

# R資料分析 報告文件製作: R Markdown

吳漢銘

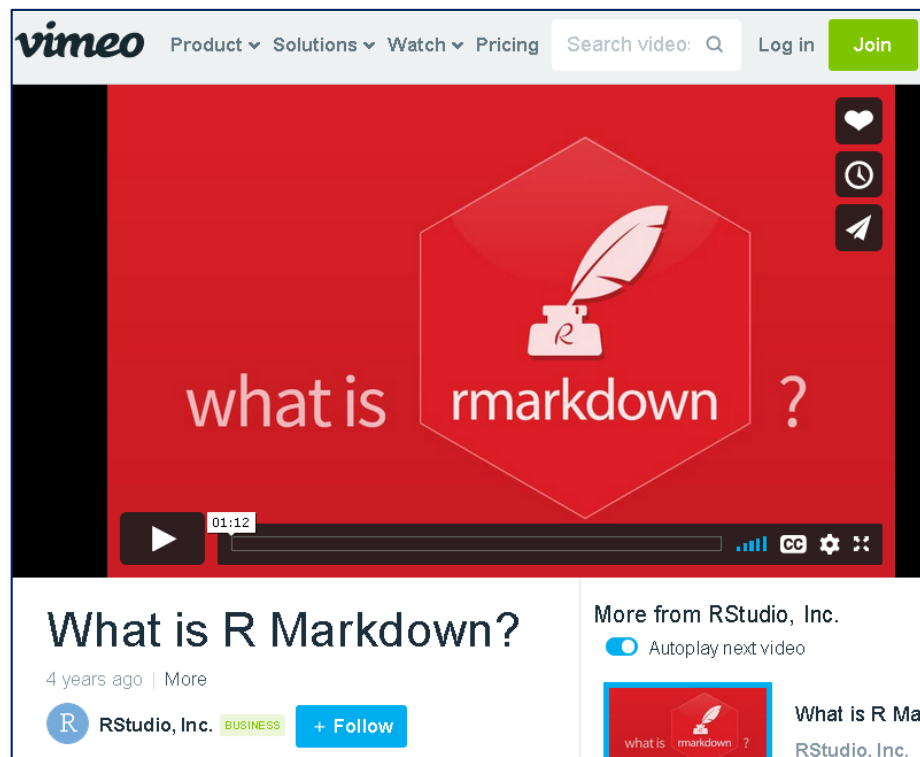
國立政治大學 統計學系



<http://www.hmwu.idv.tw>

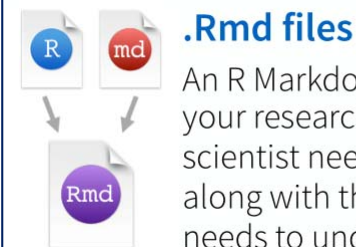


- R Markdown provides an authoring framework for data science. You can use a single R Markdown file to both
  - save and execute code
  - generate high quality reports that can be shared with an audience
- R Markdown documents are fully reproducible and support dozens of static and dynamic output formats.



## What is R Markdown?

<https://vimeo.com/178485416>



An R Markdown (.Rmd) file is a record of your research. It contains the code that a scientist needs to reproduce your work along with the narration that a reader needs to understand your work.

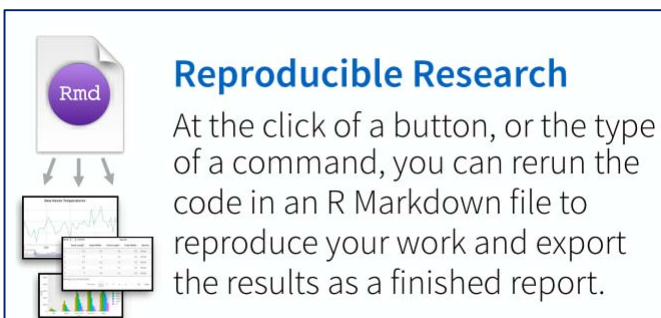
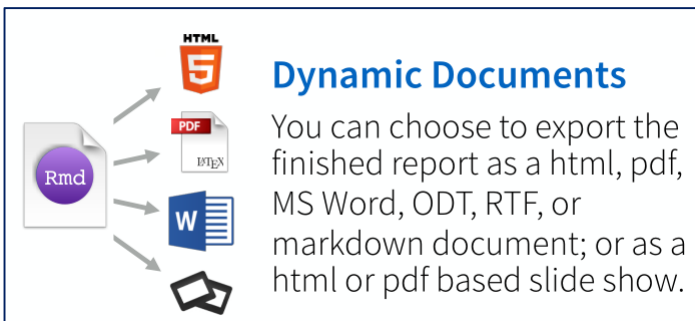
可以在 .Rmd 純文字檔案中同時寫程式與撰寫說明內容，不需要另外將程式碼、輸出與圖形另外複製貼上或匯出至文書編輯軟體中。

# Gallery: outputs and formats you can create using R Markdown

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- Documents (e.g., HTML, PDF, Word, Handouts)
- Interactive Documents (e.g., HTML Widgets, Shiny).
- Dashboards (e.g., Dashboard with gauges and value boxes · htmlwidgets · storyboard).
- Presentations (e.g., Beamer, Slidy, ioslides, reveal.js).
- Books (e.g., R for Data Science, Efficient R Programming).
- Websites (e.g., R Markdown, flexDashboard, bookdown, profvis).
- Templates (e.g., JSS, R Journal, Skeleton, CV).
- Package Vignettes (e.g., httr, rvest).

<https://rmarkdown.rstudio.com/gallery.html>



R Markdown from RStudio

Get Started Gallery Formats Articles

## Gallery

Check out the range of outputs and formats you can create using R Markdown.

### Documents

With R Markdown, you write a single .Rmd file and then use it to render finished output in a variety of formats.

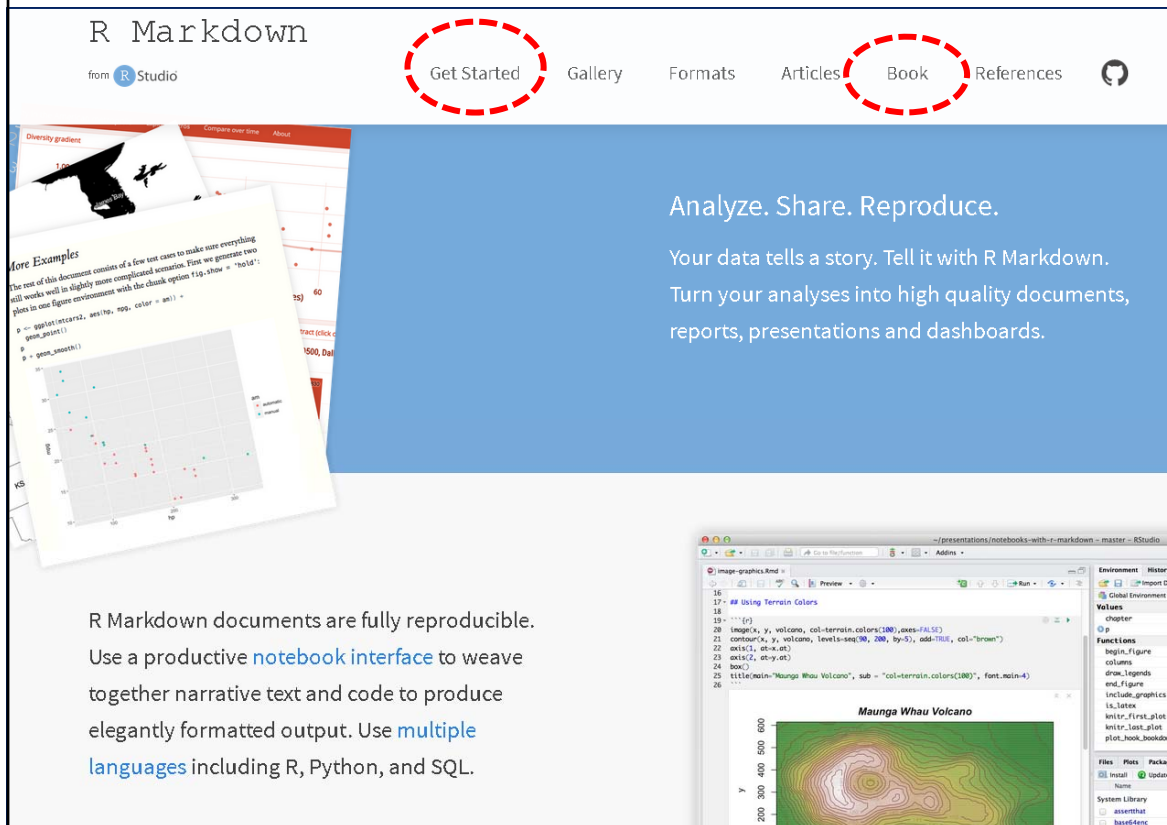
- HTML**  
HTML documents for web publishing.
- PDF**  
PDF documents for printing. Example Code
- Microsoft Word**  
Microsoft Word documents for Office workflows.
- Handouts**  
Tufte styled documents for handouts. Example Code

### Interactive Documents

Combine R Markdown with htmlwidgets or the shiny package to make interactive documents.

- HTML Widgets**  
Add interactive graphics with htmlwidgets, such as
- HTML Widgets**  
Embed htmlwidgets such as d3graphs and
- Shiny**  
Add interactive analysis with shiny, which lets
- Shiny**  
Shiny components and htmlwidgets will work

<https://rmarkdown.rstudio.com/>



R Markdown documents are fully reproducible. Use a productive [notebook interface](#) to weave together narrative text and code to produce elegantly formatted output. Use [multiple languages](#) including R, Python, and SQL.

Introduction

How It Works

Code Chunks

Inline Code

Code Languages

Parameters

Tables

Markdown Basics

Output Formats

Notebooks

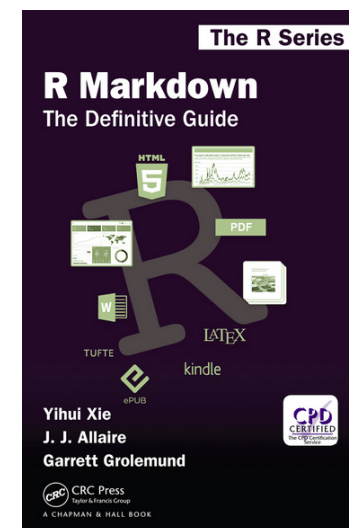
Slide Presentations

Dashboards

Websites

Interactive Documents

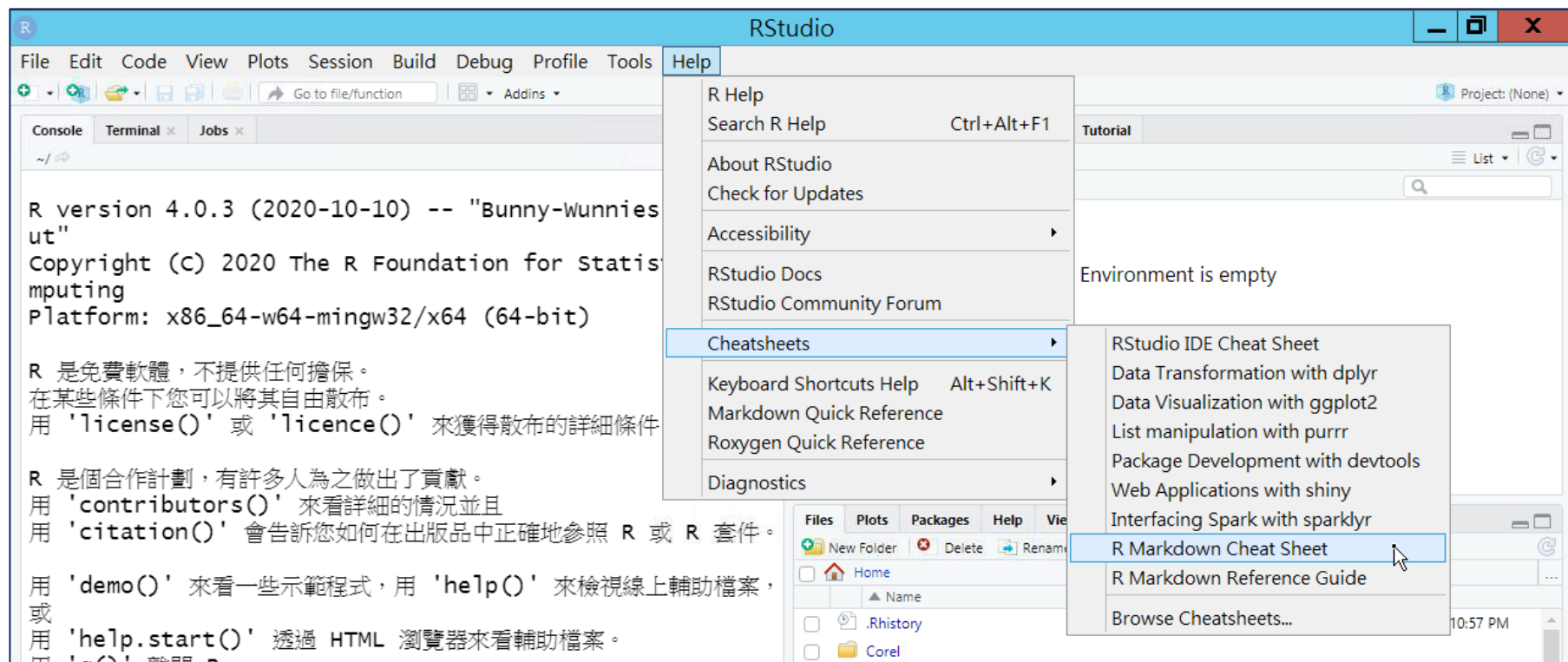
Cheatsheets





# Cheatsheet, Reference Guide

- The R Markdown Cheatsheet  
<https://rstudio.com/wp-content/uploads/2016/03/rmarkdown-cheatsheet-2.0.pdf>
- The R Markdown Reference Guide  
<https://www.rstudio.com/wp-content/uploads/2015/03/rmarkdown-reference.pdf>



