

(本頁中文版如下一頁)

## National Chengchi University, 112-2 Academic Year Midterm Exam of Statistics (II), Bonus Test, R Programming

Department/Grade: \_\_\_\_\_ ID: \_\_\_\_\_ Name: \_\_\_\_\_

Subject: Statistics (II)

Date: 2024/04/18

This test consists of 5 major questions. (20% each, total score: 100%)

Time period: 15:00~16:00 (total 60 minutes)

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### Notes:

1. Download the R exam sheet ([112-2-Stat-R-Midterm.zip](#)) from the course website and unzip in your laptop. The zip file contain the question sheet, the answer sheet, and the datasets.
2. Answers for this exam should be provided using the R programming language (either Rgui or RStudio). Other programming languages are not permitted.
3. During the exam, you may refer to textbooks, lecture notes (including videos, Please bring your own headphones), or browse the internet. However, the use of communication software/APP such as Messenger, IG, Line, etc., is strictly prohibited.
4. Any form of cheating or suspicious behavior is not allowed.
5. On this answer sheet, please ensure you copy the "**executed code and its results (including graphics)**" from the **R Console** and paste it here (in Courier New font, size 10, black text on a white background). This should include both the code and the output, not just one or the other. Finally, **the answers for each sub-question should be highlight by yellow color (not just printing the report; the TA shouldn't have to search for the answers)**
6. Please label your answers in sequence, e.g., (1)a, (1)b, (2)a, etc.
7. After completing your answers, save this Word document with the filename "**StudentID-FamilyName-Midterm.docx**" (replace with your actual "**Student ID** and "**FamilyName**") and upload it to <http://ftp.hmwu.idv.tw:8080/login.html?lang=tchinese> .
8. Username: stat112, Password: (classroom number) 26xxxx, Folder: "20240418-MidtermExam".
9. If the upload site displays a "blank page", move your cursor to the "address bar" and press "Enter". If that doesn't work, try using a different browser (IE/Edge/Firefox/Chrome).
10. Uploaded files cannot be deleted. If you need to upload a revised file, please add "-2" to the main filename, e.g., "**StudentID-FamilyName-Midterm-2.docx**".

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Wishing you a successful exam

(English version on the previous page)  
國立政治大學 112 學年度第二學期  
統計學(二) 期中 R 程式加分考

系級: \_\_\_\_\_ 學號: \_\_\_\_\_ 姓名: \_\_\_\_\_

考試科目: 統計學(二)

考試日期: 2024/04/18

本試題共 5 大題 (各 20%)

考試時間: 15:00~16:00 (共 60 分鐘)

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**注意事項:**

1. 從教學網站下載電子考卷 (112-2-Stat-R-Midterm.zip)，並於自己的筆電解壓縮。壓縮檔包含題目卷、答案卷和資料集。
2. 本次考題以 R 程式(Rgui 或 RStudio)方式作答，其他程式不允許。
3. 考試過程中可查詢書本、教學講義或上網(含上課影片，請自備耳機)，禁止利用 messenger, IG, Line 等等通訊軟體。
4. 禁止疑似作弊行為。
5. 本答案卷上請務必於 **R Console** 內複製「執行後的程式碼及結果(含圖形)」，於本答案卷貼上(Courier New, 10 點字，白底黑字)，不是只有程式碼，不是只有報表。最後，將每小題之答案以黃色底高亮起來(不能只印出報表，要助教去找答案)。
6. 請依序註明題號: (1)a, (1)b, (2)a 等等。
7. 作答完請將此 word 檔存檔，檔名為「StudentID-FamilyName-Midterm.docx」(更改成自己「學號」、「姓」)並上傳至 <http://ftp.hmwu.idv.tw:8080/login.html?lang=tchinese>
8. 帳號: stat112，密碼: (上課教室號碼) 26xxxx，資料夾: 「20230418-MidtermExam」
9. 如果上傳網站出現「空白頁」，請將滑鼠移至「網址列」後，按「Enter」即可。若再不行，請換其它瀏覽器(IE/Edge/Firefox/Chrome)
10. 上傳檔案無法刪除，若要上傳更新檔，請於主檔名後加「-2」，例如: 「StudentID-FamilyName-Midterm-2.docx」。

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祝考試順利

(1)

**Data file: UsedCars**

**Used Car Prices.** According to the National Automobile Dealers Association, the mean price for used cars is \$10,192. A manager of a Kansas City used car dealership reviewed a sample of 50 recent used car sales at the dealership in an attempt to determine whether the population mean price for used cars at this particular dealership differed from the national mean. The prices for the sample of 50 cars are shown in the file *UsedCars*.

- a. Formulate the hypotheses that can be used to determine whether a difference exists in the mean price for used cars at the dealership.
- b. What is the  $p$ -value?
- c. At  $\alpha = .05$ , what is your conclusion?

(請直接印出  $p$  值或從報表中擷取出  $p$  值，而不是只有印出報表。)

(Please directly print the  $p$ -value or extract it from the report, rather than just printing the report.)

(2)

**Production Line Accuracy.** A production line operation is tested for filling weight accuracy using the following hypotheses.

**Hypothesis**

$$H_0: \mu = 16$$

$$H_a: \mu \neq 16$$

**Conclusion and Action**

Filling okay; keep running

Filling off standard; stop and adjust machine

The sample size is 30 and the population standard deviation is  $\sigma = .8$ . Use  $\alpha = .05$ .

- a. What is the probability of making a Type II error when the machine is overfilling by .5 ounces?
- b. What is the power of the statistical test when the machine is overfilling by .5 ounces?

**(3) Data file: LateFlights**

**Comparing Length of Flight Delays.** The success of an airline depends heavily on its ability to provide a pleasant customer experience. One dimension of customer service on which airlines compete is on-time arrival. The file *LateFlights* contains a sample of data from delayed flights showing the number of minutes each delayed flight was late for two different airlines, Delta and Southwest.

- a. Formulate the hypotheses that can be used to test for a difference between the population mean minutes late for delayed flights by these two airlines.
- b. What is the sample mean number of minutes late for delayed flights for each of these two airlines?
- c. Using a .05 level of significance, what is the  $p$ -value and what is your conclusion?

(請直接印出  $p$  值或從報表中擷取出  $p$  值，而不是只有印出報表。)

(Please directly print the  $p$ -value or extract it from the report, rather than just printing the report.)

**(4)**

**Price Comparison of Smoothie Blenders.** A personal fitness company produces both a deluxe and a standard model of a smoothie blender for home use. Selling prices obtained from a sample of retail outlets follow.

Retail Outlet	Model Price (\$)		Retail Outlet	Model Price (\$)	
	Deluxe	Standard		Deluxe	Standard
1	39	27	5	40	30
2	39	28	6	39	34
3	45	35	7	35	29
4	38	30			

- The manufacturer's suggested retail prices for the two models show a \$10 price differential. Use a .05 level of significance and test that the mean difference between the prices of the two models is \$10.
- What is the 95% confidence interval for the difference between the mean prices of the two models?

(5)

**Data file: Bags**

**Bag-Filling Machines at Jelly Belly.** The variance in a production process is an important measure of the quality of the process. A large variance often signals an opportunity for improvement in the process by finding ways to reduce the process variance. Jelly Belly Candy Company is testing two machines that use different technologies to fill three pound bags of jelly beans. The file *Bags* contains a sample of data on the weights of bags (in pounds) filled by each machine. Conduct a statistical test to determine whether there is a significant difference between the variances in the bag weights for two machines. Use a .05 level of significance. What is your conclusion? Which machine, if either, provides the greater opportunity for quality improvements?