題號： 128
科目：社會研究方法
節次： 7

國立臺灣大學 102 學年度碩士班招生考試試題

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※ 注意：選擇題請於試卷之「選擇題作答區」依序作答。

第一部分：社會統計 (50分)

(一) 單選題(每題 三分，請將題號及答案標示清楚寫在答案紙上，沒有題號者不允計分)。

1. ____. Which of the following statement is **incorrect**?
   A. A distribution has zero skewness if it is symmetrical about its mean.
   B. For a symmetrical distribution, the mean, median, and mode are equal.
   C. A distribution is positively skewed (skew to the right) if the right tail is longer.
   D. A distribution is negatively skewed (skew to the left) if mean > median > mode.

2. ____. A nation faces a rate of inflation of 2% in one year, 5% in the second year, and 12.5% in the third year. Find the geometric mean of the inflation rates.
   A. 5%
   B. 6.5%
   C. 11.18%
   D. 6.45%

3. ____. Consider the regression equation: $y = \beta_0 + \beta_1 x + \beta_2 x^2$, which of the following statements regarding this equation is **incorrect**:
   A. When $\beta_1 > 0$ and $\beta_2 < 0$, the equation implies a diminishing marginal effect of x on y.
   B. The statement that x has a diminishing marginal effect on y is the same as saying that y decreases as x increases.
   C. The slope of the regression is approximately $\beta_1 + 2\beta_2 x$
   D. The maximum of the function occurs at the point $x^* = \beta_1/(-2\beta_2)$

4. ____. Which of the following statements about the expected value is **NOT** correct:
   A. if $\{a_1, a_2, \ldots a_n\}$ are constants and X_i are random variables, then $E(\sum_{i=1}^{n} a_i X_i) = \sum_{i=1}^{n} a_i E(X_i)$
   B. If $E(X) = \sum_{i=1}^{n} x_i f(x_i)$, then $E[\log(X)] = \sum_{i=1}^{n} \log(x_i) f(x_i)$
   C. If $X_1, \ldots X_n$ are n random variables such that each expectation $E(X_i)$ exists, then $E(X_1 \cdot X_2 \cdot X_3 \ldots X_n) = E(X_1)E(X_2)\ldots E(X_n)$
   D. $E(X^2)$ will not necessarily equal to $[E(X)]^2$

5. ____. For a random variable X, let $u = E(X)$, then
   A. $Var(X) \equiv [E(X - u)]^2$
   B. For any constant a and b, $Var(aX+b) = a^2 Var(X) + b$
   C. $Var(X) = E(X^2) - E(X)^2$
   D. $Var(X) = \sum_{i=1}^{n}(x_i) f(x_i) - u^2$
   E. $Var(\sum_{i=1}^{n} a_i X_i) = \sum_{i=1}^{n} a_i^2 Var(X_i)$

6. ____. Let $E(X) = u_x$, $E(Y) = u_y$, which of the following statements regarding the covariance between X and Y are **incorrect**?
   A. $Cov(X, Y) = E(XY) - u_x u_y$
   B. $Cov(X, Y) = E[(X - u_x)Y]$
   C. If $Cov(X,Y) = 0$, then X and Y are independent.
   D. $Cov(X,Y) = E[(X-u_x)(Y-u_y)]$

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7. _____. Which of the following properties regarding conditional expectations and conditional variance is **incorrect**?
    A. If X and Y are independent, the $E(Y|X) = E(Y)$
    B. $E[E(Y|X)] \neq E(Y)$
    C. If X and Y are independent, then $Var(Y|X) = Var(Y)$
    D. If $E(Y|X) = E(Y)$, then every function of X is uncorrelated with Y

8. _____. Given a very simple random sample $\{Y_1, Y_2, ..., Y_n\}$ drawn from a population distribution with population mean $E(Y) = u$ and variance $Var(Y) = \sigma^2$, which of the following is **incorrect**:
    A. $E(Y_1) = u$
    B. $Var(Y_2) = \sigma^2$
    C. $Var(\bar{Y}) = \sigma^2 / \sqrt{n}$
    D. $E[\frac{1}{n-1}\sum_{i=1}^{n}(Y_i - \bar{Y})^2] = \sigma^2$

9. _____. Consider the simple regression equation: $y = \beta_0 + \beta_1 x + e$, which of the following statements is **correct**:
    A. if the dependent variable is multiplied by a constant c, then the new OLS intercept is also multiplied by c.
    B. if the independent variable is divided by some nonzero constant c, the new OLS slope coefficient is divided by c.
    C. if the dependent variable is multiplied by a constant c, then the new OLS slope estimate will not change.
    D. all of the above.

10. _____. Suppose the true regression model is:
Wage$= \beta_0 + \beta_1(education) + \beta_2(ability) + e$, but we do not have information about "ability". We estimates the following model instead: Wage$= \tilde{\beta}_0 + \tilde{\beta}_1(education) + \varepsilon$
If "*education*" has a positive effect on wage and "*education*" and "*ability*" is positively correlated, then
    A. $\beta_1 > \tilde{\beta}_1$
    B. $\beta_1 = \tilde{\beta}_1$
    C. $\beta_1 < \tilde{\beta}_1$
    D. It cannot be decided

(二) 簡答題，每題五分:

11. 在OLS的簡單迴歸模型中，要具備那些條件或在那些假設(assumptions)之下，樣本迴歸模型所估計的斜率(slope)，才會是母體斜率的不偏估計式(unbiased estimator)? 請寫出迴歸分析的基本假定。

12. 簡單解釋下列名詞(1) type I error (2) type II error (3) the power of a significant test。

13. 想要比較白人(White)、非裔 (African American)、西裔(Hispanic)等美國三大種族之間的平均收入是否有差別，可以用什麼方法來進行統計分析?為什麼不可以用三組t-test檢定來進行?若要在控制教育年數及年齡之下比較各組的差異，則要如何進行比較合適?

14. 簡單說明測量上的reliability與validity的意義。

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第二部分 研究方法(50 分)

駱明慶分析 1997 - 2000 年台大入學生的學籍資料，發現相較於全國平均的 0.89%,
3.06%的台北市人口和 6.10%的大安區人口會成為台大學生, 台東縣的比例則只有
0.19%。另外，台大法/社科學院的學生中，42%的父親和 27%的母親為大學畢業生,
父親或母親為公教人員的比例高達 42%, 均遠高於大學生和一般人口的比例。

1. 請基於以上研究資料，請你具體說明 (25%)
(1) 相關與因果有何不同？
(2) 上述發現可能衍生哪些因果假設？
(3) 可以透過怎樣的研究設計來檢驗這些假設？

2. 從以上資料，請你發展出一個質性的研究，請具體說明 (25%)
(1) 你的研究問題
(2) 如何收集資料、選擇個案
(3) 具體討論質性與量化研究對於研究這個命題的優缺點

試題隨卷繳回