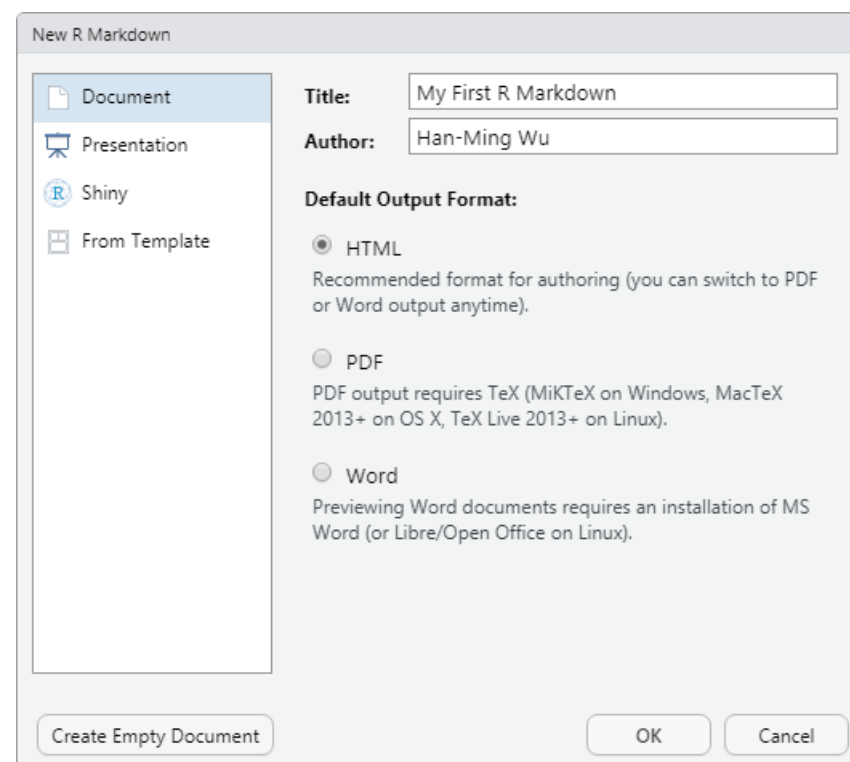


## ■ 必要

- The R Project for Statistical Computing: (檔名: R-4.0.3-win.exe)  
<https://www.r-project.org>
- RStudio Desktop (Open Source Edition) (檔名RStudio-1.3.1093.exe)  
<https://rstudio.com/products/rstudio/download>

## ■ 選要(Windows):

- MikTeX (檔名: basic-miktex-20.12-x64.exe)  
<https://miktex.org>





## How it works



- R Markdown generates a new file that contains selected text, code, and results from the .Rmd file.
- knitr: Elegant, flexible, and fast dynamic report generation with R  
<https://yihui.org/knitr/>
- Pandoc: a universal document converter  
<https://pandoc.org/>
- The new file can be a finished web page, PDF, MS Word document, slide show, notebook, handout, book, dashboard, package vignette or other format.



# Workflow Using RStudio

## R Markdown : : CHEAT SHEET

**1** Open a new .Rmd file at File ► New File ► R Markdown. Use the wizard that opens to pre-populate the file with a template

**2** Write document by editing template

**3** Knit document to create report; use knit button or render() to knit

**4** Preview Output in IDE window

**5** Publish (optional) to web server

**6** Examine build log in R Markdown console

**7** Use output file that is saved along side .Rmd

Annotations in the IDE:

- 1: RStudio logo
- 2: output: html\_document: toc: TRUE
- 3: Knit HTML button
- 4: Run button
- 5: Publish button
- 6: Run all previous chunks button
- 7: Run current chunk button
- 8: Modify chunk options button
- 9: Show outline button
- 10: Insert code chunk button
- 11: Go to code chunk button
- 12: Run code chunk(s) button
- 13: Set preview location button

Preview of the rendered HTML document:

### R Markdown

RStudio

- R Markdown

### R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents.

```
summary(cars)
```

	speed	dist
## Min. :	4.0	Min. : 2.00
## 1st Qu.:	12.0	1st Qu.: 26.00
## Median :	15.0	Median : 36.00
## Mean :	15.4	Mean : 42.98
## 3rd Qu.:	19.0	3rd Qu.: 56.00
## Max. :	25.0	Max. : 120.00

For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

File explorer showing output files:

File	Size	Date
report.Rmd	398 B	Feb 26, 2016, 3:36 PM
report.html	581.3 KB	Feb 26, 2016, 3:36 PM

<https://raw.githubusercontent.com/rstudio/cheatsheets/master/rmarkdown-2.0.pdf>

<http://www.hmwu.idv.tw>

# 範例：新增R Markdown文件

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The screenshot shows the RStudio interface with the 'File' menu open. The 'New File' option is selected, and the 'R Markdown...' option is highlighted. A 'New R Markdown' dialog box is open, showing the 'Document' template selected. The 'Title' field is 'My First R Markdown' and the 'Author' field is 'Han-Ming Wu'. The 'Default Output Format' is set to 'HTML'. A 'Install Required Packages' dialog box is also open, asking to install 'knitr' and 'rmarkdown'.

install.packages(c("knitr", "rmarkdown"))

# 直接編譯(knit)範例Rmd檔

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The screenshot shows the RStudio interface with the 'myRMD - RStudio' window. The 'Knit' menu is open, showing options like 'Knit to HTML', 'Knit to PDF', 'Knit to Word', 'Knit with Parameters...', 'Knit Directory', and 'Clear Knitr Cache...'. A red circle highlights the 'main.Rmd' file in the file explorer. Below the menu, a code chunk is visible with the following content:

```
1 ---
2 title: "My First R Markdown"
3 author: "Han-Ming Wu"
4 date: "2021/1/7"
5 output: html_document
6 ---
```

The main editor shows R Markdown content, including a code chunk for plotting the 'pressure' dataset with the parameter 'echo=FALSE'.

The screenshot shows the RStudio console output after running the Knit command. The output includes the following text:

```
9%
label: setup (with options)
List of 1
 $ include: logi FALSE

|.....| 4
3%
ordinary text without R code

|.....| 5
7%
label: cars
|.....| 7
1%
ordinary text without R code

|.....| 8
6%
label: pressure (with options)
List of 1
 $ echo: logi FALSE

|.....| 10
0%
ordinary text without R code

output file: main.knit.md

"C:/Program Files/RStudio/bin/pandoc/pandoc" +RTS -K512m -RTS main.utf8.md --to
html4 --from markdown+autolink_bare_uris+tex_math_single_backslash --output
main.html --lua-filter "C:\Users\hmmu\Documents\R\win-library\4.0\rmarkdown\r
markdown\lua\pagebreak.lua" --lua-filter "C:\Users\hmmu\Documents\R\win-librar
y\4.0\rmarkdown\rmarkdown\lua\latex-div.lua" --self-contained --standalone --s
ection-divs --template "C:\Users\hmmu\Documents\R\win-library\4.0\rmarkdown\rm
d\h\default.html" --no-highlight --variable highlightjs=1 --variable "theme:bo
otstrap" --include-in-header "C:\Users\hmmu\AppData\Local\Temp\1\RtmpyG0cCP\rm
arkdown-str21b8343590e.html" --mathjax --variable "mathjax-url:https://mathja
x.rstudio.com/latest/MathJax.js?config=TeX-AMS-MML_HTMLorMML"

Output created: main.html
```

```
library(rmarkdown)
render("main.Rmd")
```



