

※ 注意：請於試卷內之「非選擇題作答區」作答，並應註明作答之題號。

1. A prospective study of 20 participants within a 24-month follow-up. Results are shown in the table for individuals who either died or were censored before the end of the follow-up period.

(1) Calculate the probability of death at the exact time when each death occurred, the probability of survival beyond the time when each death occurred, and the cumulative probabilities of survival (15 points) (答案直接填入以下空格，並請依本表格式謄寫入答案卷中。)

Follow-Up Time (Months)	Event	Probability of Death at Exact Time When Death Occurred	Probability of Survival Beyond Point When Death Occurred	Cumulative Probability of Survival Beyond Time When Death Occurred
2	Death	1/20=0.05	0.95	0.95
4	Censored	—	—	—
7	Censored	—	—	—
8	Death			
12	Censored	—	—	—
15	Death			
17	Death			
19	Death			
20	Censored	—	—	—
23	Death			

(2) What is the cumulative survival probability at the end of follow-up period? (5 points)

(3) What is the simple proportion of surviving through the end of the study's observation period (10 points)

(4) Why are the simple proportion surviving and the cumulative probability of survival different? (10 points)

(5) Using the same data, calculate the overall death rate per 100 person-years. (10 points)

2. What would be the most appropriate probability distribution for the following random variables:

A. Whether the study participants are healthy or not (3 points)

B. Number of people who are sick out of 1000 study participants (3 points)

C. Number of car accidents last month (3 points)

3. Multiple linear regression is frequently used to model the relationship between two or more explanatory variables and a response variable by fitting a linear equation to observed data. In order to apply multiple linear regression in to data analyses, you are now conducting the residual analyses to see if multiple linear regression

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is appropriate for the data.

A. Please explain what is residual (4 points).

B. Please describe what should be checked regarding the residual distributions (12 points).

4. You are interested in studying if smoking is related to asthma risk by using the case-control study design.

A. Please explain the estimated results may be biased away or toward the null (i.e. differential or non-differential bias) in the following situations:

i. By using self-reported data before diagnosis, smoking was defined by ever or never smoking among asthma patients and controls (5 points).

ii. By using self-reported data before diagnosis, smoking was measured by pack-year among asthma patients and was measured by ever /never smoking among controls (5 points).

B. You are concerned if obesity is a potential confounder in order to study the smoking related asthma risk.

i. (a) Please describe what you are going to do in the study design in order to control for the potential confounding effects by obesity (5 points).

(b) Please describe the limitation that may be caused by this study design (5 points).

ii. Please describe what you are going to do in the data analyses in order to check if the obesity confound the observed association between smoking and asthma (5 points).

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