

A. 心理與教育統計學 (33 題選擇題，每題一分，共 33 分)

※ 注意：每個題目的選項從 4-6 個不等，請選出其中最適當的一個。

請於試卷內之「非選擇題作答區」標明題號依序作答。

1. If we had nominal data and our null hypothesis was that the sampled data came from a specified distribution we would use the
 - a. χ^2 goodness-of-fit test
 - b. χ^2 test of independence
 - c. Kruskal-Wallis H test
 - d. Wilcoxon matched-pairs signed-rank test
2. In regression analysis, the standard error of estimate is
 - a. the same as the correlation coefficient
 - b. the standard deviation of the errors of prediction
 - c. positive if r is positive, negative if r is negative.
 - d. both b and c.
3. In regression analysis, assume that $\bar{Y}=29.6$ and $s_y=5.3$. In which case is the standard error of estimate smallest?
 - a. $r=0.1$; $\bar{X}=10$
 - b. $r=0.4$, $\bar{X}=100$
 - c. $r=0.7$, $s_x=4$
 - d. $r=0.9$, $s_x=12$
4. If the intercept for the regression line is negative, it indicates that
 - a. the correlation is positive
 - b. the correlation is negative
 - c. the correlation is zero
 - d. the intercept cannot tell us whether the correlation is positive, negative, or zero
5. In regression analysis, a subject's error of prediction is
 - a. the subject's actual score minus his predicted score
 - b. the subject's actual score minus the mean
 - c. the vertical distance between the subject's score and the regression line
 - d. the shortest distance between the subject's score and the regression line (perpendicular to the regression line)
 - e. both a and c
 - f. both b and d
6. In regression analysis, the error of prediction for the i th individual is given by
 - a. $e_i = Y_i - \bar{Y}$
 - b. $e_i = \hat{Y}_i - \bar{Y}$
 - c. $e_i = Y_i - \hat{Y}_i$
 - d. $e_i = Y_i + \hat{Y}_i$
7. The least squares criterion for the regression line states that
 - a. the best regression line produces the smallest sum of squared error of prediction
 - b. the variance of the X variables must be less than the variance of the Y variable
 - c. the variance of the Y variable must be less than the variance of the X variable
 - d. the best regression line has the smallest variance of the X variable
8. $\sum Z_X Z_Y = 4$ and $n=9$, r is
 - a. -0.5
 - b. 0
 - c. +0.5
 - d. impossible to determine from the information provided
9. Power is defined as
 - a. the probability of making a Type I error
 - b. the probability of making a Type II error
 - c. the probability of correctly rejecting H_0
 - d. the probability of correctly rejecting H_1
10. If the null hypothesis of analysis of variance (ANOVA) is true, then
 - a. MS_B would be expected to be about the same magnitude as MS_W
 - b. MS_B would be expected to be exactly equal to MS_W
 - c. MS_B would be expected to be substantially larger than MS_W
 - d. MS_B would be expected to be substantially smaller than MS_W
11. In ANOVA, which of the following is equal to the pooled within group variance?
 - a. SS_B
 - b. MS_B
 - c. SS_W
 - d. MS_W

12. Degree of freedom within groups in an ANOVA are equal to
 a. $n-1$, where n equals the number of subjects in each group
 b. $k-1$, where k equals the number of groups
 c. $N-k$, where N equals the total number of scores in the analysis and k equals the number of groups
 d. $N-1$, where N equals the total number of scores in the analysis
13. If degrees of freedom for a two-dependent-sample test for means are equal to 9, how many pairs of scores (n) were used in the analysis?
 a. 7 b. 8 c. 9 d. 10 e. impossible to determine with information provided
14. The null hypothesis for a two-independent-sample test for means is
 a. $H_0: \bar{X}_1 = \bar{X}_2$ b. $H_0: \mu_1 = \mu_2$ c. $H_0: \bar{X}_1 \neq \bar{X}_2$ d. $H_0: \mu_1 \neq \mu_2$
15. Degrees of freedom for a two-independent-sample test for means is
 a. $df_1 = df_2$ b. $n_1 = n_2$ c. $n_1 + n_2 - 1$ d. $n_1 + n_2 - 2$
16. For a two-independent-sample test for means, "pooling" variances refers to
 a. take the weighted average of variances b. take the square root of variances
 c. take standard deviation of the variances d. take the variance of the standard deviation
17. Which of the following is the formula for the one-sample test statistic when σ is unknown?
 a. $Z = \frac{\bar{X} - \mu}{\sigma_{\bar{X}}}$ b. $Z = \frac{\bar{X} - \mu}{\sigma}$ c. $t = \frac{\bar{X} - \mu}{s_{\bar{X}}}$ d. $t = \frac{\bar{X} - \mu}{\sigma_{\bar{X}}}$ e. $t = \frac{\bar{X} - \mu}{\sigma}$
18. Degrees of freedom for the one-sample test for the mean with known σ are
 a. n b. N c. $n-1$ d. $N-1$ e. not applicable
 (where n = sample size for one sampling process; N = the number of sampling process)
19. Which is the smallest in absolute value?
 a. z critical value in one-tail test with $\alpha = 0.05$ b. z critical value in one-tail test with $\alpha = 0.01$
 c. z critical value in two-tail test with $\alpha = 0.05$ d. z critical value in two-tail test with $\alpha = 0.01$
20. The critical value of a statistic
 a. is a computed statistic of a sample
 b. is a computed parameter
 c. is what you see in the data prior to performing any computations
 d. marks the beginning of the rejection region
21. The probability of correctly "accepting" a true null hypothesis is
 a. α b. $1-\alpha$ c. β d. $1-\beta$
22. Which of the following statements is true?
 a. It is easier to prove a hypothesis false than it is to prove a hypothesis true
 b. It is easier to prove a hypothesis true than it is to prove a hypothesis false
 c. It is equally easy to prove a hypothesis false or true
 d. Providing a hypothesis false is the same as providing a hypothesis true
23. Which of the following is true?
 a. Inferential statistics is the science of describing distribution of samples or populations.
 b. Descriptive statistics is the science of using sample statistics to make decisions about population parameters

