

系所組別： 環境醫學研究所丁組

考試科目： 應用生物統計概論

考試日期： 0220，節次： 3

※ 考生請注意：本試題 可 不可 使用計算機

1. Please give the definition first and then explain how it is used in biostatistics. (5% each)
  - A. Power
  - B. P-value
  - C. Standard error
2. Consider a linear regression model where height measured in inches is the predictor and weight measured in inches is the outcome variable. Which of the following item will change if the units of both height and weight are changed to centimeters? Explain your answer for each item. (5% each, multiple choices).
  - i. P-value of the regression model
  - ii. Model r-square of the regression model
  - iii. Beta estimate of the intercept
  - iv. Beta estimate of the slope
3. The following output is a two-sample t-test for weight between men and women

The TTEST Procedure

Statistics

Variable	Sex	N	Lower CL		Upper CL	Lower CL	
			Mean	Mean	Mean	Std Dev	Std Dev
Weight	F	11	130.37	141.73	153.08	11.813	16.906
Weight	M	10	161.28	172.8	184.32	11.081	16.109
Weight	Diff (1-2)		-46.19	-31.07	-15.95	12.574	16.534

Statistics

Variable	Sex	Upper CL		Minimum	Maximum
		Std Dev	Std Err		
Weight	F	29.669	5.0974	118	172
Weight	M	29.409	5.0942	147	193
Weight	Diff (1-2)	24.148	7.224		

T-Tests

Variable	Method	Variances	DF	t Value	Pr >  t
Weight	Pooled	Equal	19	-4.30	0.0004
Weight	Satterthwaite	Unequal	18.9	-4.31	0.0007

Equality of Variances

Variable	Method	Num DF	Den DF	F Value	Pr > F
Weight	Folded F	10	9	1.10	0.8942

- A: What is the mean weight difference between Male and Female? (5%)
- B: Are the variances of weight between Male and Female different at  $\alpha=0.05$  significance level? Why? (5%)
- C: Do Male and Female have the same weight at  $\alpha=0.01$  significance level? Why? (5%)

(背面仍有題目,請繼續作答)

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4. Use the following 2 by 2 table (Sex by abdominal pain) to answer the following questions.

	No pain	Pain
Female	22	8
Male	13	17

A. Consider a random sample from the same population

A.1: What is the probability of selecting a man? (5%)

A.2: What is the proportion of men with abdominal pain? (5%)

A.3: Give that the individual is a female, how likely will she have abdominal pain? (5%)

A.4: For those subjects with pain, how likely will they be male? (5%)

B. Assuming that the data is collected from a Case-Control Study, what is the odds ratio of having no pain for woman vs. man? (5%)

C. Assuming that the data is collected from a Cohort (prospective) Study:

4C.1: What is the relative risk of having no pain for man vs. woman? (5%)

4C.2: What is the relative risk of having pain for woman vs. man? (5%)

5. Answer questions using the following analysis of correlation between SBP and age

The CORR Procedure

2 Variables: AGE SBP

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
AGE	1000	56.91000	9.38989	56910	29.00000	80.00000
SBP	1000	126.75600	18.22357	126756	85.00000	203.00000

Pearson Correlation Coefficients, N = 1000  
Prob > |r| under H0: Rho=0

	AGE	SBP
AGE	1.00000	0.39841 <.0001
SBP	0.39841 <.0001	1.00000

A: What is the Pearson correlation between SBP and age? (5%)

B. Is the Pearson correlation coefficient statistically significant? Why? (5%)

C. Calculate coefficient of determination (r-square) and interpret this number (5%)