

(本頁中文版如下一頁)

## National Chengchi University, 112-1 Academic Year Midterm Exam of Statistics (I), Bonus Test, R Programming

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

Subject: Statistics (I)

Date: 2023/11/09

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 (112-1-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: "20231109-Midterm".
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

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(English version on the previous page)  
國立政治大學 112 學年度第一學期  
統計學(一) 期中 R 程式加分考

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

考試科目: 統計學(一)

考試日期: 2023/11/09

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 (112-1-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: 「20231109-Midterm」
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

## How to Upload the Answer Sheet?

**Step 1:** Check the file name is correct: StudentID-FamilyName-Midterm.docx.  
(Example: 110101069-Tsai-Midterm.docx)

**Step 2:** Go to the upload site: <http://ftp.hmwu.idv.tw:8080/login.html?lang=tchinese>



**Step 3:** Type in the login name and password.

A screenshot of a login form. At the top, it displays the user's name Han-Ming Wu, the URL http://www.hmwu.idv.tw, and the department name 國立政治大學統計學系. The page title is 【作業考試上傳區】. The form contains a username field with the text 'stat112', a password field with masked characters, a language dropdown menu set to '繁體中文', a checkbox for '記住此帳號', and a '下載 App' button. A large blue button labeled '登入' is at the bottom. The footer text reads 'Wing FTP Server ©2003-2022 wftpserver.com All Rights Reserved'.

**Step 4:** Click to enter the correct folder before uploading.

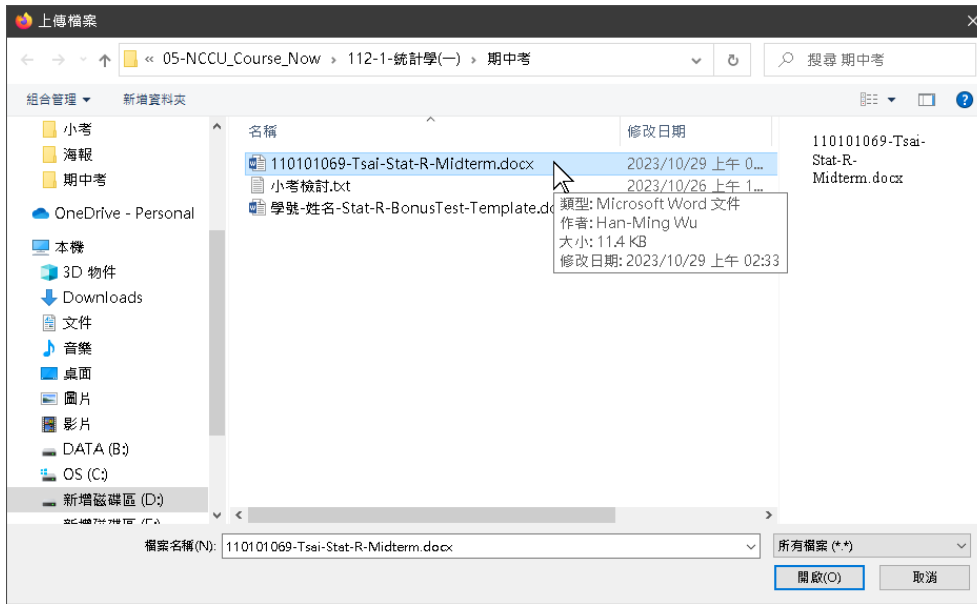


**Step 5:** Click the upload file button.



**Step 6:** Select your answer sheet file.





**Step 7:** Close the select file window.



**Step 8:** Ensure the uploaded file is correct and then log out.



## How to Write the Answer Sheet?

(1)

**Data file: NCAA**

**NCAA Basketball Game Scores.** A sample of 10 NCAA college basketball game scores provided the following data.

Winning Team	Points	Losing Team	Points	Winning Margin
Arizona	90	Oregon	66	24
Duke	85	Georgetown	66	19
Florida State	75	Wake Forest	70	5
Kansas	78	Colorado	57	21
Kentucky	71	Notre Dame	63	8
Louisville	65	Tennessee	62	3
Oklahoma State	72	Texas	66	6
Purdue	76	Michigan State	70	6
Stanford	77	Southern Cal	67	10
Wisconsin	76	Illinois	56	20

- Compute the mean and standard deviation for the points scored by the winning teams.
- Assume that the points scored by the winning teams for all NCAA games follow a bell-shaped distribution. Using the mean and standard deviation found in part (a), estimate the percentage of all NCAA games in which the winning team scores 84 or more points. Estimate the percentage of NCAA games in which the winning team scores more than 90 points.
- Compute the mean and standard deviation for the winning margin. Do the data contain outliers? Explain.

```

> # 1(a)
> library(readxl)
> NCAA <- read_excel("data/NCAA.xlsx")
> head(NCAA)
# A tibble: 6 × 5
  WinningTeam PointsW LosingTeam PointsL WinningMargin
  <chr>         <dbl> <chr>         <dbl>         <dbl>
1 Arizona      90 Oregon        66            24
2 Duke         85 Georgetown    66            19
3 Florida State 75 Wake Forrest 70             5
4 Kansas       78 Colorado     57            21
5 Kentucky     71 Notre Dame   63             8
6 Louisville   65 Tennessee   62             3
> mean(NCAA$PointsW)
[1] 76.5
> sd(NCAA$PointsW)
[1] 7.011895
>
> # 1(b)
> xbar <- mean(NCAA$PointsW)
> s <- sd(NCAA$PointsW)
> z <- (84 - xbar) / s
> z # about one-sd
[1] 1.069611
> cat("The percentage of all NCAA games in which the winning team scores 84 or more
points is: ", (100 - 68)/2, "%.")
The percentage of all NCAA games in which the winning team scores 84 or more points
is: 16 %.
> z <- (90 - xbar) / s
> z # about two-sd
[1] 1.9253
> cat("The percentage of NCAA games in which the winning team
+ scores more than 90 points: ", (100 - 95)/2, "%.")
The percentage of NCAA games in which the winning team
scores more than 90 points: 2.5 %.
>
> # 1(c)
> xbar_wm <- mean(NCAA$WinningMargin )
> xbar_wm
[1] 12.2
> s_wm <- sd(NCAA$WinningMargin)
> s_wm
[1] 7.885289
>
> Detect_Outlier <- function(x){
+   Q1 <- quantile(x, type = 6, probs = 0.25)
+   Q3 <- quantile(x, type = 6, probs = 0.75)
+   IQR.x <- IQR(x, type = 6)
+   Lower.Limit <- Q1 - 1.5 * IQR.x
+   Upper.Limit <- Q3 + 1.5 * IQR.x
+   ifelse(x < Lower.Limit | x > Upper.Limit, "Outlier", "Not")
+ }
> Detect_Outlier(NCAA$WinningMargin)
[1] "Not" "Not" "Not" "Not" "Not" "Not" "Not" "Not" "Not"
> cat("The data did not contain outliers.")
The data did not contain outliers.

```