# 如果順利的話，可以看到產生的文件

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~/myRMD/main.html

main.html | Open in Browser | Find | Publish

## My First R Markdown

Han-Ming Wu  
2021/1/7

### R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

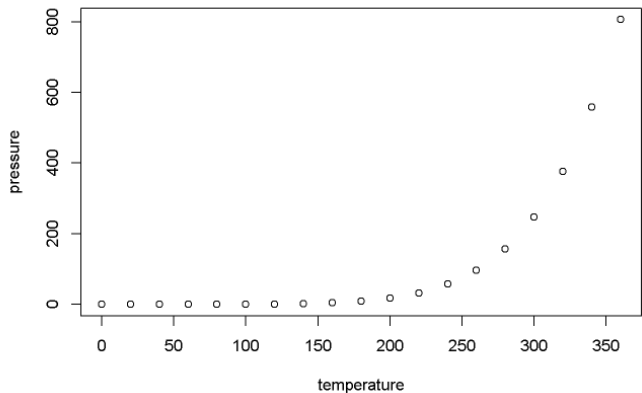
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed      dist  
##  Min.   : 4.0    Min.   :  2.00  
##  1st Qu.:12.0    1st Qu.: 26.00  
##  Median :15.0    Median : 36.00  
##   Mean :15.4     Mean : 42.98  
##  3rd Qu.:19.0    3rd Qu.: 56.00  
##   Max. :25.0     Max. :120.00
```

### Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

myRMD

檔案 常用 共用 檢視

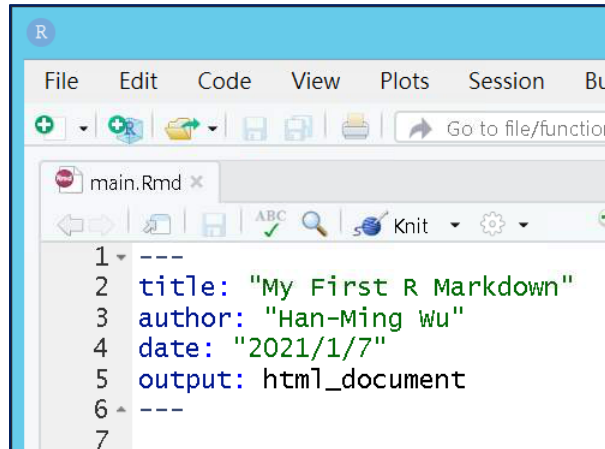
System (C:) > 使用者 > hmwu > 我的文件 > myRMD

名稱	修改日期	類型	大小
.Rproj.user	2021/1/6 下午 11...	檔案資料夾	
main.html	2021/1/7 上午 12...	Chrome HTML D...	628 KB
main.Rmd	2021/1/7 上午 12...	RMD 檔案	1 KB
myRMD.Rproj	2021/1/6 下午 11...	R Project	1 KB

4 個項目

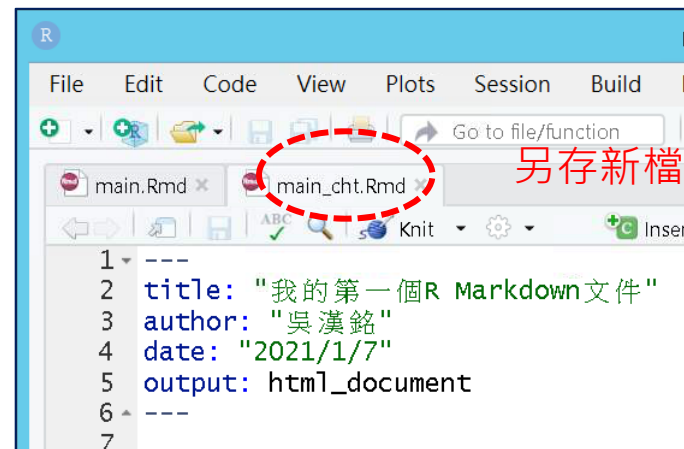
# 改成中文試試看! (html)

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The RStudio interface shows the 'main.Rmd' file. The code is as follows:

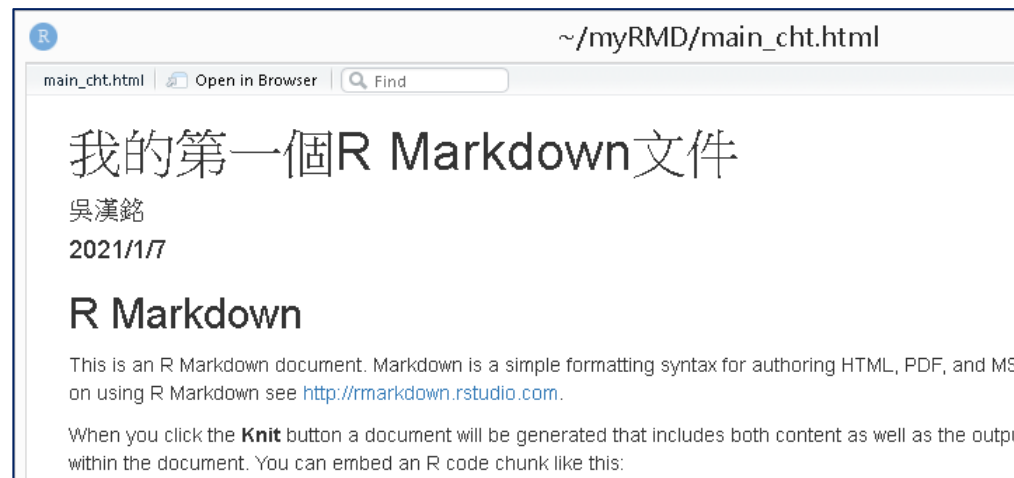
```
1 ---
2 title: "My First R Markdown"
3 author: "Han-Ming Wu"
4 date: "2021/1/7"
5 output: html_document
6 ---
7
```



The RStudio interface shows the 'main\_cht.Rmd' file. The code is as follows:

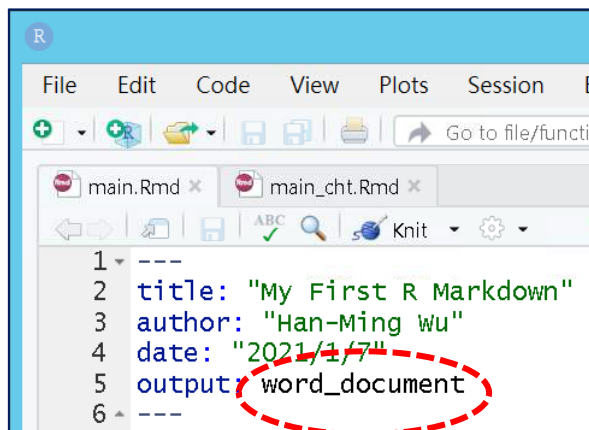
```
1 ---
2 title: "我的第一個R Markdown文件"
3 author: "吳漢銘"
4 date: "2021/1/7"
5 output: html_document
6 ---
7
```

另存新檔: main\_cht.Rmd

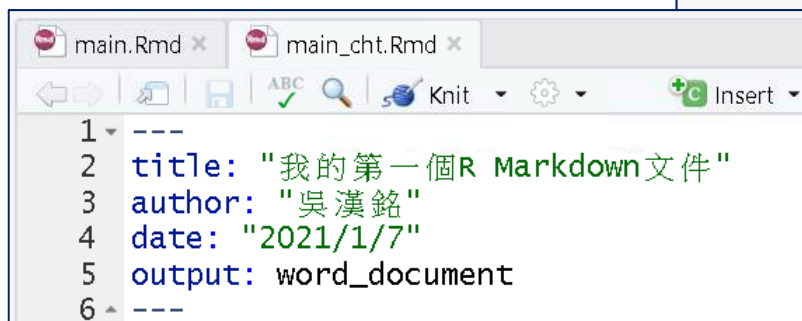


# 產生Word文件(英文、中文)

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```
1 ---
2 title: "My First R Markdown"
3 author: "Han-Ming Wu"
4 date: "2021/1/7"
5 output: word_document
6 ---
```

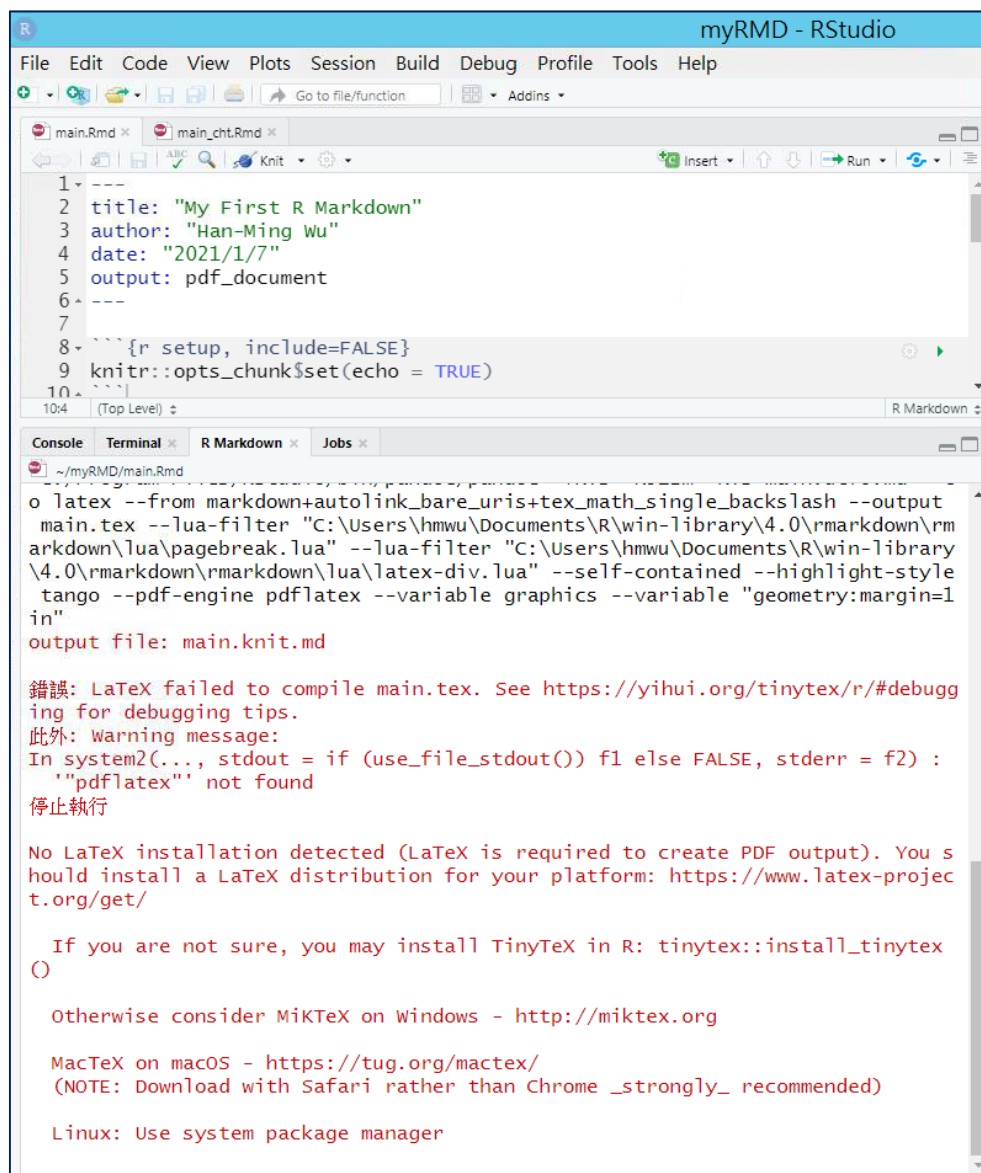


```
1 ---
2 title: "我的第一個R Markdown文件"
3 author: "吳漢銘"
4 date: "2021/1/7"
5 output: word_document
6 ---
```

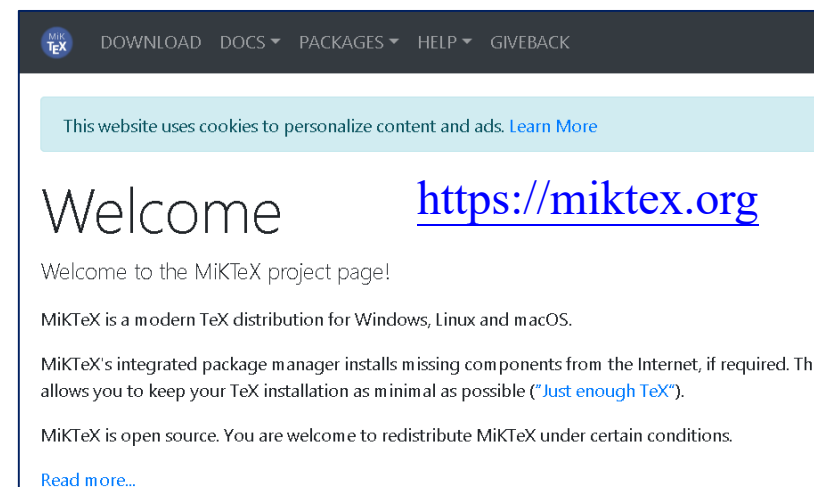


# 產生PDF文件(英文)

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```
1 ---
2 title: "My First R Markdown"
3 author: "Han-Ming Wu"
4 date: "2021/1/7"
5 output: pdf_document
6 ---
7
8 {r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10
11
12 o latex --from markdown+autolink_bare_uris+tex_math_single_backslash --output
main.tex --lua-filter "C:\Users\hmmwu\Documents\R\win-library\4.0\rmarkdown\r
arkdown\lua\pagebreak.lua" --lua-filter "C:\Users\hmmwu\Documents\R\win-library
\4.0\rmarkdown\rmarkdown\lua\latex-div.lua" --self-contained --highlight-style
tango --pdf-engine pdflatex --variable graphics --variable "geometry:margin=1
in"
output file: main.knit.md
錯誤: LaTeX failed to compile main.tex. See https://yihui.org/tinytex/r/#debugg
ing for debugging tips.
此外: Warning message:
In system2(..., stdout = if (use_file_stdout()) f1 else FALSE, stderr = f2) :
  "pdflatex" not found
停止執行
No LaTeX installation detected (LaTeX is required to create PDF output). You s
hould install a LaTeX distribution for your platform: https://www.latex-projec
t.org/get/
If you are not sure, you may install TinyTeX in R: tinytex::install_tinytex
()
Otherwise consider MiKTeX on Windows - http://miktex.org
MacTeX on macOS - https://tug.org/mactex/
(NOTE: Download with Safari rather than Chrome _strongly_ recommended)
Linux: Use system package manager
```



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## Welcome <https://miktex.org>

Welcome to the MiKTeX project page!

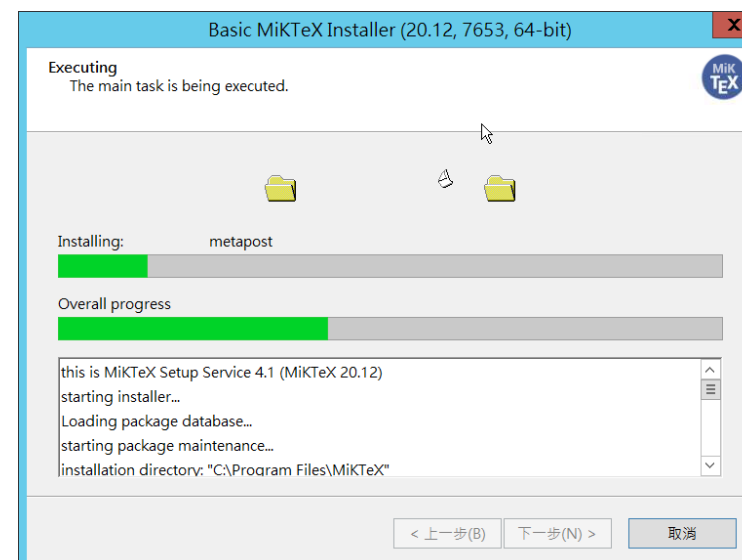
MiKTeX is a modern TeX distribution for Windows, Linux and macOS.

MiKTeX's integrated package manager installs missing components from the Internet, if required. This allows you to keep your TeX installation as minimal as possible ("Just enough TeX").

MiKTeX is open source. You are welcome to redistribute MiKTeX under certain conditions.

[Read more...](#)

(檔名: basic-miktex-20.12-x64.exe)





# 編譯一定不會順利~

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關掉RStudio => 重新開啟 => knit