- c. Inferential statistics is the science of inferring the characteristics of a distribution of means from the distribution of the variable
 d. descriptive statistics is the science of inferring the characteristics of a distribution of means from the distribution of the variable
 e. none of the above
24. The number of degrees of freedom in a confidence interval when the standard deviation is known is _____; when the standard deviation is unknown, the number of degrees of freedom is _____
 a. not applicable; $n - 1$ b. not applicable; n c. n ; not applicable d. n ; $n - 1$
25. The reason that the t distribution is _____ than the z distribution is that _____
 a. narrower; the sample size is smaller b. narrower; the point estimate of the mean is larger
 c. wider; s is not a perfect point-estimate of σ d. wider; the sample size is smaller
26. A 95% confidence interval based on 100 subjects is likely to be _____ a 95% confidence interval based on 50 subjects.
 a. the same width as b. wider than c. narrower than
 d. wider, narrower, or the same width as (impossible to say)
27. A 95% confidence interval is approximately _____ wide (from its lower limit to its upper limit)
 a. 3 standard deviations b. 4 standard deviations c. 6 standard deviations
 d. 3 standard errors e. 4 standard errors f. 6 standard errors
28. If we increase the level of confidence, say from 95% to 99%, the width of confidence interval will
 a. decrease b. increase c. stay the same d. impossible to say
29. Suppose that IQ is normally distributed with mean 100 and standard deviation 15. What is the z score for $\bar{X} = 130$?
 a. 1 b. 2 c. -1 d. -2 e. none of the above
30. According to the central limit theorem, as the sample size n increases, the sampling distribution of the means of samples of size n approaches a normal distribution
 a. only if the parent distribution is itself normal b. even if the parent distribution is not normal
 c. only if the parent distribution is normal or only slightly skewed
 d. only if the parent distribution is not bimodal
31. $z = -1$ is approximately the _____ percentile.
 a. 10th b. 14th c. 16th d. 34th e. 50th
32. The standard deviation is defined as
 a. the highest value minus the lowest value in a data set
 b. a measure of width equal to the square root of the mean of the squared deviations
 c. a measure of width equal to the mean of the squared deviations
 d. a measure of width equal to the mean deviation
33. It is permissible to use the median as a measure of central tendency if the data are
 a. nominal b. ordinal c. interval/ratio d. either nominal or ordinal
 e. either ordinal or interval/ratio

B.心理測驗學 (33%)

心測題目為簡答題，請簡單扼要回應說明。

[B1] Z 公司發展了一個程式設計能力測驗甄選新進資訊工程師，測驗分數的再測信度為 0.91。你的好朋友應徵後因為百分等級 (PR) 只有 52，不及公司要求的 60 而未被錄用。他非常不服氣，又再次遞了履歷表，再考一次，結果第二次的百分等級剛好 60。他得意洋洋地說，『只要多應徵幾次，就定會上的啦！』你們共同的好朋友小丁第一次也沒上，聽了很開心，就努力地試了好幾次，可是不管他多麼努力，PR 卻沒差多少，他很傷心地說：『怎麼會這樣？』請問：你猜小丁的 PR 可能在什麼範圍？為什麼？請說明你的理由。(4%)

