

國立臺北護理學院九十七學年度碩士班招生

統計學試題

注 意 (標準答案附 於最後一頁)	1. 本試題共有四頁(含附表)。 2. 旅遊健康所、資訊管理所及健康事業管理所 試題。 3. 本學科考試可以攜帶<u>計算機</u>，並請於作答時列 出所有相關計算過程或原因。 4. Q1-Q12 請依題號次序於<u>答案卡</u>上作答。 Q13-Q16 請標明題號依序於<u>答案卷</u>上作答。
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Select **one** answer that is best for each question (Q1-Q12), and a score of 5% for each question.

Q1-Q2: Diastolic blood pressure is distributed normally in a group of female automotive assembly line workers ($n=75$), with a mean of 80 mmHg and standard deviation of 10 mmHg.

Q1. What is the probability that a worker selected at random from this group has a diastolic blood pressure of 90 mmHg or greater?

- (A) $1/75=0.0133$
- (B) Approximately 0.16
- (C) Approximately 0.34
- (D) Approximately 0.66

Q2. Approximately what percentage of workers have a diastolic blood pressure between 60 and 90 mmHg?

- (A) 32%
- (B) 48%
- (C) 64%
- (D) 82%

Q3-Q5: The value of diet, exercise, and meditation was studied in 16 hypertensive women. The researchers believe these women will enjoy a decrease in their diastolic blood pressure (DBP) after 4 months in the experimental program. The pre-trial mean DBP of study participants is 120 mmHg; their post-trial DBP is 115 mmHg. Assume normality of the relevant distribution(s).

Q3. The investigator should use which statistical test to examine their data?

- (A) t-test, two independent means
- (B) z-test, two independent means
- (C) t-test, within-subject design
- (D) z-test, within-subject design

Q4. The researcher conducted the appropriate test with $\alpha=0.05$ and obtained a p-value <0.04 . The appropriate conclusion is that:

- (A) severely hypertensive women in the experimental program enjoy a decrease in DBP (pre versus post), but this decrease is not statistically significant
- (B) a significant difference exists between pre- and post-trial DBP among women who participate in the experimental program
- (C) no significant difference exists between pre- and post-trial DBP among women who participate in the experimental program
- (D) post-trial DBP of severely hypertensive women who participate in the experimental program is significantly less than their original reading

Q5. The statistical analysis conducted by these investigators is an example of a

- (A) two-tailed test
- (B) non-directional test
- (C) one-tailed test, test with pre-trial DBP greater than post-trial DBP
- (D) one-tailed test, test with pre-trial DBP less than post-trial DBP

Q6-Q8: Trigeminal neuralgia is characterized by momentary episodes of sudden lancinating facial pain, lasting typically 10-30 seconds per episode. Two drugs, A & B, are compared to determine their effectiveness for controlling these episodes in 100 affected women matched on age at diagnosis. Data appear in the following table:

	Drug B		
Drug A	Relief: Yes	Relief: B	Total
Relief: Yes	12	32	44
Relief: No	1	5	6
Total	13	37	50

Q6. In this study, the dependent variable is the

- (A) drug therapy
- (B) age at diagnosis
- (C) disease status
- (D) episode control

Q7. The appropriate analysis to determine if a difference in effectiveness exists between these two drugs is the

- (A) binomial exact test for proportions, matched/pair data
- (B) normal approximation to the binomial for proportions, matched/pair data
- (C) chi-square for independence
- (D) t-test, two means, matched/pair data

Q8. In the analysis of these data, the number of pairs of observations included in the actual calculation is

- (A) 50
- (B) 44
- (C) 37
- (D) 33

Q9-Q11: Two investigators studied the relationship between lead exposure (ug/dL) and performance on a standardized intelligence test in 122 children who lived near a lead-smelting operation from birth to 12 years. Based on previous research, the clinicians postulated an indirect relationship between these two variables. They obtained the following from a linear regression in which test scores are predicted from exposure: $b=-0.40$, $s_b=0.16$, $t=-2.5$. $t_{\text{critical value}}=-1.66$, $p\text{-value}<0.01$, $\alpha=0.05$.

Q9. The appropriate conclusion is that

- (A) the slope differs significantly from zero, the value in the null hypothesis.
- (B) a significant direct relationship exists between lead exposure and performance on a standardized intelligence test.
- (C) the slope is significantly greater than zero, the value is the null hypothesis.
- (D) the slope is significantly less than zero, the value is the null hypothesis.

Q10. If lead exposure increases 10ug/dL, the predicted value of the intelligence score

- (A) increases by 4 points
- (B) decreases by 4 points
- (C) decreases by an undetermined amount
- (D) changes by an undetermined amount; but we cannot assess at this point whether the predicted score increases or decreases

Q11. If the investigators compute the Poisson correlation to quantify the strength of the association between lead exposure and intelligence test scores, they will find that

- (A) the association is positive, indicating that increases in lead exposure tend to be associated with increases in intelligence test scores.
- (B) the correlation is negative, indicating that increases in lead exposure tended to be associated with decreases in intelligence test scores.
- (C) the correlation differs significantly from zero, but its sign cannot be determined before its calculation.
- (D) they have to test the null hypothesis of zero correlation to know whether a significant association exists between lead exposure and intelligence test scores in these children.