```
Console Terminal R Markdown Jobs
~/myRMD/main.Rmd

|.....| 100%
ordinary text without R code

"C:/Program Files/RStudio/bin/pandoc/pandoc" +RTS -K512m -RTS main.utf8.md --to latex --from ma
rkdown+autolink_bare_uris+tex_math_single_backslash --output main.tex --lua-filter "C:\Users\hm
wu\Documents\R\win-library\4.0\rmarkdown\rmarkdown\lua\pagebreak.lua" --lua-filter "C:\Users\hm
wu\Documents\R\win-library\4.0\rmarkdown\rmarkdown\lua\latex-div.lua" --self-contained --highli
ght-style tango --pdf-engine pdflatex --variable graphics --variable "geometry:margin=1in"
output file: main.knit.md

! Sorry, but C:\PROGRA~1\MiKTeX\miktex\bin\x64\pdflatex.exe did not succeed.

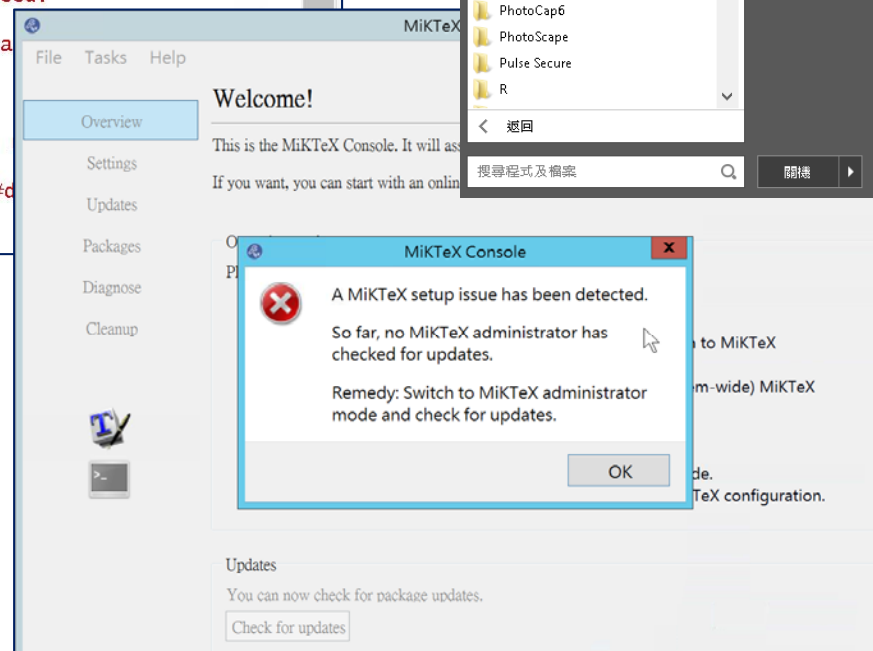
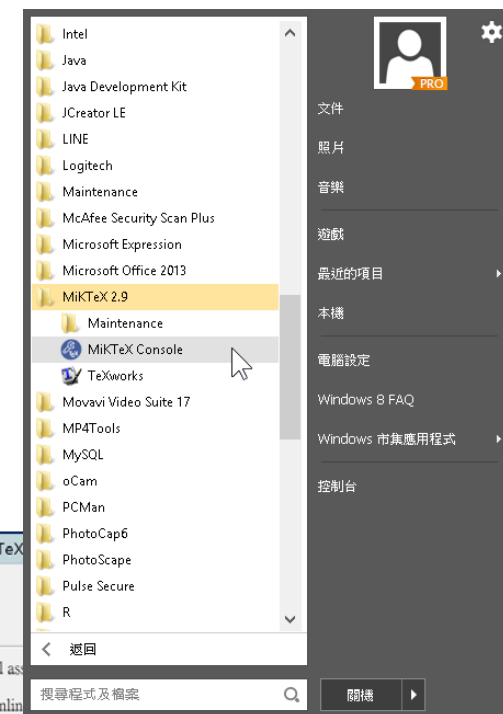
! The log file hopefully contains the information to get MiKTeX going aga