[B2] O 老爺開心地宴請親朋，座上貴賓的你好奇地問 O 老爺是怎麼一回事？O 老爺得意洋洋地說：『哈哈，我這二年級的寶貝兒子簡直就是天才，他在數學成就測驗上得了個年級當量五呢！他簡直就跟五年級的小朋友一樣聰明，所以哪，我要去找老師，要求讓他直接跳讀五年級。』請問，如果你是老師，聽了家長這樣說，你會如何回應呢？(4%)

[B3] A 研究員編製了一份社交恐懼量表，所提供的效度研究資料包括以下說明，請試評論其敘述。(4%)
『文獻中，B 學者發現社交恐懼與神經質傾向有關。據此研究結果，本研究即以社交恐懼量表和神經質傾向量表分數的相關，進行社交恐懼量表的收斂效度研究。結果發現兩量表分數間相關為 0.56，表示此新編製的社交恐懼量表具收斂效度。』

[B4] 請說明何為 Rasch model？(5%)

[B5] 某測驗分數的變異數為 9，信度為 0.84，請計算此測驗分數的測量標準誤 (standard error of measurement, 簡稱 SEM) (計算過程需列出)。又，若 X 為測驗的實得分數，當我們以 $X \pm SEM$ 估計真分數的 68% 信賴區間時，請問此作法需要那些假設條件 (assumptions)？(8%)

[B6] X 銀行希望能發展一份會計能力測驗，測量應徵者能力，以作為新進人員甄選之用。人事部經理設計題目並施測收集資料後，計算各題答對的百分比，以及每一題與測驗總分的相關。如果你是 X 銀行的人事部門顧問，當人事部經理提供你這些數據，並請教你如何選題時，你會如何回應呢？(8%)

C. 心理實驗法 (34%)

[C1] 某研究機構想要探討現場經歷台灣 921 地震，對於事後心理創傷的影響。研究調查一群親身經歷 921 地震的參與者，及另一群沒有親身經歷 921 地震的參與者，並且使用學界公認的心理創傷量表，測量兩群參與者在心理創傷量表分數上的差異。

- (a) 這樣的研究設計的缺點為何【4%】
 (b) 這樣的研究設計較相關分析法好的優點為何 (請說出至少兩項)【6%】

[C2] 某研究者想要瞭解大學生聽音樂對於漢字的判斷是否會有影響，於是研究 30 位大學生，每位大學生都接受兩種條件 (聽音樂及不聽音樂)，每種條件下分別有 50 個真字及 50 個假字，每位大學生都接受字彙判斷作業 (lexical decision task)，需要判斷所看到的視覺符號是真字或是假字。結果發現在聽音樂的條件下，判斷真字的平均正確率為 90%，判斷假字的平均正確率為 30%。在不聽音樂的條件下，判斷真字的平均正確率為 60%，判斷假字的平均正確率為 90%。兩種條件的標準差皆為 0.1。因為兩種條件在真字的平均正確率差異為 30%，該研究者推論大學生聽音樂對於漢字的判斷會有助益。

- (a) 這樣推論的缺點為何 (請以你所知道的理論來說明理由)【4%】
 (b) 寫出正確的分析結果來檢驗此假設【5%】

[C3] 以前，發表論文的作者會列出 MSe 的資訊。但晚近依 APA 對論文書寫的規定，是可以不必列出 MSe 資訊的。 MSe 資訊其實可以幫助研究者進行後續實驗前估計所需要的受試人數，相當有用，這是統計學裡的一般常識，所以研究者有必要能夠根據別人發表的論文算出對應的 MSe 。

假設某學者進行兩個獨變項的實驗，A 為受試者間變項，包括 2 種隨機分派而且互相獨立的實驗組別，B 為受試者內變項，包括 3 種實驗情況。每一實驗細格情況組合分別得到 10 個測量值，計算出的各情況平均值如下表所示。

	B1	B2	B3
A1	35	32	29
A2	29	28	27

- (a) 在實驗的結果與討論裡，作者宣稱 A 的主要效果顯著， $F(1, 9) = 8, p < .05$ ；B 的主要效果顯著， $F(2, 18) = 5, p < .05$ ；A 與 B 的交互作用效果顯著， $F(2, 18) = 5, p < .05$ 。請你幫忙分別計算並補足用以評估這三個變異來源顯著程度的 MSe 值。【9%】
 (b) 根據上題的自由度訊息，可以判斷作者並未執行了正確的變異分析，他顯然在統計套裝程式裡設定錯了分析模型。假設已知總變方和 SS_{total} 為 1520，請你依據現有訊息，設法幫作者列出正確的變異分析摘要表。【6%】