

(本頁中文版如下一頁)

National Chengchi University, 113-2 Academic Year Final Exam of Statistics (II), Bonus Test, R Programming

Department/Grade: _____ ID: _____ Name: _____

Subject: Statistics (II)

Date: 2025/06/19

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

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

Notes:

1. Download the R exam sheet (**113-2-Stat-R-Final.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-Final.docx**" (replace with your actual "**Student ID** and **FamilyName**") and upload it to <http://hmwu.nccu.edu.tw/login.html>.
8. Username: stat113, Password: (classroom number) 26xxxx, Folder: "20250619-FinalExam".
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-Final-2.docx**".

Wishing you a successful exam

(English version on the previous page)
國立政治大學 113 學年度第二學期
統計學(二) 期末 R 程式加分考

系級:_____ 學號:_____ 姓名:_____

考試科目: 統計學(二)

考試日期: 2025/06/19

本試題共 5 大題 (各 20%)

考試時間: 15:00~16:00 (共 60 分鐘)

注意事項:

1. 從教學網站下載電子考卷 (113-2-Stat-R-Final.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-Final.docx**」(更改成自己「學號」、「姓」)並上傳至 <http://hmwu.nccu.edu.tw/login.html>
8. 帳號: stat113，密碼: (上課教室號碼) 26xxxx，資料夾: 「**20250619-FinalExam**」
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-Final-2.docx**」。

_____ 祝考試順利 _____

(1)

Data file: Demand

Weekly Demand at Whole Foods Market. The manager at a Whole Foods Market is responsible for managing store inventory. The mathematical models that she uses to determine how much inventory to stock rely on product demand being normally distributed. In particular, the weekly demand of sriracha chili kale chips at a Whole Foods Market store is believed to be normally distributed. Use a goodness of fit test and the following data to test this assumption. Use $\alpha = .10$.

18	20	22	27	22
25	22	27	25	24
26	23	20	24	26
27	25	19	21	25
26	25	31	29	25
25	28	26	28	24

(2)

Data file: BrokerRatings

Broker Satisfaction. The American Association of Individual Investors (AAII) On-Line Discount Broker Survey polls members on their experiences with discount brokers. As part of the survey, members were asked to rate the quality of the speed of execution with their broker as well as provide an overall satisfaction rating for electronic trades. Possible responses (scores) were no opinion (0), unsatisfied (1), somewhat satisfied (2), satisfied (3), and very satisfied (4). For each broker summary scores were computed by calculating a weighted average of the scores provided by each respondent. A portion of the survey results follow (AAII website).

Brokerage	Speed	Satisfaction
Scottrade, Inc.	3.4	3.5
Charles Schwab	3.3	3.4
Fidelity Brokerage Services	3.4	3.9
TD Ameritrade	3.6	3.7
E*Trade Financial	3.2	2.9
Vanguard Brokerage Services	3.8	2.8
USAA Brokerage Services	3.8	3.6
Thinkorswim	2.6	2.6
Wells Fargo Investments	2.7	2.3
Interactive Brokers	4.0	4.0
Zecco.com	2.5	2.5

- Develop a scatter diagram for these data with the speed of execution as the independent variable.
- What does the scatter diagram developed in part (a) indicate about the relationship between the two variables?
- Develop the least squares estimated regression equation.
- At the .05 level of significance, test whether speed of execution and overall satisfaction are related.
- Show the ANOVA table. What is your conclusion?

(3)

Data file: RentMortgage

Buy Versus Rent. Occasionally, it has been the case that home prices and mortgage rates dropped so low that in a number of cities the monthly cost of owning a home was less expensive than renting. The following data show the average asking rent for 10 markets and the monthly mortgage on the median priced home (including taxes and insurance) for 10 cities where the average monthly mortgage payment was less than the average asking rent (*The Wall Street Journal*).

City	Rent (\$)	Mortgage (\$)
Atlanta	840	539
Chicago	1062	1002
Detroit	823	626
Jacksonville, Fla.	779	711
Las Vegas	796	655
Miami	1071	977
Minneapolis	953	776
Orlando, Fla.	851	695
Phoenix	762	651
St. Louis	723	654

Source: The Wall Street Journal, (wsj.com)

- Develop the estimated regression equation that can be used to predict the monthly mortgage given the average asking rent.
- Construct a residual plot against the independent variable.
- Do the assumptions about the error term and model form seem reasonable in light of the residual plot?

(4)	<p>Building Contracts. The values of Alabama building contracts (in \$ millions) for a 12-month period follow.</p> <p>240 350 230 260 280 320 220 310 240 310 240 230</p> <p>a. Construct a time series plot. What type of pattern exists in the data?</p> <p>b. Compare the three-month moving average approach with the exponential smoothing forecast using $\alpha = .2$. Which provides more accurate forecasts based on MSE?</p> <p>c. What is the forecast for the next month?</p>
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(5)

Data file: Textbooks

Textbook Sales. The quarterly sales data (number of copies sold) for a college textbook over the past three years follow.

Quarter	Year 1	Year 2	Year 3
1	1690	1800	1850
2	940	900	1100
3	2625	2900	2930
4	2500	2360	2615

- Construct a time series plot. What type of pattern exists in the data?
- Use the following dummy variables to develop an estimated regression equation to account for any seasonal effects in the data: Qtr1 = 1 if Quarter 1, 0 otherwise; Qtr2 = 1 if Quarter 2, 0 otherwise; Qtr3 = 1 if Quarter 3, 0 otherwise.
- Compute the quarterly forecasts for next year.
- Let $t = 1$ to refer to the observation in quarter 1 of year 1; $t = 2$ to refer to the observation in quarter 2 of year 1; . . . and $t = 12$ to refer to the observation in quarter 4 of year 3. Using the dummy variables defined in part (b) and t , develop an estimated regression equation to account for seasonal effects and any linear trend in the time series. Based upon the seasonal effects in the data and linear trend, compute the quarterly forecasts for next year.