! C:\Users\hmwu\AppData\Local\MiKTeX\miktex\log\pdflatex.log

! pdflatex: major issue: So far, no MiKTeX administrator has checked for

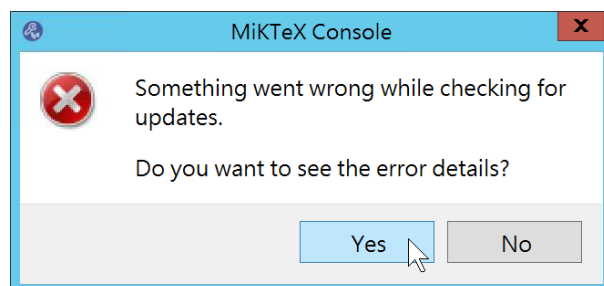
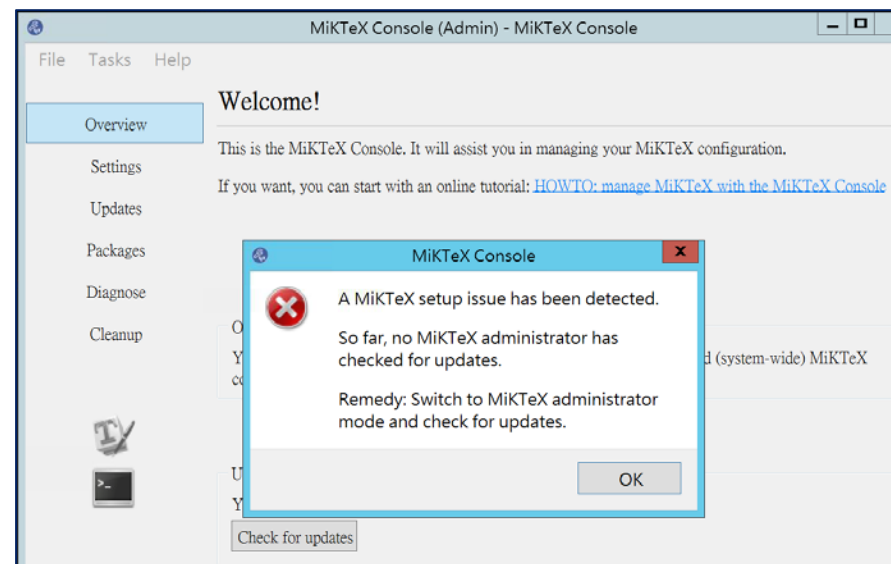
錯誤: LaTeX failed to compile main.tex. See https://yihui.org/tinytex/r/#
tips. See main.log for more info.
停止執行
```

開啟MiKTeX Console  
進行更新和設定



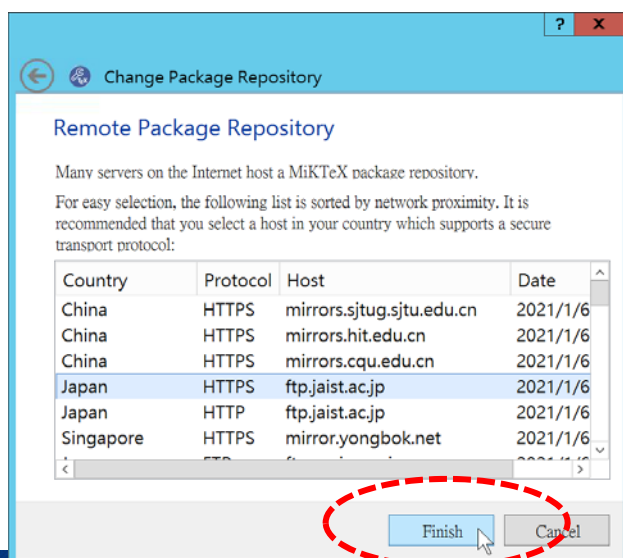
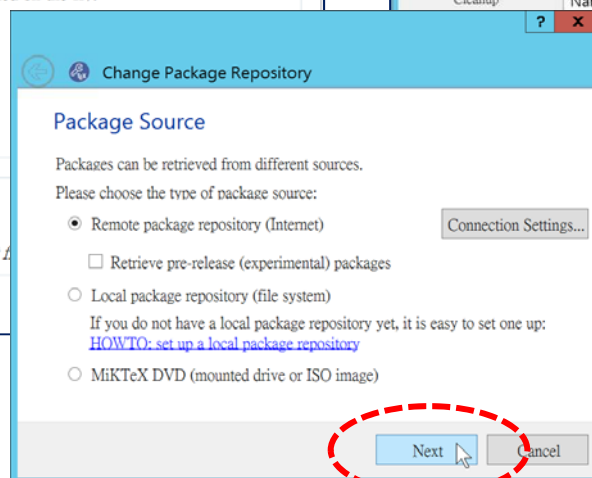
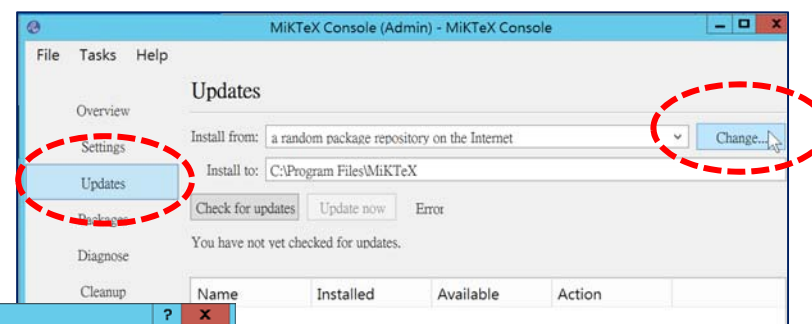
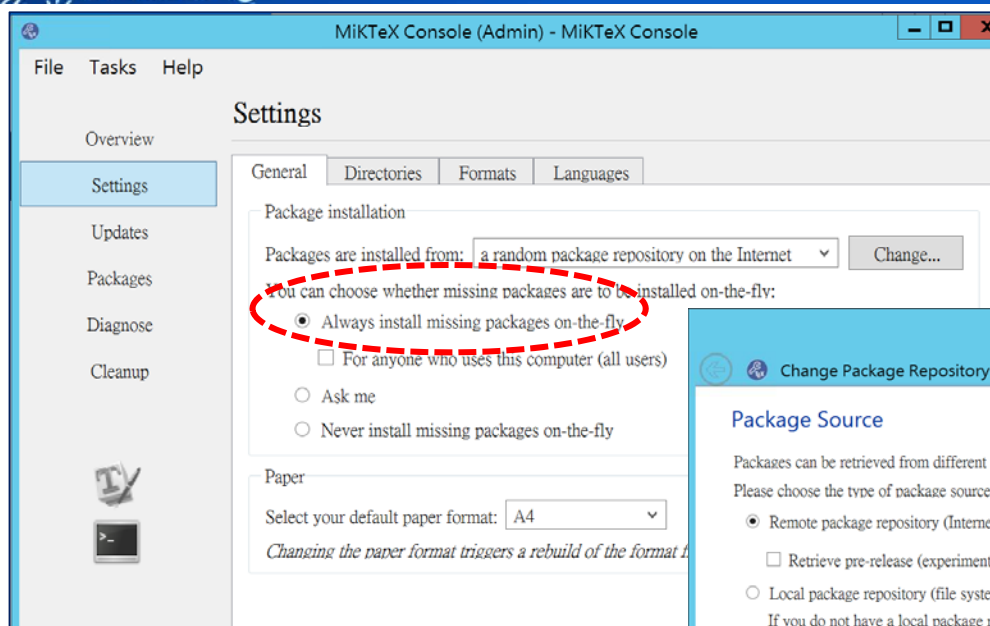
# MikTeX 更新和設定

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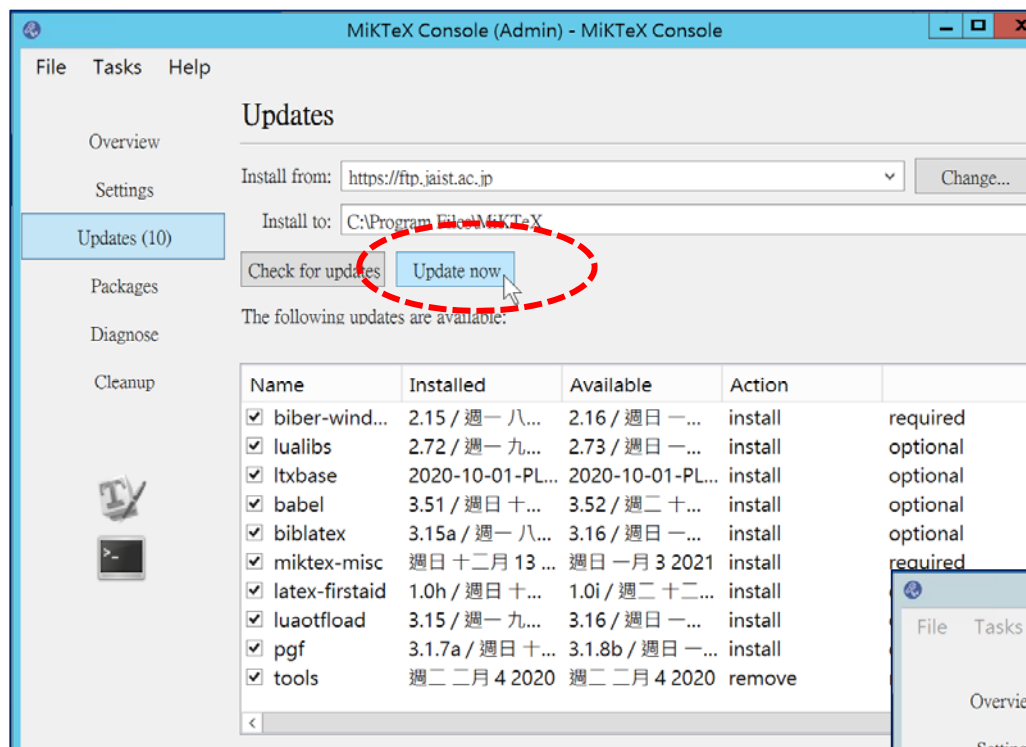
# MikTeX 更新和設定

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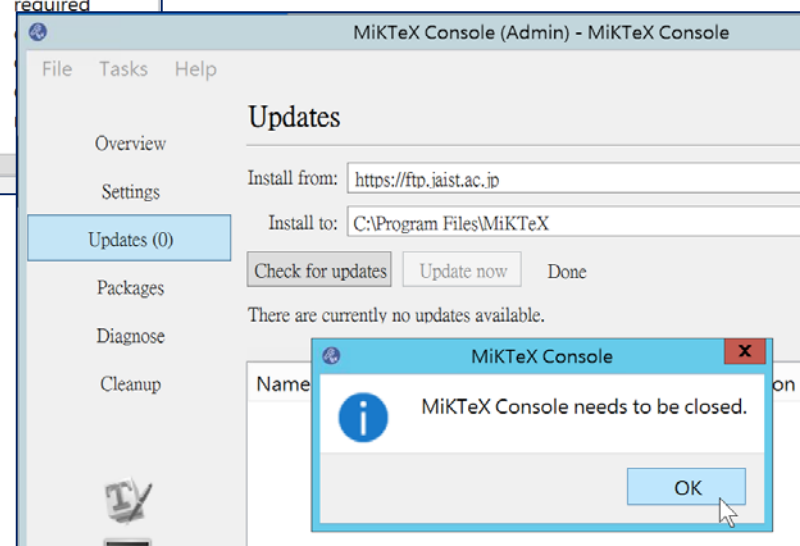


# MikTeX 更新和設定

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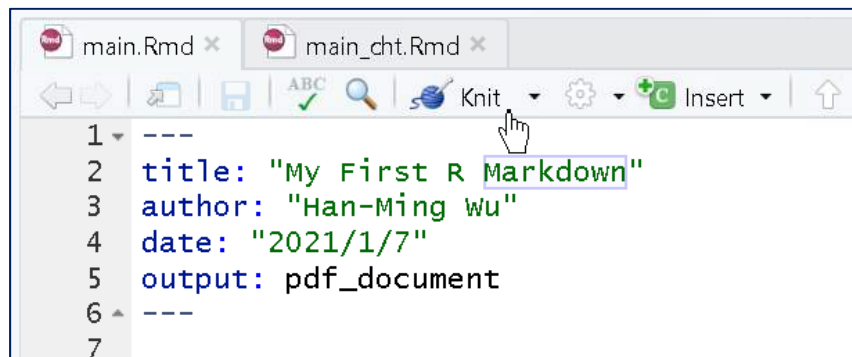
更新可能要很久!



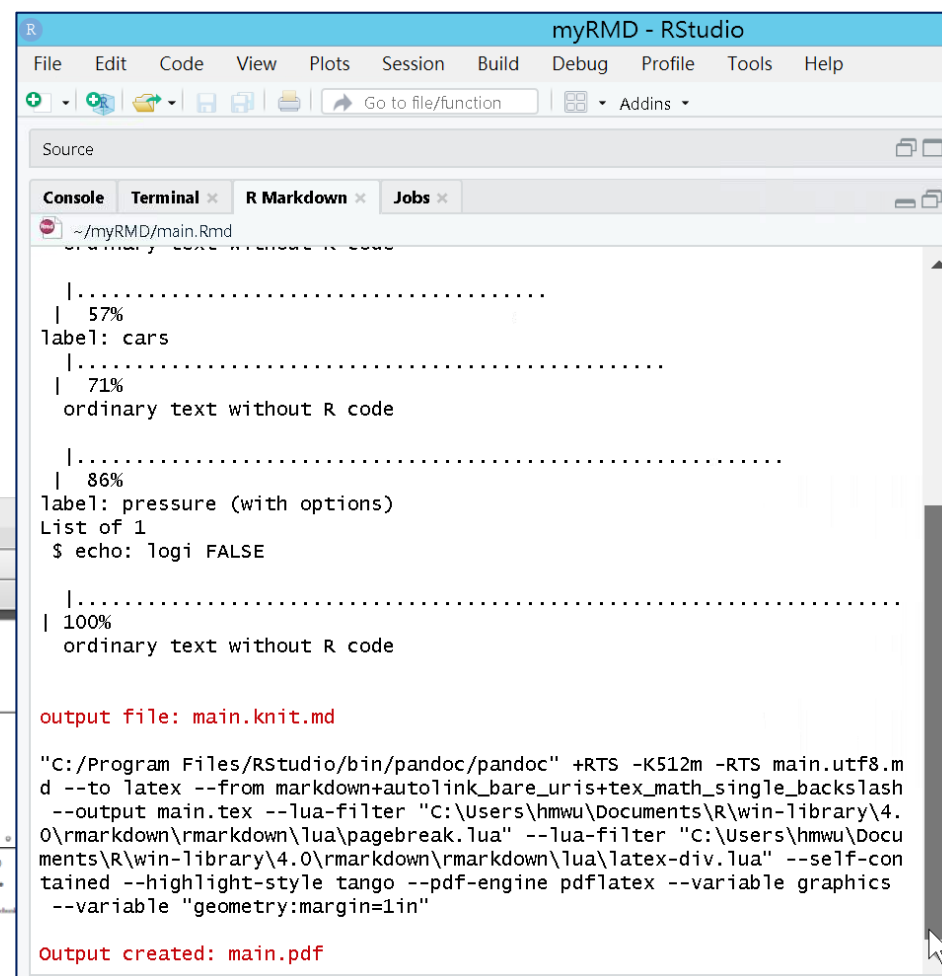
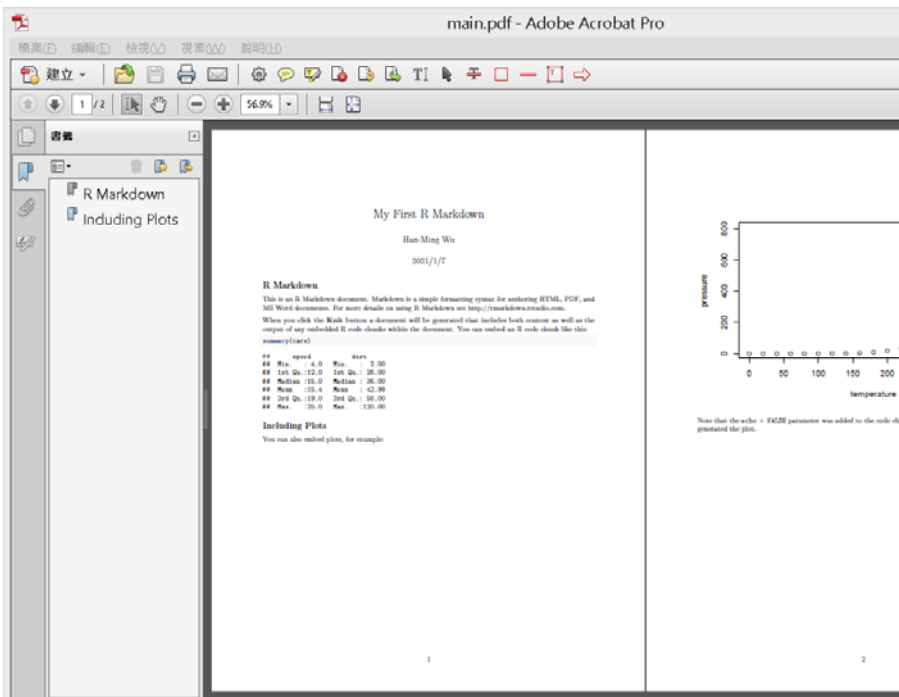


# 產生PDF文件(英文)終於順利了~

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```
1 ---
2 title: "My First R Markdown"
3 author: "Han-Ming Wu"
4 date: "2021/1/7"
5 output: pdf_document
6 ---
7
```



