = 0.25$, $p_2 = 0.25$ and $p_3 = 0.5$? ($\chi^2_{0.05,2} = 5.99$)(10%)
 7. An investor decides to form a portfolio by putting two equal amounts of money into each of two investments. Both investments are quite risky because the possible returns are highly variable. Investment 1 has a mean return of 15% with a standard deviation of 25%. Investment 2 is expected to return 27%, and its standard deviation is 40%.
 - (1) Find the expected return on the portfolio. (5%)
 - (2) If the two investments' returns are perfectly positively correlated, find the standard deviation of the return of the portfolio. (10%)
 - (3) What's portfolio's standard deviation if $\rho = 0.5$. (10%)