國立臺北科技大學九十九學年度碩士班招生考試

系所組別：4111、4112、4120

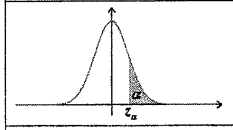
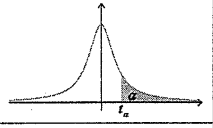
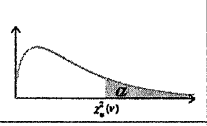
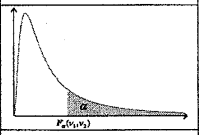
工業工程與管理系碩士班甲、乙組

第一節　統計學　試題

注意事項：

1. 本試題共 25 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
			
$z_{0.025}=1.960$	$t_{0.025}(4)=2.776$	$\chi^2_{0.025}(2)=7.378$	$F_{0.05}(1,3)=10.13$
$z_{0.05}=1.645$	$t_{0.025}(5)=2.571$	$\chi^2_{0.025}(3)=9.343$	$F_{0.05}(1,4)=7.71$
$P(Z>0.04)=0.4840$	$t_{0.05}(24)=1.711$	$\chi^2_{0.025}(4)=11.143$	$F_{0.05}(1,5)=6.61$
$P(Z>0.45)=0.3264$	$t_{0.05}(25)=1.708$	$\chi^2_{0.05}(2)=5.991$	$F_{0.05}(1,6)=5.99$
$P(Z>1.0)=0.1587$	$t_{0.05}(26)=1.706$	$\chi^2_{0.05}(3)=7.815$	
$P(Z>1.414)=0.0787$	$t_{0.05}(27)=1.703$	$\chi^2_{0.05}(4)=9.488$	
$P(Z>1.5)=0.0668$			

單選題共 25 題，每題 4 分，共 100 分，題目需計算者，需列計算過程，無過程者不予計分。

An electrical firm manufactures light bulbs that have a length of life that is approximately normally distributed with a standard deviation of 40 hours. A sample of 30 bulbs has an average life of 780 hours.

1. (　) Find a 95% confidence interval for the population mean of all bulbs produced by this firm. ① 766<μ<794②766<$\bar{x}$<794 ③778<μ<782 ④778<$\bar{x}$<782.
2. (　) What is the most sampling error at 95% confidence interval? ① 4②8 ③ 14④28.
3. (　) How large a sample is needed if we wish to be 95% confident that our sample mean will be within 10 hours of the true mean? ① 245② 6③68 ④62.
4. (　) What will the sampling error if we increase confident from 95% to 96%? ① No change② Increase③ Decrease④Uncertain.

A random sample of size n_1=16 with a sample standard deviation s_1=5.2, has a mean $\overline{x_1}$=81. A second random sample of size n_2=11 with a sample standard deviation s_2=3.4, has a mean $\overline{x_2}$=76.

5. (　) What is the approximate pooled standard deviation if we assume that two populations have equal variance? ① 7.83②3.96③ 4.57④1.78.
6. (　) What is the degree of freedom for the t distribution of $\overline{x_1}-\overline{x_2}$? ① 24② 27③ 26④25.
7. (　) What is value of the test statistic t? ①1.094 ②1.636 ③2.796 ④4.228.
8. (　) Test the hypothesis at the 0.05 level of significance, that Ho: $\mu_1=\mu_2$ against Ha: $\mu_1>\mu_2$. We may conclude ① Accept Ho② Accept Ha③ Not Reject Ho④ Hard to conclude.

Suppose that we wish to test the hypothesis Ho: μ=68 kilograms vs. Ha: μ>68 kilograms, for the weights of male students at a certain college using an α = 0.05 level of significance when it is known that σ = 5.

9. (　) What is the β risk if the true mean is 69 kilograms and sample size n = 36? ①0.67 ② 0.33③ 0.16④0.84.
10. (　) What is the power if the true mean is 69 kilograms and sample size n = 64? ①0.3264 ② 0.1587③ 0.4840④0.6736.
11. (　) If we wish to decrease the β risk, we may ① increase the sample size② decrease the sample size③ decrease α risk④ change statistics.
12. (　) Find the sample size required if the power of our test is to be 0.95 when the true mean is 69 kilograms. ①98 ② 72③ 143④271.

In a shop study, a set of data was collected to determine whether or not the proportion of defectives produced by workers was the same for the day, evening or night shift worked. The following data were collected:

	Shift		
	Day	Evening	Night
Defectives	45	55	70
Non-defectives	905	890	870

Use a 0.025 level of significance to determine if the proportion of defectives is the same for all three shifts.

13. (　) Which test statistic are you going to use in this test? ①t statistic ②Z statistic ③χ^2 statistic④ F statistic.
14. (　) What the critical value of this test? ① 2.571②1.96 ③7.378 ④11.143.

注意：背面尚有試題

15. (　) What is the value of test statistic? ① 6.29②4.83 ③ 2.41④3.18.
16. (　) What will you conclude? ① Night shift has higher defective rate than the other two. ② All shifts have no significant difference. ③ All shifts have significant differences. ④ Information is not sufficient to do any conclusion.

Suppose that an experiment want to study about the relationship of response y and independent variables x1, x2 and x3. Variables x1, x2 and x3 are coded for convenience.

y	x1	x2	x3
82	-1	-1	-1
93	1	-1	-1
114	-1	1	-1
124	-1	-1	1
111	1	1	-1
129	1	-1	1
157	-1	1	1
164	1	1	1

$\sum y_i^2 = 124252$

17. (　) What is the value of correlation coefficient r between y and x1? ① 0.5541② -0.5541③-0.0939④0.0939.
18. (　) What are the signs of variable estimates b1, b2 and b3 if we fit the data with a multiple linear regression $\mu_{Y|x} = \beta_0 + \beta_1 x_x + \beta_2 x_2 + \beta_3 x_3$?①One positive, two negative. ②Two positive, one negative. ③ All positive.④ All negative.
19. (　) What is the least square estimate of intercept β_0 ? ① 121.75② 65.3③ 136.5④0.
20. (　) What is the least square estimate of β_1 ? ① 4.7② 2.5③ -2.5④-4.7.

The data are the same as above. Please construct the ANOVA table.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
β_1	50	1	50	2.16
β_2	(a)	1	---	---
β_3	----	1	---	---
error	(b)	(d)	---	
Total	(c)	---		

21. (　) What is the value of (a)? ① 92.5② 2378.5③ 832.5④ 1740.5.
22. (　) What is the value of (b)? ① 92.5② 1740.5③ 832.5④2378.5
23. (　) What is the value of (c)? ① 6212.2② 5667.5③ 124252④109428.
24. (　) What is the degree of freedom of error or (d)? ① 3② 6③ 4④5.
25. (　) What is the estimate of σ^2? ① 832.5② 92.5③ 52.47④23.12.