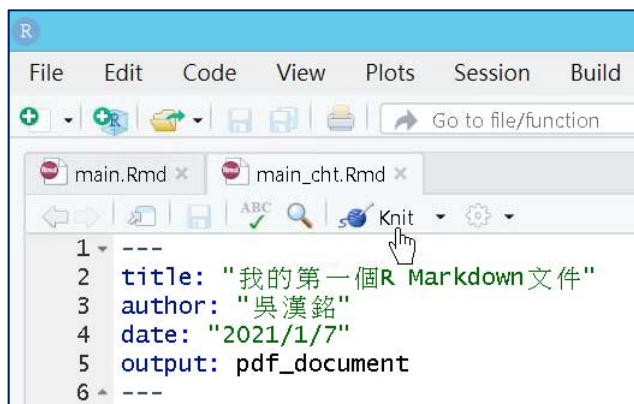
```
myRMD - RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function Addins
Source
Console Terminal R Markdown Jobs
~/myRMD/main.Rmd
|.....
| 57%
label: cars
|.....
| 71%
ordinary text without R code
|.....
| 86%
label: pressure (with options)
List of 1
$ echo: logi FALSE
|.....
| 100%
ordinary text without R code

output file: main.knit.md

"C:/Program Files/RStudio/bin/pandoc/pandoc" +RTS -K512m -RTS main.utf8.m
d --to latex --from markdown+autolink_bare_uris+tex_math_single_backslash
--output main.tex --lua-filter "C:\Users\hmwu\Documents\R\win-library\4.
0\rmarkdown\rmarkdown\lua\pagebreak.lua" --lua-filter "C:\Users\hmwu\Docu
ments\R\win-library\4.0\rmarkdown\rmarkdown\lua\latex-div.lua" --self-con
tained --highlight-style tango --pdf-engine pdflatex --variable graphics
--variable "geometry:margin=1in"

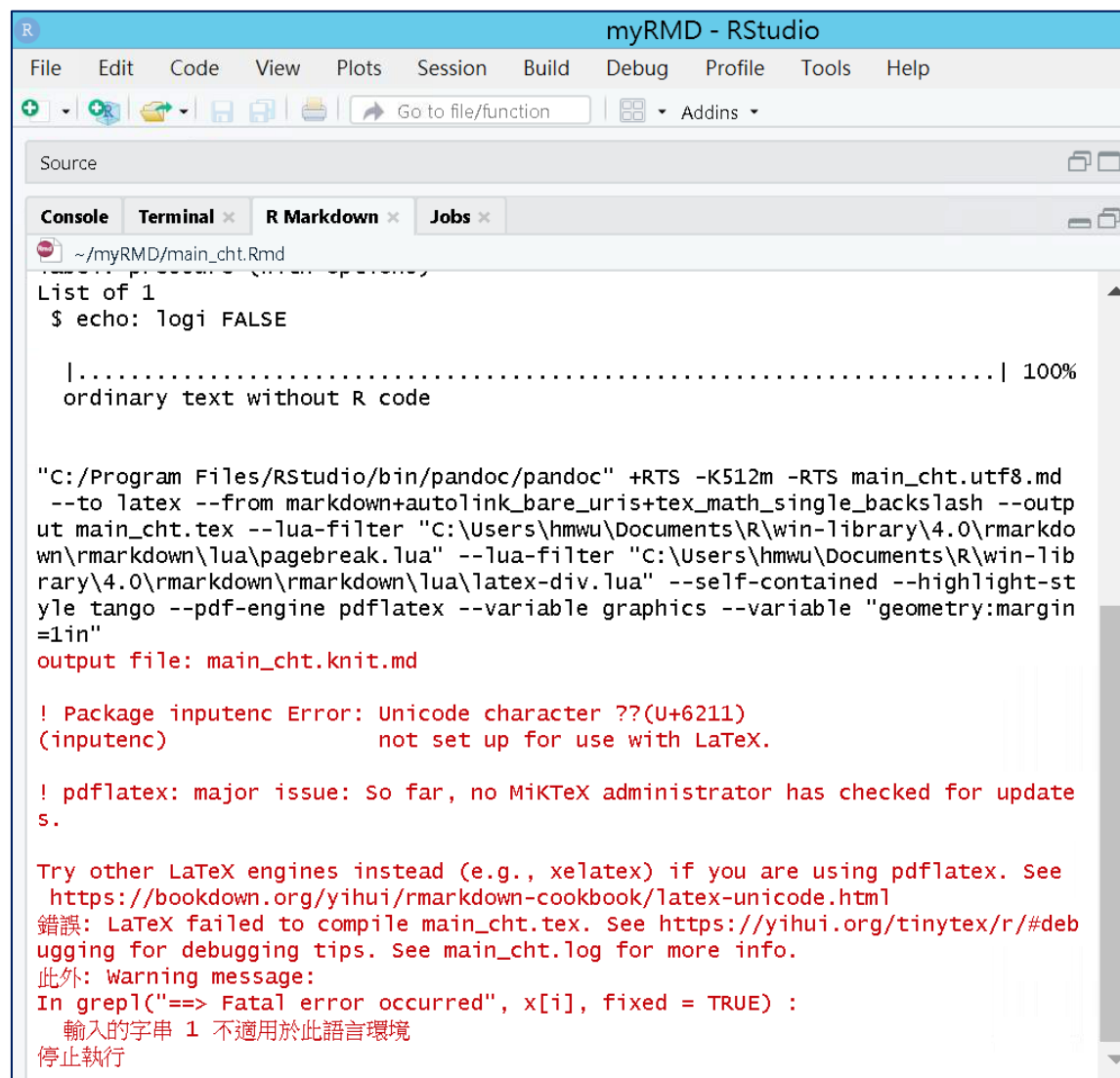
Output created: main.pdf
```

# 產生PDF文件(中文)，又不順了!!



```

1 ---
2 title: "我的第一個R Markdown文件"
3 author: "吳漢銘"
4 date: "2021/1/7"
5 output: pdf_document
6 ---
  
```



```

Source

Console Terminal R Markdown Jobs

~/myRMD/main_cht.Rmd

List of 1
$ echo: logi FALSE

|.....| 100%
ordinary text without R code

"C:/Program Files/RStudio/bin/pandoc/pandoc" +RTS -K512m -RTS main_cht.utf8.md
--to latex --from markdown+autolink_bare_uris+tex_math_single_backslash --outp
ut main_cht.tex --lua-filter "C:\Users\hmwu\Documents\R\win-library\4.0\rmarkdo
wn\rmarkdown\lua\pagebreak.lua" --lua-filter "C:\Users\hmwu\Documents\R\win-lib
rary\4.0\rmarkdown\rmarkdown\lua\latex-div.lua" --self-contained --highlight-st
yle tango --pdf-engine pdflatex --variable graphics --variable "geometry:margin
=1in"
output file: main_cht.knit.md

! Package inputenc Error: Unicode character ??(U+6211)
(inputenc) not set up for use with LaTeX.

! pdflatex: major issue: So far, no MiKTeX administrator has checked for update
s.

Try other LaTeX engines instead (e.g., xelatex) if you are using pdflatex. See
https://bookdown.org/yihui/rmarkdown-cookbook/latex-unicode.html
錯誤: LaTeX failed to compile main_cht.tex. See https://yihui.org/tinytex/r/#deb
ugging for debugging tips. See main_cht.log for more info.
此外: warning message:
In grepl("==> Fatal error occurred", x[i], fixed = TRUE) :
輸入的字串 1 不適用於此語言環境
停止執行
  
```

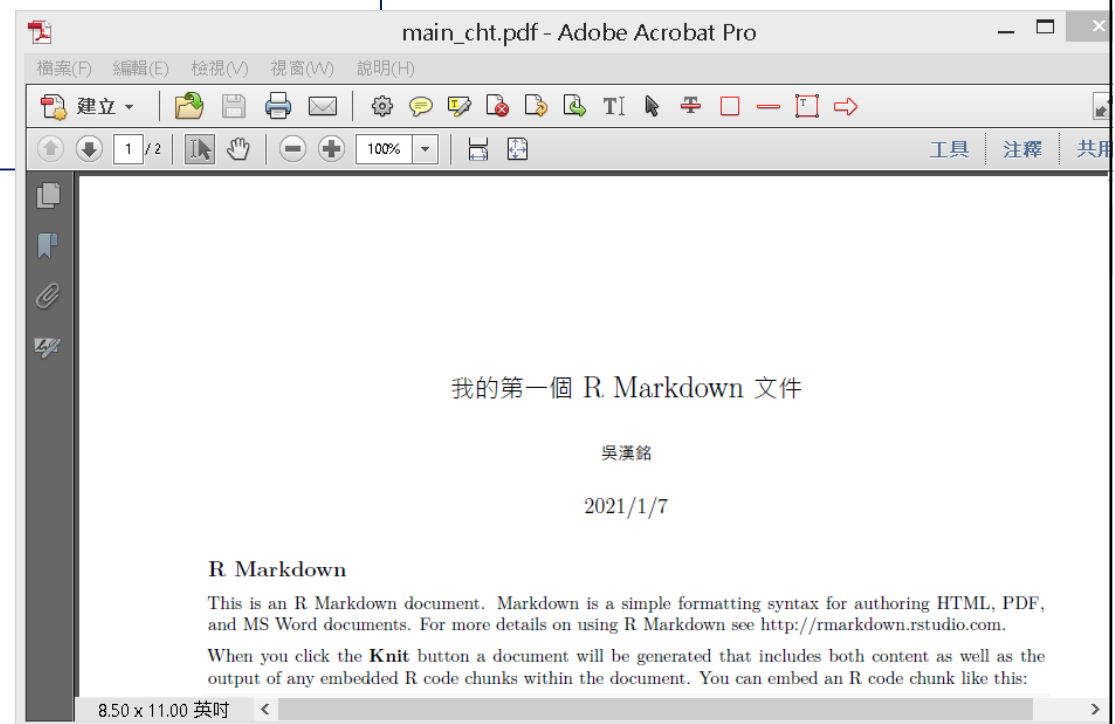
<https://bookdown.org/yihui/rmarkdown-cookbook/latex-unicode.html>

## 加入LaTeX 設置碼: header-includes

```
main.Rmd x main_chn.Rmd x
---
header-includes:
- \usepackage{xCJK} % 讓中文字體分開設置
- \usepackage{fontspec} %加這個就可以設定字體
- \setCJKmainfont{微軟正黑體} %可以改用「標楷體」、「細明體」
- \XeTeXlinebreaklocale "zh"
- \XeTeXlinebreakskip = 0pt plus 1pt %這兩行一定要加，中文才能自動換行
title: "我的第一個R Markdown文件"
author: "吳漢銘"
date: "2021/1/7"
output:
  pdf_document:
    latex_engine: xelatex
---
```

```
---
header-includes:
- \usepackage{xCJK}
- \usepackage{fontspec}
- \setCJKmainfont{微軟正黑體}
- \XeTeXlinebreaklocale "zh"
- \XeTeXlinebreakskip = 0pt plus 1pt

title: "我的第一個R Markdown文件"
author: "吳漢銘"
date: "2021/1/7"
output:
  pdf_document:
    latex_engine: xelatex
---
```

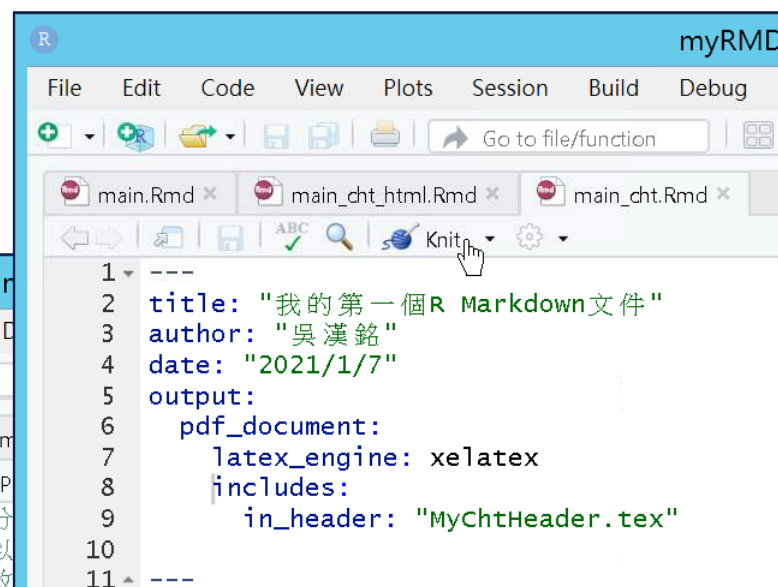
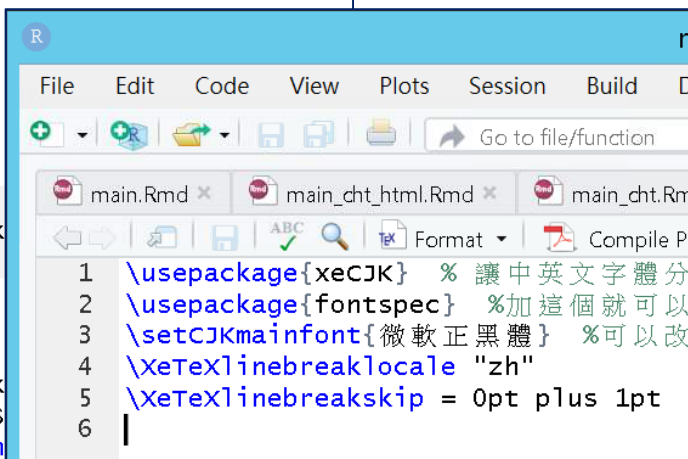
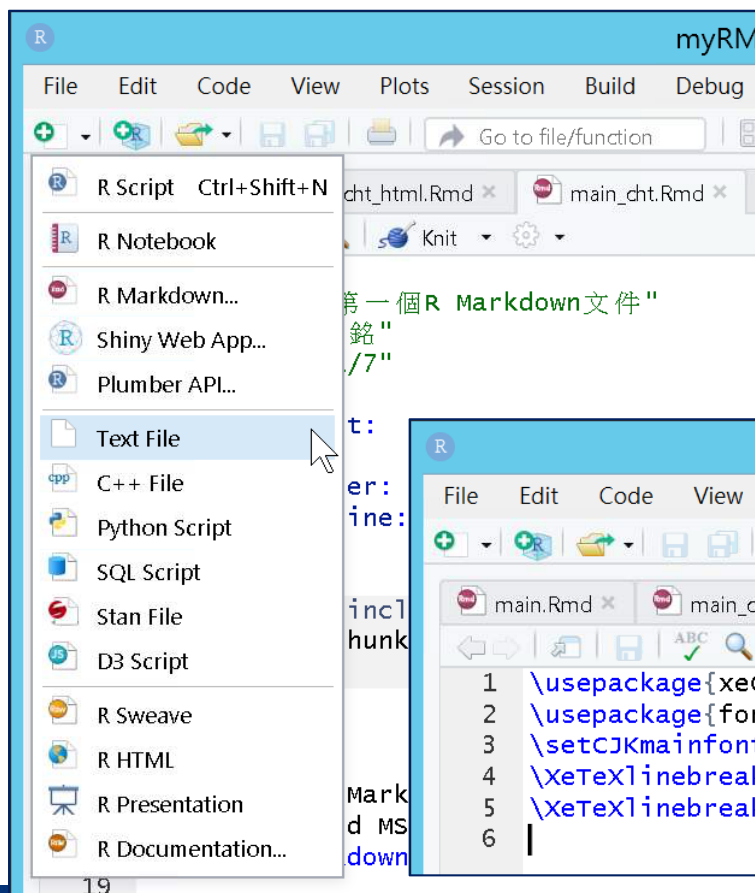


