

一、生物統計部分佔 50 分

1. 下列為研究細菌性腦膜炎(bacterial meningitis)病童所測得之 bFGF(basic fibroblastic growth factor)資料。
224,358,6,6.72,8.16,6.29,8.54,5.96,8.16,4.62,8.92,5.15,6.77,5.86, 6.75,7.64,6.39

- (A) bFGF 資料的標準平方差(standard deviation) 是多少? (4分)
- (B) bFGF 資料的範圍(range) 是多少? (2分)
- (C) bFGF 資料的 first quartile (25%) and third quartile (75%) 兩者的差是多少? (4分)
- (D) 如果(C)的值很小,但是(B)的值很大。你能否說明原因? (5分)

2. Hypothesis testing

假設母群體某變數, X, 是常態分佈,平均值是 μ ,標準差等於 1。
如果要檢定 μ 是否等於 0; i.e. $H_0: \mu=0$ vs. $H_a: \mu \neq 0$ 。

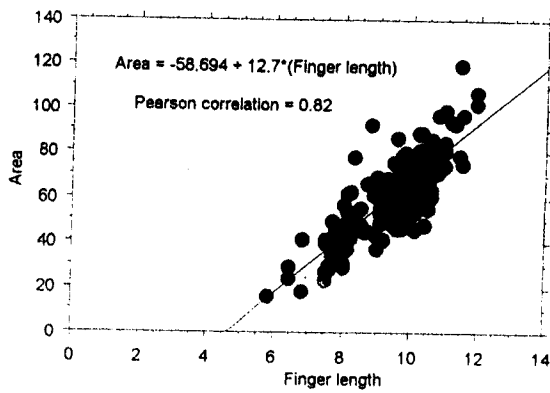
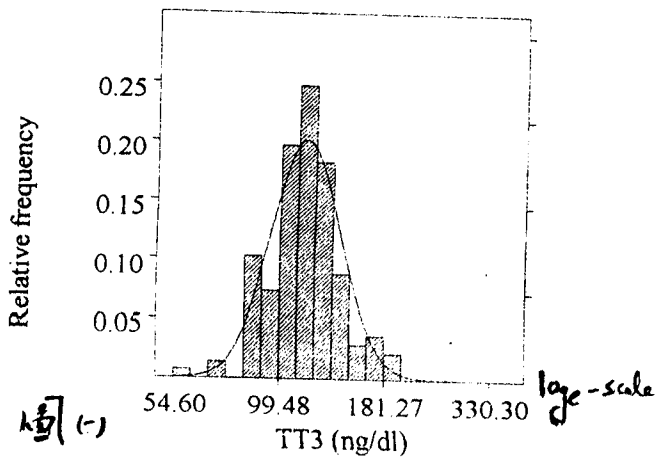
- (A) 假設樣本數, n, 是 10^{24} , 請問當 Type I error 發生機率定在 0.05(以下), 樣本平均數, \bar{X} , 落在什麼範圍,你會拒絕 the null hypothesis H_0 ? (5分)
- (B) 在 $\mu=10^{-10}$ 的情況下,the power of such a study 是多少? (5分)
- (C) 在 $\mu=10^{-10}$ 的情況下,如果計算出 power 接近 1,你會不會懷疑假設檢定這方法有問題?如果有,問題在那裡? (5分)

3. 假設 65 歲以上老年人口的 total triiodothyronine (TT3) levels 在自然對數表上所得之長條圖(圖一)約為常態分佈(normal distribution)。其平均值是 4.75 (ng/dl), 標準平方差是 0.20 (ng/dl) [after taking the natural log transformation of the raw data]。請問屬於中間百分之九十五的老年人之 TT3 level 是在什麼範圍之內? (10分)

(註: The upper (and lower) 2.5% percentile of a standard normal distribution is 1.96 (and -1.96)).

4. 圖(二)縱座標所顯示是用某測量方法所得手指截面積(area)數據; 橫座標則是手指實際長度(finger length)。如用簡單線性函數描述兩者關係 (simple linear function), 所得線性回歸分析結果是

Area = -58.694 + 12.7*(Finger length); Pearson correlation = 0.82.
請問此分析方式有何不妥處? 並請說明。(10分)



(背面仍有題目,請繼續作答)

二、流行病學部分佔 50 分

Select the best answer for each multiple choice question. Each question is worth 2 points.

1. In what stage of disease do we apply early detection and prompt treatment?
 - (A) Stage of susceptibility
 - (B) Stage of presymptomatic disease
 - (C) Stage of clinical disease
 - (D) Stage of disability

2. Which of the following diseases was not one of the three leading causes of death in Taiwan in 1994?
 - (A) Gastritis, duodenitis
 - (B) Malignant neoplasm
 - (C) Cerebrovascular disease
 - (D) Accidents

3. Which of the following measure is usually used in the denominator when calculating incidence density of a disease?
 - (A) The number of new cases
 - (B) The number of all existing cases
 - (C) Total population in a community
 - (D) Total observed person-time

4. When a new treatment is developed that prevents death but does not produce recovery from a disease, which of the following will occur?
 - (A) Prevalence of the disease will decrease
 - (B) Prevalence of the disease will increase
 - (C) Incidence of the disease will decrease
 - (D) Incidence of the disease will increase

5. In a study of 100 cases of Disease A and 100 controls, the suspected etiological Factor B is found in 20 of the cases and 10 of the controls. The absolute risk (incidence) of Disease A in people with Factor B is:
 - (A) 2.3%
 - (B) 20.0%
 - (C) 67.7%
 - (D) Cannot be computed from data given

Use the information on the following table for questions 6 and 7.

