

國立高雄應用科技大學
九十七學年度碩士班招生考試
資訊管理系(甲組)

准考證號碼□□□□□□□□ (考生必須填寫)

統計學

- 注意：a.本試題共五大題，第一大題為選擇題，佔 40 分，第二至五題為計算題，每題配分列示於題目前，五大題總分共 100 分。
b.作答時不需抄題。各試題答案必須依題號順序作答，否則不予計分。
c.計算題須有計算過程，否則不予計分。
d.計算過程若遇小數，一律四捨五入取至小數點後二位，或小數位數後開始有非 0 值位數多取兩位。
e.所有計算題的檢定皆須依序寫出：(1)虛無假設與對立假設；(2)檢定統計量與決策法則；(3)判斷過程與最後結論。
f.不可以使用具有「Prog.」鍵或具儲存程式功能的計算機。
g.考生作答前請詳閱答案卷之考生注意事項。
h.題目最後有附相關查表值。

一、選擇題(單選，每題 5 分，答錯倒扣 1 分)(40%)

1. The chi-square test for equality of percentages is useful for testing _____.
 - A. a single quantitative variable where you have numbers.
 - B. two quantitative variables where you have numbers.
 - C. attribute data that is binomial.
 - D. two qualitative variables where you have categories.
 - E. a single qualitative variable where you have categories.
2. There are three sources of the numbers that we use as probabilities:
 - A. discrete numbers, continuous numbers and independent numbers.
 - B. relative frequency numbers, discrete numbers and continuous numbers.
 - C. discrete numbers, continuous numbers and theoretical numbers.
 - D. subjective numbers, theoretical numbers and relative frequency numbers.
 - E. discrete numbers, continuous numbers and subjective numbers.

3. A standard deck of playing cards has 52 cards — 13 cards in each of 4 suites —Diamonds, Hearts, Clubs and Spades. There are no jokers. If you select one card at random, and then are told that you have drawn a Diamond, what is the probability that the card is the King of Diamonds?
A. $1/52$ B. $1/13$ C. $13/52$ D. $26/52$ E. $4/52$

4. X is a discrete random variable that can have values from 0 to infinity, and occurrences of the events X counts are independent. The standard deviation of X is equal to the square root of the mean. The probability distribution of X is a(n) _____ distribution.
A. Poisson B. hypergeometric C. normal D. binomial E. geometric

5. I am using a t test to evaluate the 2nd independent variable (X_2) in a regression model with 5 independent variables. If I reject the null hypothesis for the t test, it means that _____.
A. the constant is irrelevant
B. the variable does not belong in the model
C. the variable belongs in the model
D. none of the variables belong in the model
E. at least one of the variables belongs in the model

6. I am evaluating a regression model with 4 independent variables. Unfortunately, this model is flawed because two of the independent variables explain the same part of the variability of the dependent variable. This condition is known as _____.
A. hetroscedasticity B. multiscedasticity C. multicollinearity
D. homoscedasticity E. homocollinearity

7. To do a one-way ANOVA, there must be a data set consisting of observations of one quantitative variable collected for each of at least _____ categories of a qualitative variable (factor).
A. 1 B. 2 C. 3 D. 5 E. 10

8. If we wished to decrease the width of a confidence interval, we would not do which of the following.
A. Increase the size of the sample.
B. Reduce the size of the population.
C. Decrease the level of confidence
D. Increase the level of confidence
E. None of the above

二、(10%)假設檢查 10 台某型號電腦，發現 2 台不良，請建立此型號電腦不良率 p 的 95%信賴區間

三、(15%)根據下表所列 x 與 y 的資料，請回答下列三個問題

x	20	20	20	30	30	40	40	50	50	60	60	60
y	40	30	80	180	220	240	280	240	180	130	100	160

(1) (5%)估計出簡單線性迴歸式 $\hat{Y}_i = \alpha + \beta x_i$ ，並說明 β 的意義

(2) (5%)若不考慮缺適度下，檢定 β 是否等於 0，並說明其意涵

(3) (5%)檢定缺適度(lack-of-fit)，並說明其意涵

附註:下表提供部分變異數分析表的資料

變異來源	平方和
迴歸	8928.57
殘差	64738.10
缺適度	58138.10
純誤	6600.00
總變異	73666.67

四、(25%)某人想知道性別對體重是否有影響，找了五組雙胞胎兄妹或姐弟測量體重，五組體重的資料如下表。

	第 1 組	第 2 組	第 3 組	第 4 組	第 5 組
男性	68	70	58	82	64
女性	64	68	55	75	59

試求解下列問題：

(1) (4%) 上述實驗是歸屬於哪一種實驗設計模式?為何要如此設計?

(2) (3%)有興趣的實驗因子為何?

(3) (10%)以變異數分析法檢定性別對體重是否有影響($\alpha = 0.05$)。需要什麼假設條件?

