所別：生物統計研究所碩士班、公共衛生學系碩士班

科目：流行病學　　【可攜帶電子計算機應試】

考生注意：答案不可寫在試題上，必須寫在答案卷上，否則不予計分。

A大題總分40分，每小題4分；B大題總分60分

(A)選擇題

1.Which of the following statements explains the principal difference between an experimental study and a prospective cohort study?
(A) In an experimental study, subjects are followed forward in time from intervention to outcome.
(B) An experimental study requires larger sample sizes
(C) In an experimental study, subjects are randomly allocated to comparison groups
(D) A control group is required in an experimental study
(E) Participants in an experimental study are randomly selected from the target population

Questions 2-3

2.In a study to evaluate the efficacy of a new antiviral agent in curing the common cold in young children, 100 children between the ages of 2 and 8, diagnosed with colds by participating pediatricians, were given the new drug. One week later, the investigators conducting the study observed that 90 of the 100 subjects were asymptomatic. They concluded that the antiviral drug was highly effective in curing children's colds. Which of the following statements regarding this conclusion is correct?
(A) The conclusion is valid for the study population
(B) The conclusion is invalid because the investigators measured prevalence rather than incidence
(C) The conclusion is invalid because the frequency measure reported does not have an appropriate denominator
(D) The conclusion is invalid because it is not generalizable to the target population of all children with colds
(E) The conclusion is invalid because the study lacks an appropriate control group

3.Plausible explanations for the observed result include all of the following EXCEPT
(A) recovery may be attributed to the typical course of the common cold in children, rather than to the new drug
(B) subjects may have come from families that were especially health conscious; as a result, they received care measures in addition to the new drug (e.g., over-the-counter cold remedies, special diets, or extra bed rest)
(C) symptomatic relief (the reported outcome) is not necessarily equivalent to a cure (true response variable)
(D) the new drug is effective in alleviating cold symptoms in children
(E) selection bias, rather than the drug, is likely to be responsible for the observed result

4.An occupational health planner who wanted to see if a new safety device would help reduce accident rates among auto workers conducted a study over a two-year trial period involving two randomly selected manufacturing plants. The new device was installed at the first plant (plant A), while the second plant (plant B) continued to operate with only routine safety equipment and procedures. During the observation period, five accidents were recorded at plant A and 20 at plant B. The investigator concluded that the new safety device was efficacious in decreasing work- related accidents. Which of the following statements best describes this conclusion?
(A) It is valid for the study population
(B) It is invalid because prevalence, rather than incidence, was measured
(C) It is invalid because the study lacked a control group
(D) It is invalid because the control group and the treatment group were drawn from different settings

Questions 5-7
Match each protocol described below to the relevant study design.
(A) Experimental study: completely random design
(B) Experimental study: randomized block design
(C) Observational study: prospective cohort study
(D) Observational study: historical cohort study

5.Subjects volunteering for a study of atherosclerotic heart disease were divided into three groups according to their degree of vascular plaque accumulation (low, moderate, or high). Within each of the three strata, subjects were assigned one of three diets: very low fat diet (<10% of total calories from fat), low fat diet (<30% of total calories from fat), or a reduced calorie diet with no restrictions on fat intake. At the end of five-year follow-up period, vascular plaque accumulation was assessed in the three diet groups to determine which diet led to the greatest reduction in plaque accumulation.

6.A study is carried out to compare the effect of two low fat diets on vascular plaque accumulation. The investigator conducting the study obtained a list of individuals who had been continuously enrolled between 1985 and 1 990 in one of two commercial weight loss programs based on the two diets. Participants in both diet programs were invited to participate in the study.

7.A group of patients with coronary heart disease volunteered to participate in a study of the relationship between diet and vascular plaque accumulation. The subjects were randomly assigned to one of three diets: very low fat diet (<10% of total calories from fat), low fat diet (<30% of total calories from fat), or a reduced calorie diet with no restrictions on fat intake. At the end of five-year follow-up period, vascular plaque accumulation was assessed in the three diet groups was compared to determine which diet had achieved the greatest reduction in plaque accumulation.

Questions 8-10
8.The Framingham Study is an ongoing large-scale prospective cohort study initiated in 1949 to investigate putative risk factors for coronary heart disease (CHD). Study participants underwent a complete physical examination at the beginning of the study and every two years thereafter. The upper table shown below summarizes the existence of CHD at the initial exam, while the lower table depicts the occurrence of CHD over one particular eight-year follow-up period.

Table 1.Existence of Coronary Heart Disease (CHD) at Initial Examination Among 4469 Persons 30-62 Years of Age, Framingham Study

Age (Years)	Males Examined	Males with CHD	Rate per 1000	Females Examined	Females with CHD	Rate per 1000
30-44	1083	5	5	1317	7	5
45-62	941	43	46	1128	21	19
Totals	2024	48		2445	28	

Reprinted from Mausner JS, Kramer S: Mausner and Bahn's Epidemiology: An Introductory Text, 2nd ed. Philadelphia, WB Saunders, 1985.