## 加入LaTeX 設置碼: in\_header

## MyChtHeader.tex

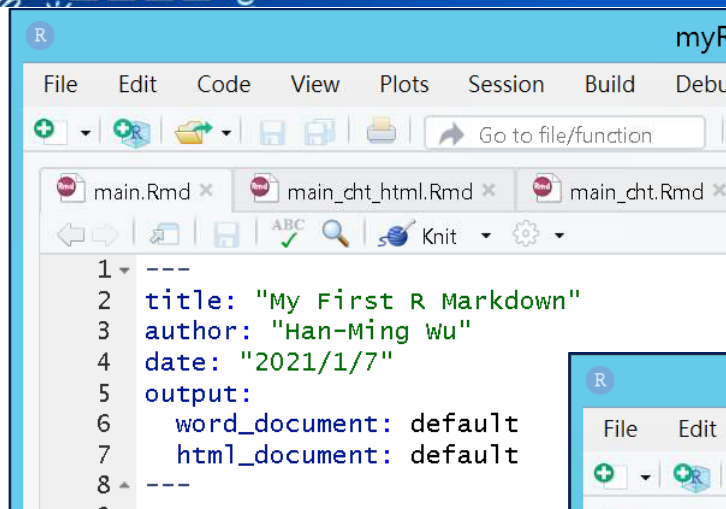
```
\usepackage{xCJK}
\usepackage{fontspec}
\setCJKmainfont{微軟正黑體}
\XeTeXlinebreaklocale "zh"
\XeTeXlinebreakskip = 0pt plus 1pt
```

```
---
title: "我的第一個R Markdown文件"
author: "吳漢銘"
date: "2021/1/7"
output:
  pdf_document:
    latex_engine: xelatex
  includes:
    in_header: "MyChtHeader.tex"
---
```



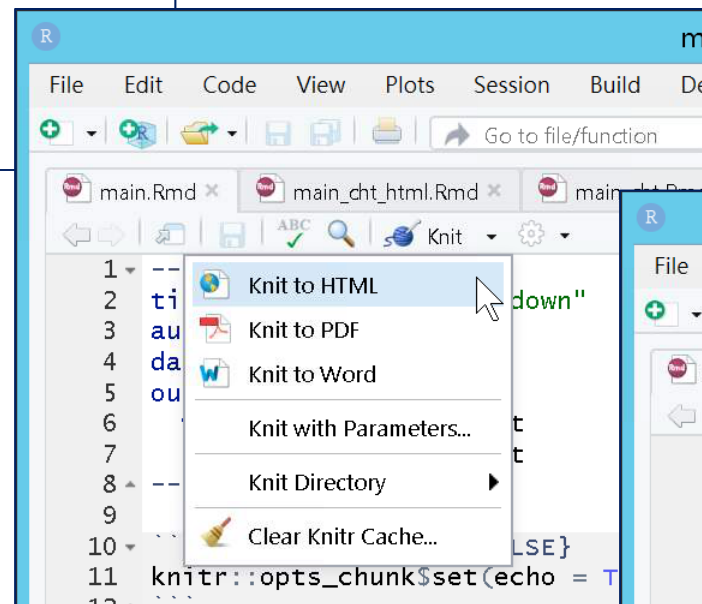


# Multiple Output Formats



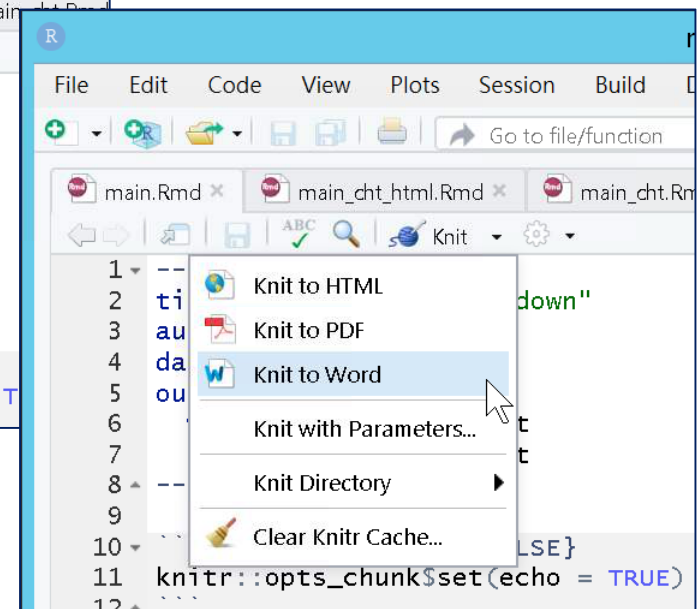
The RStudio interface shows a file named 'main.Rmd' with the following content:

```
1 ---  
2 title: "My First R Markdown"  
3 author: "Han-Ming Wu"  
4 date: "2021/1/7"  
5 output:  
6   word_document: default  
7   html_document: default  
8 ---
```



The RStudio interface shows the 'Knit' menu open, with the following options:

- Knit to HTML
- Knit to PDF
- Knit to Word
- Knit with Parameters...
- Knit Directory
- Clear Knitr Cache...



The RStudio interface shows the 'Knit' menu open, with the following options:

- Knit to HTML
- Knit to PDF
- Knit to Word
- Knit with Parameters...
- Knit Directory
- Clear Knitr Cache...

# Rmd檔及所編譯出來的html檔

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```
1 ---
2 title: "我的第一個R Markdown文件 (HTML)"
3 author: "吳漢銘"
4 date: "2021/1/7"
5 output: html_document
6 ---
7
8 ```{r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10 ```
11
12 ## R Markdown
13
14 This is an R Markdown document. Markdown is a simple formatting
15 syntax for authoring HTML, PDF, and MS Word documents. For more
16 details on using R Markdown see <http://rmarkdown.rstudio.com>.
17
18 When you click the Knit button a document will be generated that
19 includes both content as well as the output of any embedded R code
20 chunks within the document. You can embed an R code chunk like this:
21
22 ```{r cars}
23 summary(cars)
24 ```
25
26 ## Including Plots
27
28 You can also embed plots, for example:
29
30 ```{r pressure, echo=FALSE}
31 plot(pressure)
32 ```
33
34 Note that the `echo = FALSE` parameter was added to the code chunk to
35 prevent printing of the R code that generated the plot.
```

## Code Chunks

~myRMD/main\_cht\_html.html

### 我的第一個R Markdown (HTML)

吳漢銘  
2021/1/7

#### R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

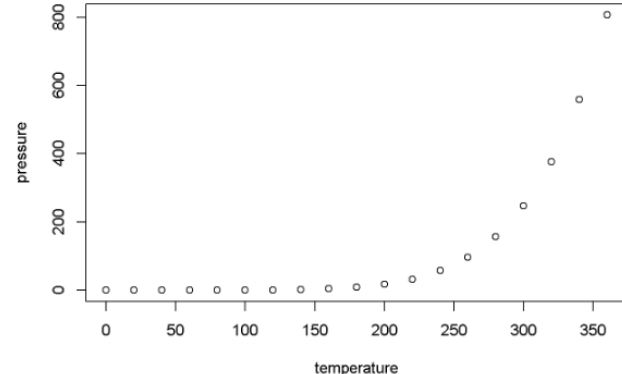
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

	speed	dist
## Min.	: 4.0	Min. : 2.00
## 1st Qu.	:12.0	1st Qu.: 26.00
## Median	:15.0	Median : 36.00
## Mean	:15.4	Mean : 42.98
## 3rd Qu.	:19.0	3rd Qu.: 56.00
## Max.	:25.0	Max. :120.00

#### Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

# Code Chunks

## ■ insert chunks:

- the keyboard shortcut **Ctrl + Alt + I** (OS X: **Cmd + Option + I**)
- the Add Chunk command in the editor toolbar
- type the chunk delimiters ````\{r}` and `````.

**Global Options:** apply to every chunk in your file, call `knitr::opts_chunk$set`, overwritten in individual chunk headers.

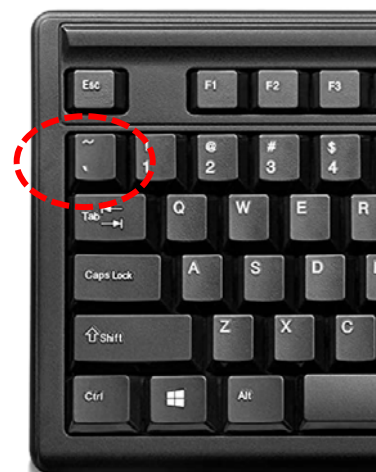
```
8  ```{r setup, include=FALSE}
9  knitr::opts_chunk$set(echo = TRUE)
10  ````
```

```
17
18  ```{r cars}
19  summary(cars)
20  ```
21
22  ## Including Plots
23
24  You can also embed plots, for example:
25
26  ```{r pressure, echo=FALSE}
27  plot(pressure)
28  ```
29  ````
```

Chunk Options

<https://yihui.org/knitr/options/>

Code evaluation, Text output, Code decoration, Cache, Plots, Animation, Code chunk, Child documents, Language engines, Option templates, Extracting source code, Other chunk options.



# A Notebook Interface

myRMD - RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

main.Rmd x main\_chrt\_html.Rmd x main\_chrt.Rmd x

Go to file/function Addins

16 When you click the **knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

17

18 `##{r cars}`

19 `summary(cars)`

20

speed	dist
Min. : 4.0	Min. : 2.00
1st Qu.:12.0	1st Qu.: 26.00
Median :15.0	Median : 36.00
Mean :15.4	Mean : 42.98
3rd Qu.:19.0	3rd Qu.: 56.00
Max. :25.0	Max. :120.00

21

22 `## Including Plots`

23

24 You can also embed plots, for example:

25

26 `##{r pressure, echo=FALSE}`

27 `plot(pressure)`

28

Run Current Chunk

Chunk Name: pressure

Output: Show output only

☐ Show warnings

☐ Show messages

☐ Use paged tables

☐ Use custom figure size

[? Chunk options](#)

Revert Apply

- ☒ Preview in Window
- Preview in Viewer Pane
- (No Preview)
- ☒ Preview Images and Equations
- ☒ Show Previews Inline
- ☒ Chunk Output Inline
- Chunk Output in Console
- Expand All Output
- Collapse All Output
- Clear Output
- Clear All Output
- Output Options...





# The R Markdown Reference Guide: Chunk Options

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```
26 {r pressure, echo=FALSE}  
27 plot(pressure)  
28 }
```

