

國立政治大學 114 學年度第 2 學期 小考 (1) 考試命題紙

考試科目：統計學 (二)

開課班別：統計學整合開課

命題教授：吳漢銘

考試日期：3/31(二)14:50-16:00

*准帶項目打「O」，否則打「×」

1. 需加發計算紙或答案紙請在試題內封袋備註。

本試題共2頁，印刷份數：67份

計算機	課本	筆記	字典	手機平板筆電
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2. 為環保節能減碳，試題一律採雙面印

刷，有特殊印製需求，請註記：**A** 卷

備註：注意事項要看!! (ch10~11.1)

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注意事項：

- (1) 在答題紙上填寫學號和姓名。請在答題紙右上角標明你使用的試卷編號：A (預設) 或 B。
- (2) 所有問題可用中文或英文作答 (無需考慮語法和拼寫)。
- (3) 請按題號順序作答。總分為 120 分。
- (4) 建議使用深色原子筆 (允許使用鉛筆)。禁用手機 3C 產品。可使用計算機 (無程式功能)。
- (5) 計算過程 (針對 IV 和 V 部分) 必須寫出 (計算至小數點後 4 位)。
- (6) 答題紙與試題卷須一併交回。
- (7) 作弊學生當次及日後考試試卷將不予批改，情節嚴重將報校處理。

(-) **宣誓詞** (0%): 複寫下列宣誓詞至答案卷的第一頁最上面。(不寫扣 10 分)

0. "本人姓名 恪遵各項考試規則，若如違反，願受校方最嚴厲處罰，謹誓。"

(I) **選擇題** (30%); select one correct answer.

1. (7%) In testing $H_0 : \mu_1 - \mu_2 = 0$ using a Z-test with known variances, which of the following would most directly increase the test statistic in magnitude (assuming sample means are fixed)? (A) Decreasing the standard error. (B) Increasing the population variances. (C) Decreasing the sample sizes. (D) Increasing the confidence level.
2. (7%) When σ_1 and σ_2 are unknown and assumed equal, what is the main purpose of using a pooled variance estimator? (A) To reduce bias in estimating the means. (B) To combine information from both samples to improve variance estimation. (C) To ensure independence between samples. (D) To guarantee a normal distribution.
3. (8%) Regarding inferences about the difference between two population means, the sampling design that uses a pooled sample variance in cases of equal population standard deviations is based on (A) paired samples. (B) pooled samples. (C) independent samples. (D) match samples.
4. (8%) Why is the chi-square distribution used in inference about a population variance? (A) Because it is symmetric and centered at zero. (B) Because it describes the distribution of standardized means. (C) Because it arises from the sum of squared normal variables. (D) Because it applies to any distribution.

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(II) 填空题 (Correct spelling should be used.) (20%, 5% each)

5. To make inferences about the difference between two population means when σ_1 and σ_2 are known, we require that both populations are normally distributed, or that the sample sizes are large enough that the _____ enables us to conclude that the sampling distributions of \bar{x}_1 and \bar{x}_2 can be approximated by a _____ distribution.
6. One piece of practical advice for making inferences about the difference between two population means when σ_1 and σ_2 are unknown is that larger sample sizes are recommended if the population distributions are highly _____ or contain _____.

(III) 简答题 (20%)(write down the statement (or definition), formula if any, interpretation)

7. What is the procedure for conducting a two-tailed hypothesis test for a population variance?

(IV) 計算題 (30%, 10% each)

8. **Credit Card Expenditures.** Bank of America's Consumer Spending Survey collected data on annual credit card charges in seven different categories of expenditures: transportation, groceries, dining out, household expenses, home furnishings, apparel, and entertainment. Using data from a sample of 42 credit card accounts, assume that each account was used to identify the annual credit card charges for groceries and the annual credit card charges for dining out. Using the difference data, the sample mean difference was $\bar{d} = \$850$, and the sample standard deviation was $s_d = \$1123$.

- (a). Formulate the H_0 and H_a to test for no difference between the population mean credit card charges for groceries and the population mean credit card charges for dining out.
- (b). Use a 0.05 level of significance. Can you conclude that the population means differ? ($t_{0.1,41} = 1.303$; $t_{0.05,41} = 1.683$, $t_{0.025,41} = 2.020$)
- (c). What is the point estimate of the difference between the population means? What is the 95% confidence interval estimate of the difference between the population means?

(V) 加分題 (20%)

9. Derive the $(1-\alpha)100\%$ confidence interval estimate of a population variance.

注意：1、考試求公平及公正，請同學務必自律，維護學校與學生之榮譽。

2、考試時不得有交談、窺視、夾帶、抄襲、傳遞、代考或其它作弊等舞弊行為，考畢務必交卷，不得攜卷出場，違者依考場規則議處。