Table 2. Incidence of Coronary Heart Disease (CHD) Over an Eight-Year Period Among 4995 Persons 30-59 Years of Age Free of CHD at Initial Examination

Age (Years)	Males Examined	Males with CHD	Females Examined	Females with CHD
30-39	825	20	1036	1
40-49	770	51	955	19
50-59	617	81	792	53
Totals	2212	152	2873	73

Reprinted from Mausner JS, Kramer S: Mausner and Bahn's Epidemiology: An Introductory Text, 2nd ed. Philadelphia, WB Saunders, 1985.

Based on the data in the upper table, the conclusion that the risk of CHD for men between the ages of 30 and 44 is equal to the risk for women in the same age range is
(A) Correct
(B) incorrect, because the age distribution for men and women may differ
(C) incorrect, because a rate must be calculated to support this inference
(D) incorrect, because of a failure to distinguish between incidence and prevalence
(E) incorrect, because of the lack of an appropriate control or comparison group

9. Based on the data in the lower table, the absolute risk of developing CHD over the eight-year observation period among men between 30 and 39 years of age is
(A) 0.00097 (0.97 per 1000)
(B) 0.0687 (68.7 per 1000)
(C) 0.0242 (24.2 per 1000)
(D) 0.0262 (26.2 per 1000)
(E) not able to be calculated from the data given

10. The RR of developing CHD for men between the ages of 30 and 39, compared to women in the same age range, is
(A) 20.0
(B) 25.1
(C) 2.42
(D) 2.70
(E) not able to be calculated from the data given

(B)計算題

(1) By reviewing the incidence data from Framingham for the 10 year period in the following 2×2 table, we can determine the risk of developing CHD among those with elevated versus normal serum cholesterol at the time of the initial examination. Estimate the proportion of the cohort with elevated Serum cholesterol levels in 1948.(14%)

		Disease Status in 1958		
		CHD	CHD	
Elevated Serum	Yes	95	503	598
Cholesterol level	No	210	4186	4396
At Initial Examination (1948)		305	4689	4994

What is the risk of developing CHD in the group with elevated serum cholesterol levels (the "yes" group) as compared to the remaining population (the "no" group)? Derive the ratio of the two risks and other parameters below.

1-① risk of CHD, high cholesterol group for 10 years

1-② risk of CHD, normal cholesterol group for 10 years

1-③ risk ratio (elevated/normal)

1-④ attributable risk

1-⑤ attributable risk percent

1-⑥ population attributable risk

1-⑦ population attributable risk percent

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(2)The following data show the population, number of HIV cases in Snow County, Michigan and Gray County, Florida. Please use the information provided in table 3 to answer the following questions.

Table3. The HIV cases and rates stratified by age group in Snow County, Michigan and Gray County, Florida.

Age Group	Snow County, Michigan			Gray County, Florida		
	Population ()*	No. Cases	Rates Per 10,000	Population ()*	No. Cases	Rates Per 10,000
<20	300,000 (0.40)	3	_____	200,000 (0.09)	2	_____
20-39	200,000 (0.27)	20	_____	600,000 (0.27)	60	_____
40-59	180,000 (0.24)	90	_____	600,000 (0.27)	300	_____
60-79	60,000 (0.08)	300	_____	50,000 (0.23)	2,500	_____
80+	10,000 (0.01)	200	_____	30,000 (0.14)	6,000	_____
Total	750,000	613	_____	2,200,000	8,862	_____

*() proportion of total population in specific age group

Calculate the rates per 10,000 in table 3. Calculate age-specific rate ratios for Snow County versus Gray County in Table 3. Then answer the following questions.

1. Compare the crude rates per 10,000 between the two counties in Table 3. Can you state that individuals in one county have a higher risk of disease than those in the other county? Why or why not?(10%)
2. Directly standardize Gray County to the Snow County population (show your calculations). How does the adjusted rate compare to the Snow County crude rate? Can you compare these two rates? (10%)
3. Briefly state your conclusions about the rates in the two populations and how standardizing them affects the results. (6%)

(3)Compare the crude and age-adjusted rates between the two populations in Tables 4-5. Can you state that individuals in one population have a higher risk of disease than those in the other population? What's the role of age? a confounder or an effect modifier. (20%)

Table 4. The number of population, risk of disease and number with disease for hypothesized populations A and B

Age	Population A			Population B		
	Population	Risk of Disease	Number with Disease	Population	Risk of Disease	Number with Disease
0-20	100	0.1	10	500	0.1	50
21-50	200	0.2	40	200	0.2	40
51+	500	0.4	200	100	0.4	40
Total	800		250	800		130

Table 5. The number of population, risk of disease and number with disease for hypothesized populations A and B

Age	Population A			Population B		
	Population	Disease Risk	Number of Cases Expected	Population	Disease Risk	Number of Cases Expected
0-20	100	0.1	40	500	0.5	200
21-50	200	0.2	80	200	0.3	120
51+	500	0.4	80	100	0.2	40
Total	800		200	800		360