Q12. Which of the following data are nominal?

- (A) place of birth
- (B) number of students in a class
- (C) body height in cm
- (D) blood pressure in mmHg

Q13-Q14. The resting heart rates were measured in a sample of women smokers and non-smokers at a university. There were 14 smokers and 18 non-smokers in the sample.

Resting Heart Rates		
Smokers		Nonsmokers
78		72
100		82
88		62
62		84
94		61
88		68
76		72
90		64
85		76
82		62
77		66
91		68
90		96
68		58
		87
		80
		78
		69
Mean=83.5		Mean=72.5
		SD=10.3

Q13. The following table shows the information on descriptive statistics for the 14 smokers. Please complete the table by filling the information of std. error of mean, median, variance, inter-quartile range, and coefficient. (10%)

N		14
Mean		83.5
Std. Error of Mean		?
Median		?
Mode		88(a)
Variance		?
Range		38
Minimum		62
Maximum		100
Inter-quartile range		?
Coefficient of variation		?
Percentiles	25	76.75
	50	86.50
	75	90.25

(a) Multiple modes exist. The smallest value is shown

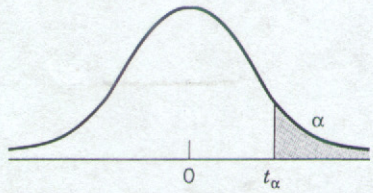
Q14. Was there a significant difference in the resting heart rates of the two groups? Use $\alpha=0.05$ with a two-tailed test and assumptions of $\sigma_1^2 = \sigma_2^2$ and normally distributed in population. [Note: Your answer should include the following: (1) *the statement of H_o and H_1* , (2) *degree of freedom of the testing*, (3) *test statistic*, (4) *critical value*, and (5) *the decision*] (10%)

Q15-Q16. The standard hemoglobin reading for healthy adult men is 15 g/100 ml with a standard deviation of $\sigma=2$ g. For a group of 25 men in a certain occupation, we find a mean hemoglobin of 16.0 g/100 ml.

Q15. Obtain a 95% confidence interval for μ , and give its interpretation. (10%)

Q16. As the sample size increases, does the confidence interval shrink or widen? Explain. (10%)

TABLE 4 Percentage Points of t Distributions



d.f. \ α	.25	.10	.05	.025	.01	.00833
1	1.000	3.078	6.314	12.706	31.821	38.204
2	.816	1.886	2.920	4.303	6.965	7.649
3	.765	1.638	2.353	3.182	4.541	4.857
4	.741	1.533	2.132	2.776	3.747	3.961
5	.727	1.476	2.015	2.571	3.365	3.534
6	.718	1.440	1.943	2.447	3.143	3.287
7	.711	1.415	1.895	2.365	2.998	3.128
8	.706	1.397	1.860	2.306	2.896	3.016
9	.703	1.383	1.833	2.262	2.821	2.933
10	.700	1.372	1.812	2.228	2.764	2.870
11	.697	1.363	1.796	2.201	2.718	2.820
12	.695	1.356	1.782	2.179	2.681	2.779
13	.694	1.350	1.771	2.160	2.650	2.746
14	.692	1.345	1.761	2.145	2.624	2.718
15	.691	1.341	1.753	2.131	2.602	2.694
16	.690	1.337	1.746	2.120	2.583	2.673
17	.689	1.333	1.740	2.110	2.567	2.655
18	.688	1.330	1.734	2.101	2.552	2.639
19	.688	1.328	1.729	2.093	2.539	2.625
20	.687	1.325	1.725	2.086	2.528	2.613
21	.686	1.323	1.721	2.080	2.518	2.601
22	.686	1.321	1.717	2.074	2.508	2.591
23	.685	1.319	1.714	2.069	2.500	2.582
24	.685	1.318	1.711	2.064	2.492	2.574
25	.684	1.316	1.708	2.060	2.485	2.566
26	.684	1.315	1.706	2.056	2.479	2.559
27	.684	1.314	1.703	2.052	2.473	2.552
28	.683	1.313	1.701	2.048	2.467	2.546
29	.683	1.311	1.699	2.045	2.462	2.541
30	.683	1.310	1.697	2.042	2.457	2.536
40	.681	1.303	1.684	2.021	2.423	2.499
60	.679	1.296	1.671	2.000	2.390	2.463
120	.677	1.289	1.658	1.980	2.358	2.428
∞	.674	1.282	1.645	1.960	2.326	2.394

標準答案：

第 1-12 題：BDCDC-DBDDDB-BA

第 13 題：

SEM	2.77301
Median	86.5000
Variance	107.654
IQR	13.5
CV	8.048

第 14 題： $H_0: \mu_1 = \mu_2$; $H_1: \mu_1 \neq \mu_2$

$Df = 14 + 18 - 2 = 30$

$t = 2.982$

$cv = \pm 2.04$

Reject null hypothesis. The results are significant, i.e., the heart rate for smokers is significantly higher than for (different from) non-smokers.

第 15 題： $16 \pm 1.96 \cdot 2/5 = [15.22-16.78]$

第 16 題：As the n increases, the CI will shrink. Because a reduction of SE.