

國立臺北科技大學九十七學年度碩士班招生考試

系所組別：4111 4112 4120 工業工程與管理系碩士班甲乙組

第一節 統計學 試題

填准考證號碼

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第一頁 共二頁

注意事項：

1. 本試題共九題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

Note:

Standard Normal	t Distribution	Chi-Square	F Distribution
$z_{0.025} = 1.960$ $P(Z > 0.5) = 0.3085$ $P(Z > 1.0) = 0.1587$ $P(Z > 1.5) = 0.0668$	$t_{0.05}(9) = 1.833$ $t_{0.05}(8) = 1.860$ $t_{0.025}(9) = 2.262$ $t_{0.025}(8) = 2.306$	$\chi_{0.975}^2(8) = 2.180$ $\chi_{0.05}^2(4) = 9.488$ $\chi_{0.05}^2(5) = 11.070$ $\chi_{0.025}^2(8) = 17.535$	$F_{0.05}(3,14) = 3.335$ $F_{0.05}(3,12) = 3.490$ $F_{0.05}(2,14) = 3.739$ $F_{0.05}(2,12) = 3.885$

一、The following table lists the percentage of grades of a professor in a certain course for previous years and the number of such grades for 100 of a professor's students for the current year.

Grade	A	B	C	D	E
Previous years	10%	30%	40%	15%	5%
Current years	15	23	32	22	8

Consider the following null hypothesis:

H_0 : Current students are distributed as previous students.

Use a chi-square test at the $\alpha=0.05$ significance level to accept or reject the null hypothesis H_0 . (5%)

- 二、Assume that a certain class is given a midterm examination. The probability of a student studying for the examination is 0.6. Of those students who study, the probability of their passing the examination is 0.9; if a student does not study, his or her probability of passing is 0.05. Given that a student did not pass the examination, what is the probability that he or she studied? (5%)
- 三、Suppose that we want to estimate the true proportion of defectives in a very large shipment of adobe bricks, and that we want to be at least 95% confident that the error is at most 0.04. How large a sample will we need if
 1. we have no idea what the true proportion might be; (5%)
 2. we know that the true proportion does not exceed 0.1? (5%)
- 四、Suppose that a machine is used for a particular task in the morning and for a different task in the afternoon. Let X and Y represent the number of times the machine breaks down in the morning and in the afternoon, respectively. The following table gives the joint probability distribution of (X, Y).

Y \ X	X=0	X=1	X=2
Y=0	0.1	0.2	0.2
Y=1	0.04	0.1	0.06
Y=2	0.06	0.1	0.14

1. $Cov(X, Y) = ?$ (5%)
2. $Var(X) = ?$ (5%)
- 五、If the random variable X has the probability density function

$$f(x) = \begin{cases} k\sqrt{x} & , 0 < x < 1 \\ 0 & , \text{elsewhere} \end{cases}$$
 1. Evaluate k . (5%)
 2. Evaluate $P(\frac{1}{9} \leq X < \frac{1}{4})$. (5%)
- 六、Let X be a Normal Distribution with mean 10 and standard deviation 4.
 1. Find $P(6 \leq X \leq 12) = ?$ (5%)
 2. If $P(X \geq k) = 0.9332$, then $k = ?$ (5%)
- 七、The following are the volumes, in deciliters, of 9 cans of peaches distributed by a certain company: 46.2, 45.6, 46.6, 45.9, 45.7, 45.6, 46.7, 45.9, and 45.8. Assume the distribution of the volumes to be normal.
 1. Find the sample variance s^2 . (5%)
 2. Find a 95% confidence interval for the mean. (5%)
 3. Find a 95% confidence interval for the variance. (5%)

注意：背面尚有試題

八、The data in the following table represent the number of hours of pain relief provided by 3 different brands of headache tablets administered to 15 subjects. The 15 subjects were randomly divided into 3 groups and each group was treated with a different brand.

Hours of Relief from Headache Tablet

Tablet		
A	B	C
5	2	3
4	3	5
6	4	2
6	2	5
4	4	5

1. Perform the analysis of variance. (10%)

	df	SS	F
Between Groups	_____	_____	_____
Within Groups	_____	_____	

2. Test the hypothesis at the 0.05 level of significance that the mean number of hours of relief provided by the tablets is the same for all 3 brands. (5%)

九、The following table is the result of the linear regression Y on X.

ANOVA (Predictors: Constant, X Dependent Variable: Y)

Model	df	SS	F
Regression	1	3513686911.40	86.52
Residual	48	1949402263.51	

Coefficients

Model	Coef.	Std. Err.
constant	-43692.72	12859.62
X	727.87	78.25

Now let $Y^* = Y/1000$, $X^* = X/100$.

Please fulfill the blank columns of the linear regression Y^* on X^* .

1. ANOVA (Predictors: Constant*, X* Dependent Variable: Y*)(6%)

Model	df	SS	F
Regression*	1	_____	_____
Residual*	48	_____	

2. Coefficients(8%)

Model	Coef.	Std. Err.
Constant*	_____	_____
X*	_____	_____

3. $R^2 =$ _____ (6%)