

系所組別： 公共衛生研究所甲組一般生、在職生

考試科目： 流行病學及生物統計學

考試日期： 0220，節次： 2

※ 考生請注意：本試題 可 不可 使用計算機

Q1-Q2. 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

Q1. 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

(背面仍有題目,請繼續作答)

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Q2. Was there a significant difference in the resting heart rates of the two groups? Use $\alpha=0.05$ with a two-tailed test, assumptions of $\sigma_1^2 = \sigma_2^2$, and that resting heart rate is normally distributed in population. [Note: Your answer should include the following: (1) the statement of H_0 and H_1 , (2) degree of freedom of the testing, (3) test statistic, (4) critical value, and (5) the decision]. (10%)

Q3-Q4. 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 mean hemoglobin of 16.0 g/100 ml (sample mean).

Q3. Obtain a 95% confidence interval for μ (parameter of sample mean), and give its interpretation. (10%)

Q4. As the sample size increased, does the confidence interval shrink or widen? Explain. (10%)

Q5-Q19: Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case. (60%, 4% for each question from **Q5** to **Q19**)

Q5. In some homes, a mother's behavior seems to be independent of her baby's, and vice versa. If the mother looks at her child a total of 2 hours each day, and the baby looks at the mother a total of 3 hours each day, and if they really do behavior independently, what is the probability that they will look at each other at the same time? (A) 0.036 (B) 0.01 (C) 0.167 (D) 0.042

Q6. In **Q5**, assume that both the mother and child are asleep from 8:00 pm to 7:00 am. What would be the probability now? (A) 0.036 (B) 0.01 (C) 0.167 (D) 0.042

Q7. A graduate-admissions committee has finally come to realize that it cannot make valid distinctions among the top applicants. This year, the committee read all 300 applicants and randomly chose 10 from those in the top 20%. What is the probability that any particular applicant will be admitted (assuming you have no knowledge of her or his rating)? (A) 60/300 (B) 10/20 (C) 10/60 (D) 10/300

Q8. Using the data of **Q7**, what is the conditional probability that a person will be admitted given that she/he has the highest faculty rating among the 300 students? (A) 60/300 (B) 10/20 (C) 10/60 (D) 10/300

Q9. In a study of knowledge of current events, we give a 20-item true-false test to a class of college freshmen. One of the students gets **X** answers right. The sampling distribution of **X** would be a (A) normal

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distribution (B) binomial distribution (C) multinomial distribution (D) Poisson distribution

Q10. A study aims to compare the number of hospitalization for car accident (Y) in various areas with differential population size. The sampling distribution of Y would be a (A) normal distribution (B) binomial distribution (C) multinomial distribution (D) Poisson distribution

Q11. Among elderly subjects who are fit, vigorous exercise reduces the risk of heart disease. Among elderly subjects who are unfit, the initiation of vigorous exercise might precipitate a myocardial infarction. Fitness may be considered (A) a risk factor (B) an effect modifier (C) a confounder (D) a necessary cause (E) a sufficient cause.

Q12. An ecological study is conducted in which the rate of cigarette smoking and the prevalence of tuberculosis are assessed in different populations at the same time. A strong relationship between cigarette smoking and tuberculosis was found to be high, and the conclusion is drawn that cigarette smoking is causally related to tuberculosis. Based on this study, all of the following are true statements regarding this conclusion EXCEPT (A) it may be incorrect due to confounding (B) it is merely a hypothesis (C) it could serve as the basis for a case-control or cohort study (D) it is correct but not generalizable without further study (E) it may be incorrect due to the ecological fallacy.

Q13. All of the following are the methods used for removing confounding EXCEPT (A) matching (B) stratification (C) randomization (D) restriction (E) increasing sample size.

Q14. Which of the following can be used to minimize information bias due to measurement error? (A) statistical analysis (B) randomization (C) hypothesis testing (D) double-blinding (E) increasing the sample size.

Q15. Two pediatricians want to investigate a new laboratory test that identifies streptococcal infections. Dr. Kidd uses the standard culture test, which has a sensitivity of 90% and a specificity of 96%. Dr. Childs uses the new test, which is 96% sensitive and 96% specific. If 200 patients undergo culture with both tests, which of the following is correct? (A) Dr. Kidd will correctly identify more people *with* streptococcal infection than Dr. Childs (B) Dr. Kidd will correctly identify fewer people *with* streptococcal infection than Dr. Childs (C) Dr. Kidd will correctly identify more people *without* streptococcal infection than Dr. Childs (D) The prevalence of streptococcal infection is needed to determine which pediatrician will correctly identify the larger number of people with the disease.

Q16. An advertisement in a medical journal stated, "2,000 subjects with sore throats were treated with our new medicine. Within four days, 94% were asymptomatic." The advertisement claims that the medicine was effective. Based on the evidence given above, the claim: (A) Is correct (B) May be incorrect because the conclusion is not based on a rate (C) May be incorrect because of failure to recognize a long-term cohort phenomenon (D) May be incorrect because no test of statistical significance

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was used (E) May be incorrect because no control or comparison group was involved.

Q17. Residents of three villages with three different types of water supply were asked to participate in a survey to identify cholera carriers. Because several cholera deaths had occurred in the recent past, virtually everyone present at the time submitted to examination. The proportion of residents in each village who were carriers was computed and compared. Classify this study: (A) Cross-sectional study (B) Case-control study (C) Concurrent cohort study (D) Nonconcurrent cohort study (E) Experimental study.

Q18. Which of the following is a case-control study? (A) Study of co-existence of diabetes and depression in a given population (B) Analysis of previous research in different places and under different circumstances to permit establishment of hypotheses based on cumulative knowledge of all known factors (C) Obtaining histories and other information from a group of known cases and a comparison group to determine the relative frequency of a characteristic or exposure under study (D) Study of the incidence of cancer in men who have quit smoking (E) Both (A) and (C).

Q19. In a study begun in 1965, a group of 3,000 adults in Baltimore were asked about alcohol consumption. The occurrence of cases of cancer was studied in this group between 1981 and 1995. This is an example of a: (A) Cross-sectional study (B) Concurrent cohort study (C) Retrospective cohort study (D) Clinical trial (E) Case-control study.

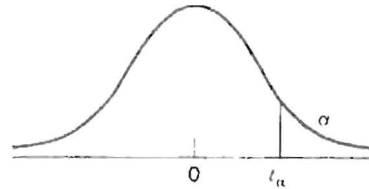
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TABLE 4 Percentage Points of *t* Distributions



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