國立臺北科技大學九十六學年度碩士班招生考試

系所組別：4111、4112、4121、4122 工業工程與管理系碩士班甲、乙組

第一節 統計學 試題

第一頁 共二頁

注意事項：

1. 本試題共 20 子題，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。

填充題，每題需附簡單計算才予計分，共 20 子題，每子題 5 分，共 100 分

Note: Normal Distribution $Z_{.1} = 1.282$, $Z_{.05} = 1.645$, $Z_{.025} = 1.96$, $Z_{.01} = 2.326$, $Z_{.005} = 2.576$, $Z_{.0005} = 3.291$, $P(Z>0.5) = 0.3085$, $P(Z>1) = 0.1587$, $P(Z>1.3) = 0.0968$, $P(Z>1.4) = 0.0808$, $P(Z>1.5) = 0.0668$, $P(Z>2) = 0.0228$

1. Find the median __(a)__ and the 25th percentile __(b)__ from the following numbers.

85 80 71 94 76 85 84 69 71 88 68 82 86 95 104 84 73 67
64 85 81 94 59 97 75 87 61 103

2. A large brokerage firm computed an arithmetic mean of 58.5 opening transactions per day. The standard deviation is 15.8 and the median 63.5 opening transactions.
(1) Using Chebyshev's theorem, in what percent of the days will there be between 19.0 and 98.0 transactions. __(c)__
(2) What is the shape of transaction distribution? Symmetrical, positive skewness (skew to right) or negative skewness (skew to left) The answer and reason are __(d)__.

3. BB Electronics, Inc. purchases TV picture tubes from four different suppliers. TW supplies 20 percent of the tubes, FI 30 percent, KP 25 percent, and Parts, Inc. 25 percent. TW tends to have the best quality, as only 3 percent of their tubes arrive defective, FI tubes are 4 percent defective, KP 7 percent, and Parts, Inc. 6.5 percent defective.
(1) What is the overall (average) percent defective? __(e)__
(2) A defective picture tube was discovered in the latest shipment. What is the probability that it came from TW? __(f)__

4. The position of chief of police in a city of Taiwan is open. The search committee, charged with the responsibility of recommending a new chief to the city council, received 12 applications for the position. Four of the 12 applicants are female. The search committee decides to interview all 12 of the applicants. The 4 randomly selected applicants are none of female. What is the possibility of this occurrence? __(g)__

5. Suppose that your waiting time for a bus in the morning is uniformly distributed on [0,5], while waiting time in the evening is uniformly distributed on [0, 10] independent of morning waiting time.
(1) If you take the bus each morning and evening for a week, what is your total expected waiting time? __(h)__
(2) What is the variance of your total waiting time? __(i)__

6. ANOVA Table

Source	d.f.	SS	MS
Treatment	1	1.6875	D
Error	A	C	0.5862
Total	B	7.5492	

(1) What is the F-value? __(j)__
(2) What is the degree of freedom of t-statistic? __(k)__

7. A packaging experiment was conducted by placing two different package designs for breakfast food side by side on a supermarket shelf. The objective of the experiment was to see whether buyers indicated a preference for one of the two package designs. In a given day six customers purchase a package from the supermarket, with one choosing package design 1 and five choosing design 2.
(1) Let x be the number of buyers who choose the second package design. What is the value of α for the test if the rejection region includes x =0 and x = 6? __(l)__
(2) What is the value of β for the alternative p = 0.8 (that is, 80% of the buyers actually favor the second page design)? __(m)__

8. Past surveys revealed that 30 percent of the tourists going to Las Vegas to gamble during a weekend spent more than $1,000. Management wants to update that percentage. Using the .90 degree of confidence, management wants to estimate the percentage of the tourists spending more than $1,000 within 1 percent. What sample size should be employed? __(n)__

注意：背面尚有試題

9. To test if the population mean μ is greater than 50, a sample of 100 data were collected, which yields $\bar{x} = 53$, s = 20.

(1) If the critical point is 54, then the significance level is close to __(o)__.

(2) When the significance level is greater than __(p)__, the null hypothesis will be rejected?

10. An experiment is conducted to study the effects of three factors and their interactions. Two levels of each factor are used and two experimental runs are made for each treatment. The design and results are as follows:

Response y		X1	X2	X3
4.65	5.81	-1	-1	-1
21.42	21.35	1	-1	-1
12.66	12.56	-1	1	-1
18.27	16.62	-1	-1	1
7.93	7.88	1	1	-1
13.18	12.87	1	-1	1
6.51	6.26	-1	1	1
18.23	17.83	1	1	1

(1) What is the mean square of factor x1? __(q)__

(2) What is the R^2? __(r)__

(3) Using the coded variables, estimate the multiple linear regression equation $\hat{y} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3$. What is the estimator of β_2 __(s)__?

11. the grades in a statistics course for a particular semester were as follows:

Grade	A	B	C	D	F
f	14	18	32	20	16

What is test statistic of the hypothesis that the distribution of grades is uniform? __(t)__