Bladder cancer rates in cigarette smokers and nonsmokers
Bladder Cancer Rate per 100,000
Males

Cigarette smokers	50.0
Nonsmokers	30.0

6. The relative risk of developing bladder cancer for male cigarette smokers compared with male nonsmokers is:
- (A) 50.0 per 100,000 males
 - (B) 20.0 per 100,000 males
 - (C) 1.67
 - (D) Cannot be computed from data given
7. The attributable risk % (etiologic fraction) of bladder cancer due to cigarette smoking in male smokers is:
- (A) 60%
 - (B) 50%
 - (C) 40%
 - (D) 1.67
8. The latent period is defined as the time from:
- (A) Birth until first exposure to a risk factor
 - (B) Initial to final exposure to a risk factor
 - (C) Exposure to a risk factor until occurrence of the disease
 - (D) Disease occurrence until death
9. In a case-control study of the relationship between obesity and occurrence of gallstones, controls are matched to cases on age and gender. This approach is intended to decrease the chance of which of the following biases?
- (A) Selection bias
 - (B) Information bias
 - (C) Ecologic fallacy
 - (D) Confounding

(背面仍有題目,請繼續作答)

10. Which of the following is not a criteria for causality?
- (A) Temporal association
 - (B) Strength of association
 - (C) Biological plausibility
 - (D) Clear definition
11. An investigator finds a positive correlation between per capita fat consumption and mortality rates for breast cancer across 20 different countries. This type of study is most useful for
- (A) Hypothesis generation
 - (B) Hypothesis testing
 - (C) Determining clinical importance
 - (D) Evaluating causality
12. In order to investigate this relationship further, a study is conducted in which 100 women with breast cancer and 100 women without breast cancer are compared with respect to earlier fat consumption habits. The design of this study is best described as:
- (A) Experimental
 - (B) Cross-sectional
 - (C) Case-control
 - (D) Cohort
13. From the study mentioned in question 12, if women with breast cancer are more likely than women without breast cancer to overestimate prior fat consumption, this could result in which of the following types of bias?
- (A) Recall bias
 - (B) Selection bias
 - (C) Ecologic fallacy
 - (D) Confounding
14. What kind of effect will the above mentioned bias has on the association between fat and risk of breast cancer:
- (A) Decreased
 - (B) Increased
 - (C) Unchanged
 - (D) Altered, but the direction cannot be predicted

15. Next, a study is conducted in which 10,000 women without breast cancer are recruited, questioned about fat consumption, and then followed for future development of breast cancer. The design of this study is best described as:

- (A) Experimental
- (B) Cross-sectional
- (C) Case-control
- (D) Cohort

16. If the risk ratio for breast cancer increases with reported level of fat consumption, it can be inferred that there is:

- (A) A biologically plausible relationship
- (B) A statistically significant result
- (C) A dose-response relationship
- (D) A consistent relationship across studies

17. If the estimated risk ratio of heavy to light fat consumption is 1.5, with a 95% confidence interval of (1.1, 2.2), it can be inferred that there is:

- (A) A biologically plausible relationship
- (B) A statistically significant result
- (C) A dose-response relationship
- (D) A consistent relationship across studies

Use the following information for Questions 18-20.

Investigators at VA hospital tried to study the effect of combining a nicotine patch with a drug "mecamylamine" in helping smokers quit smoking. They recruited 130 smokers, and randomly assigned half of them to the combination treatment and the other half to nicotine patch only. Forty percent of the smokers with the combination treatment had quit after six months, vs. 20% of those treated with nicotine alone.

18. The design of this study is best described as:

- (A) Experimental
- (B) Cross-sectional
- (C) Case-control
- (D) Cohort

(背面仍有題目,請繼續作答)

19. The purpose of randomization in this study was to:
- (A) Obtain similar sizes for two treatment groups
 - (B) Select a representative sample of smokers for study
 - (C) Increase smokers' compliance with treatment
 - (D) Obtain treatment groups with comparable baseline prognoses
20. The investigators knew which treatment each smoker received but the smokers themselves were unaware of the treatment assignment. This design is best described as:
- (A) Unblinded
 - (B) Single-blinded
 - (C) Double-blinded
 - (D) Triple-blinded
21. A case-control study was carried out to investigate possible risk factors for liver cancer. Fifty liver cancer cases were diagnosed in National Cheng Kung University Hospital (NCKUH) during 1995-1997. Which of the following will be the best source of controls?
- (A) Liver cancer patients from other hospitals in Tainan City.
 - (B) Non-liver cancer patients from NCKUH
 - (C) Non-liver cancer patients from all hospitals in Tainan City
 - (D) No controls are needed for this study design
22. Which of the following groups would you use for a prospective cohort study of the association between safety helmet wearing and motorcycle accident?
- (A) Patients with motorcycle accident and healthy controls
 - (B) Patients with motorcycle accident who do not wear helmet and healthy controls who wear helmet
 - (C) Healthy motorcycle riders who wear helmet and healthy riders who do not wear helmet
 - (D) Healthy motorcycle riders who wear helmet and healthy non-motorcycle riders
23. Each of the following is emphasized in epidemiologic research **EXCEPT**
- (A) Pattern of disease development
 - (B) Observations of naturally occurring events
 - (C) Experiments with laboratory animals
 - (D) Characteristics associated with disease occurrence

24. The usual incidence of a disease in a population is referred to as the:

- (A) Pandemic rate
- (B) Epidemic rate
- (C) Endemic rate
- (D) Hypodermic rate

25. Each of the following is likely to be an advantage of retrospective as opposed to prospective cohort studies **EXCEPT**:

- (A) Less expensive
- (B) More rapidly completed
- (C) Useful for the evaluation of discontinued exposure
- (D) Allow more accurate assessment of exposure