

國立中央大學八十八學年度碩士班研究生入學試題卷

所別: 人力資源管理研究所 甲組 科目: 統計學 共 2 頁 第 1 頁

參考用

一. Suppose two random samples $(x_1, x_2, \dots, x_n; y_1, y_2, \dots, y_m)$ are drawn independently from the populations with means and standard deviations, μ_x and μ_y, σ_x and σ_y , respectively. Some statements are made by two students, A and B.

(1) Student A: "All of the $x_1, x_2, \dots, x_n, y_1, y_2, \dots$ and y_m are independently distributed. They are also distributed identically as their respective populations."

Student B: " x_1, x_2, \dots and x_n are distributed identically and independently. So are y_1, y_2, \dots and y_m ."

How would you modify the statements to make them correct, if necessary? State it!(15%)

(2) Student A: "The random variables \bar{X} and \bar{Y} have the following distributions, respectively: $\bar{X} \sim N(\mu_x, \sigma_x^2/n), \bar{Y} \sim N(\mu_y, \sigma_y^2/m)$."

Student B: "Statistics \bar{X} and \bar{Y} are the unbiased estimators of the respective population means."

Are the above statements correct? If not, how would you modify them?(10%)

(3) Students A and B want to test the hypothesis about the population variances.

So they set up the following hypothesis: $H_0: S_x^2 = S_y^2$ v.s. $H_a: S_x^2 \neq S_y^2$.

Empirically, since $S_x^2 / S_y^2 < F_{\alpha}(n-1, m-1)$, they claim that the population variances should be the same. (15%)

(a) Is there any problem with this test procedure and their conclusion?

(b) What errors could be involved in this hypothesis?

(4) The two students also want to test the hypothesis about the population

means. Student A claims that he needs to test the equality of σ_x^2 and σ_y^2

first. While student B said it is more appropriate to employ a paired difference test.

What's your opinion on their claims?(15%)

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二. According to the regression outcomes shown below, answer the following questions:

$$\hat{Y} = 56.36 + 0.036 X_1 - 0.508 X_2 - 0.088 X_3$$

$$(6.70) \quad (0.003) \quad (0.073) \quad (0.035)$$

$$R^2 = 0.641; \quad \text{Number of observations} = 80$$

Values in the parenthesis are standard errors.

- (1) What is the \bar{R}^2 of this regression? How is the fitness of this model, if it is a cross-sectional one?(15%)
- (2) What is the F-statistic corresponding to the hypothesis test: H_0 : all coefficients except the intercept = 0 v.s. H_a : at least one coefficient (other than the intercept) = 0? According to the above test statistic, how is the fitness of this model?(15%)
 $F_{0.025}(3, 60)=3.34$; $F_{0.025}(3, 120)=3.23$.
 $F_{0.025}(4, 60)=3.01$; $F_{0.025}(4, 120)=2.89$.
- (3) What is the significance of X_3 ? Write down its corresponding hypothesis test and make your conclusion.(15%)

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