(4) (5%)以 t 檢定法檢定性別對體重是否有影響($\alpha = 0.05$)。解此問題需要什麼假設條件?

(5) (3%) 上述(3)和(4)兩種檢定間存在什麼關係

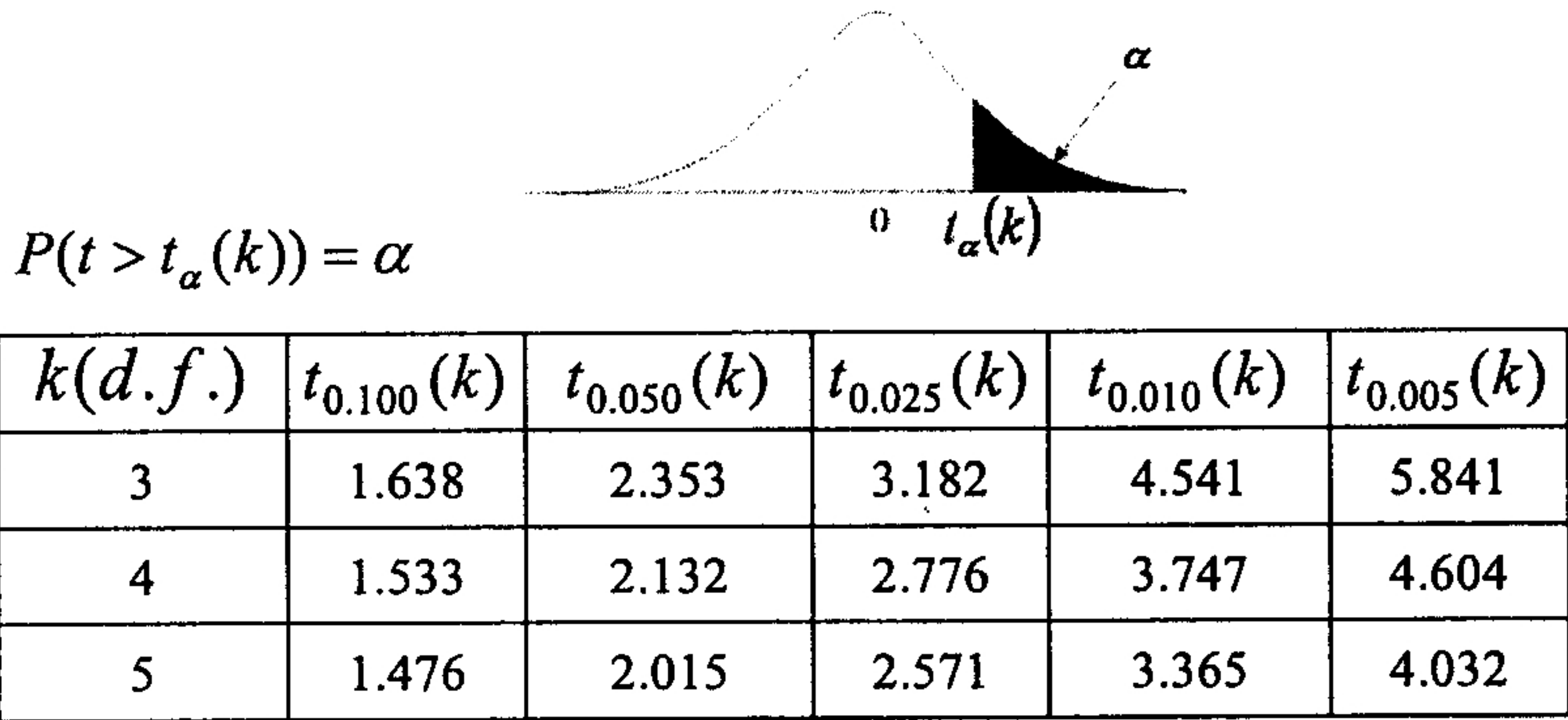
五、(10%)

(1) (5%)想要估計柴山上面到底有多少隻猴子，研究人員先從柴山隨機捕捉 30 隻猴子做記號後放回，一段時間後再重返柴山隨機捕捉 50 隻猴子，發現其中有 1 隻有記號，試問柴山上面大約有多少隻猴子?

(2) (5%)某考試報名總數為 N ，分別編上 1 至 N 號。該試務中心未公佈報考人數。某考生想估算報考人數 N ，隨機詢問了其中 10 位考生的編號如下，請問報考人數 N 可能為何?

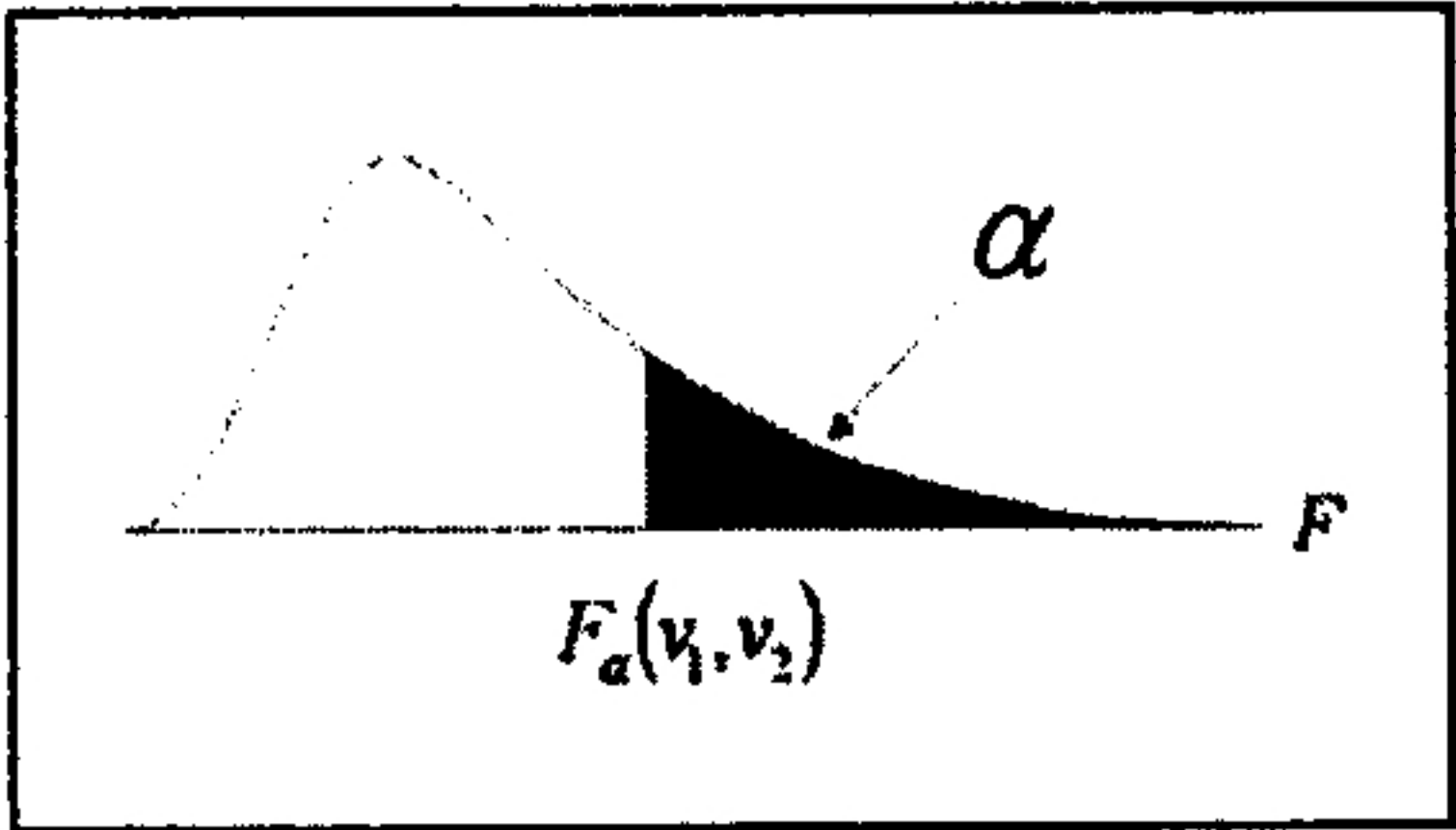
編號	573	423	76	255	385	715	600	142	389	689
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附表一 t 分配臨界值表



附表二 F 分配臨界值表

$P(F > F_{\alpha}(v_1, v_2)) = \alpha$



分母 $v_2(d.f.)$	分子 $v_1(d.f.)$ $\alpha = 0.05$									
	1	2	3	4	5	6	7	8	9	10
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6	5.96
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.1	4.06
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64
8	5.32	4.46	4.07	3.84	3.69	3.58	3.5	3.44	3.39	3.35
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14
10	4.96	4.1	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98
11	4.84	3.98	3.59	3.36	3.2	3.09	3.01	2.95	2.9	2.85

附表三 二項分配累積分配函數表

$P(X \leq a)$

$n = 10$

p

a	0.01	0.02	0.03	0.04	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7
0	0.904	0.817	0.737	0.665	0.599	0.349	0.107	0.028	0.006	0.001	0.000	0.000
1	0.996	0.984	0.965	0.942	0.914	0.736	0.376	0.149	0.046	0.011	0.002	0.000

2	1.000	0.999	0.997	0.994	0.988	0.930	0.678	0.383	0.167	0.055	0.012	0.002
3	1.000	1.000	1.000	1.000	0.999	0.987	0.879	0.650	0.382	0.172	0.055	0.011