## Chunk options

option	default value	description
<b>Code evaluation</b>		
<b>child</b>	NULL	A character vector of filenames. Knitr will knit the files and place them into the main document.
<b>code</b>	NULL	Set to R code. Knitr will replace the code in the chunk with the code in the code option.
<b>engine</b>	'R'	Knitr will evaluate the chunk in the named language, e.g. <b>engine</b> = 'python'. Run <code>names(knitr::knit_engines\$get())</code> to see supported languages.
<input checked="" type="checkbox"/> <b>eval</b>	TRUE	If <b>FALSE</b> , knitr will not run the code in the code chunk.
<b>include</b>	TRUE	If <b>FALSE</b> , knitr will run the chunk but not include the chunk in the final document.
<b>purl</b>	TRUE	If <b>FALSE</b> , knitr will not include the chunk when running <code>purl()</code> to extract the source code.
<b>Results</b>		
<b>collapse</b>	FALSE	If <b>TRUE</b> , knitr will collapse all the source and output blocks created by the chunk into a single block.
<input checked="" type="checkbox"/> <b>echo</b>	TRUE	If <b>FALSE</b> , knitr will not display the code in the code chunk above it's results in the final document.
<input checked="" type="checkbox"/> <b>results</b>	'markup'	If ' <b>hide</b> ', knitr will not display the code's results in the final document. If ' <b>hold</b> ', knitr will delay displaying all output pieces until the end of the chunk. If ' <b>asis</b> ', knitr will pass through results without reformatting them (useful if results return raw HTML, etc.)
<b>error</b>	TRUE	If <b>FALSE</b> , knitr will not display any error messages generated by the code.
<b>message</b>	TRUE	If <b>FALSE</b> , knitr will not display any messages generated by the code.
<b>warning</b>	TRUE	If <b>FALSE</b> , knitr will not display any warning messages generated by the code.
<b>Code Decoration</b>		
<b>comment</b>	'##'	A character string. Knitr will append the string to the start of each line of results in the final document.
<b>highlight</b>	TRUE	If <b>TRUE</b> , knitr will highlight the source code in the final output.
<input checked="" type="checkbox"/> <b>prompt</b>	FALSE	If <b>TRUE</b> , knitr will add > to the start of each line of code displayed in the final document.
<b>strip.white</b>	TRUE	If <b>TRUE</b> , knitr will remove white spaces that appear at the beginning or end of a code chunk.
<b>tidy</b>	FALSE	If <b>TRUE</b> , knitr will tidy code chunks for display with the <code>tidy_source()</code> function in the <b>formatR</b> package.



# The R Markdown Reference Guide: Chunk Options

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Chunks		
<b>opts.label</b>	NULL	The label of options set in <code>knitr::opts_template()</code> to use with the chunk.
<b>R.options</b>	NULL	Local R options to use with the chunk. Options are set with <code>options()</code> at start of chunk. Defaults are restored at end.
<b>ref.label</b>	NULL	A character vector of labels of the chunks from which the code of the current chunk is inherited.

快取

Cache		
<b>autodep</b>	FALSE	If <b>TRUE</b> , knitr will attempt to figure out dependencies between chunks automatically by analyzing object names.
<b>cache</b>	FALSE	If <b>TRUE</b> , knitr will cache the results to reuse in future knits. Knitr will reuse the results until the code chunk is altered.
<b>cache.comments</b>	NULL	If <b>FALSE</b> , knitr will not rerun the chunk if only a code comment has changed.
<b>cache.lazy</b>	TRUE	If <b>TRUE</b> , knitr will use <code>lazyload()</code> to load objects in chunk. If <b>FALSE</b> , knitr will use <code>load()</code> to load objects in chunk.
<b>cache.path</b>	'cache/'	A file path to the directory to store cached results in. Path should begin in the directory that the .Rmd file is saved in.
<b>cache.vars</b>	NULL	A character vector of object names to cache if you do not wish to cache each object in the chunk.
<b>dependson</b>	NULL	A character vector of chunk labels to specify which other chunks a chunk depends on. Knitr will update a cached chunk if its dependencies change.



# The R Markdown Reference Guide: Chunk Options

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Plots		
<b>dev</b>	'png'	The R function name that will be used as a graphical device to record plots, e.g. <code>dev='CairoPDF'</code> .
<b>dev.args</b>	NULL	Arguments to be passed to the device, e.g. <code>dev.args=list(bg='yellow', pointsize=10)</code> .
<b>dpi</b>	72	A number for knitr to use as the dots per inch (dpi) in graphics (when applicable).
<b>external</b>	TRUE	If TRUE, knitr will externalize tikz graphics to save LaTeX compilation time (only for the <code>tikzDevice::tikz()</code> device).
<b>fig.align</b>	'default'	How to align graphics in the final document. One of 'left', 'right', or 'center'.
<b>fig.cap</b>	✓ NULL	A character string to be used as a figure caption in LaTeX.
<b>fig.env</b>	'figure'	The Latex environment for figures.
<b>fig.ext</b>	NULL	The file extension for figure output, e.g. <code>fig.ext='png'</code> .
<b>fig.height, fig.width</b>	✓ 7	The width and height to use in R for plots created by the chunk (in inches).
<b>fig.keep</b>	'high'	If 'high', knitr will merge low-level changes into high level plots. If 'all', knitr will keep all plots (low-level changes may produce new plots). If 'first', knitr will keep the first plot only. If 'last', knitr will keep the last plot only. If 'none', knitr will discard all plots.
<b>fig.lp</b>	'fig:'	A prefix to be used for figure labels in latex.
<b>fig.path</b>	'figure/'	A file path to the directory where knitr should store the graphics files created by the chunk.
<b>fig.pos</b>	"	A character string to be used as the figure position arrangement in LaTeX.
<b>fig.process</b>	NULL	A function to post-process a figure file. Should take a filename and return a filename of a new figure source.
<b>fig.retina</b>	1	Dpi multiplier for displaying HTML output on retina screens.
<b>fig.scap</b>	NULL	A character string to be used as a short figure caption.
<b>fig.subcap</b>	NULL	A character string to be used as captions in sub-figures in LaTeX.
<b>fig.show</b>	'asis'	If 'hide', knitr will generate the plots created in the chunk, but not include them in the final document. If 'hold', knitr will delay displaying the plots created by the chunk until the end of the chunk. If 'animate', knitr will combine all of the plots created by the chunk into an animation.
<b>fig.showtext</b>	NULL	If TRUE, knitr will call <code>showtext::showtext.begin()</code> before drawing plots.
<b>out.extra</b>	NULL	A character string of extra options for figures to be passed to LaTeX or HTML.
<b>out.height, out.width</b>	NULL	The width and height to scale plots to in the final output. Can be in units recognized by output, e.g. <code>8\\linewidth, 50px</code>
<b>resize.height, resize.width</b>	NULL	The width and height to resize tike graphics in LaTeX, passed to <code>\resizebox{ }{ }</code> .
<b>sanitize</b>	FALSE	If TRUE, knitr will sanitize tike graphics for LaTeX.

```
```{r fig.cap = "The index plot"}
plot(iris$Sepal.Length)
```
```

# Comment out text

- Comment out text in the source Rmd document, which will not be displayed in the final output.
- HTML syntax (single line):  
`<!-- your comment -->`
- HTML syntax (multiple line):  
`<!--`  
`your comment here`  
`second line`  
`-->`
- RStudio shortcut: **Ctrl + Shift + C**  
 (Command + Shift + C, macOS).

```

33
34
35 <!-- This line is a comment. -->
36
37 I would like to comment multiple line of text.
38
39 Department of Statistics
40 National Taipei University
41 151, University Rd., San Shia District,
42 New Taipei City, 23741
43

```

```

33
34
35 <!-- This line is a comment. -->
36
37 <!-- I would like to comment multiple line of text. -->
38
39 <!-- Department of Statistics -->
40 <!-- National Taipei University -->
41 <!-- 151, University Rd., San Shia District, -->
42 <!-- New Taipei City, 23741 Taiwan -->
43

```

```

33
34
35 This line is a comment.
36
37 I would like to comment multiple line of text.
38
39 Department of Statistics
40 National Taipei University
41 151, University Rd., San Shia District,
42 New Taipei City, 23741 Taiwan
43

```

```

33
34
35 <!-- This line is a comment. -->
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37 I would like to comment multiple line of text.
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39 Department of Statistics
40 National Taipei University
41 151, University Rd., San Shia District,
42 New Taipei City, 23741 Taiwan
43

```

```

33
34
35 <!-- This line is a comment. -->
36
37 <!--
38 I would like to comment multiple line of text.
39
40 Department of Statistics
41 National Taipei University
42 151, University Rd., San Shia District,
43 New Taipei City, 23741 Taiwan
44 -->
45

```



# Inline Code

```

45 <!-- Code Chunk -->
46 Here is a simple "Code Chunk".
47 ```{r}
48 myname <- "Hank Wu"
49 cat("Hello~ My name is", myname, "\n")
50 paste("Today is ", date())
51

```

```

Hello~ My name is Hank Wu
[1] "Today is  Thu Jan 07 13:13:40 2021"

```

```

52
53
54 I would like to introduce myself.
55 My name is `r myname`.
56 Today is `r date()`.
57 The sum of integers from 1 to 100 is `r sum(1:100)`.
58 The `r` command is `sum(1:100)`.

```

main\_cht\_html.html Open in Browser Find Publish

Here is a simple "Code Chunk".

```

myname <- "Hank Wu"
cat("Hello~ My name is", myname, "\n")

## Hello~ My name is Hank Wu

paste("Today is ", date())

## [1] "Today is  Thu Jan 07 13:13:55 2021"

```

I would like to introduce myself. My name is Hank Wu. Today is Thu Jan 07 13:13:55 2021. The sum of integers from 1 to 100 is 5050. The `sum(1:100)` command is `sum(1:100)`.

```

<!-- Code Chunk -->
Here is a simple "Code Chunk".
```{r}
myname <- "Hank Wu"
cat("Hello~ My name is", myname, "\n")
paste("Today is ", date())
```

```

```

I would like to introduce myself.
My name is `r myname`.
Today is `r date()`.
The sum of integers from 1 to 100 is `r sum(1:100)`. The `r` command is `sum(1:100)`.

```

The sum of integers from 1 to 100 is ``r s <- sum(1:100)``.  
The sum is ``r s``.

The sum of integers from 1 to 100 is . The sum is 5050.

# 新增R Markdown檔案

## Title及Author不能有中文

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The screenshot shows the RStudio interface. On the left, the 'New R Markdown' dialog is open, showing options for Document, Presentation, Shiny, and From Template. The 'Title' field contains '我的 R Markdown 密笈' and the 'Author' field contains '吳漢銘'. The 'Default Output Format' is set to HTML. Below the dialog, there is a button labeled 'Create Empty Document'. The main editor window shows the R Markdown file 'main\_cht\_html.Rmd' with the following content:

```
1 ---
2 ---
3
4 {r setup, include=FALSE}
5 knitr::opts_chunk$set(echo = TRUE)
6
7
8 ## R Markdown
9
10 This is an R Markdown document. Markdown is a simple formatting syntax for
```

The console window at the bottom shows an error message:

```
~/myRMD/
Error in substr(val, 1, 1) : 無效的多位元組字串於 '<e6><88><91>? Markdown 摺箱<bf><af>
><ac><88>'
> |
```

# 新增R Markdown檔案

## 先用內建「Title及Author」

35/48

The screenshot displays the RStudio interface. On the left, the 'New R Markdown' dialog box is open, showing options for document type (Document, Presentation, Shiny, From Template) and default output format (HTML, PDF, Word). The 'Title' field is set to 'Untitled' and the 'Author' field is set to 'Hank'. The 'HTML' option is selected under 'Default Output Format'. The 'Create Empty Document' button is visible at the bottom of the dialog.

On the right, the 'myRMD\_Tips.Rmd' file is open in the editor. The file content is as follows:

```
1 ---
2 title: "Untitled"
3 author: "Hank"
4 date: "2021/1/7"
5 output: html_document
6 ---
7
8 {r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10
11
12 ## R Markdown
13
14 This is an R Markdown document. Markdown is a simple formatting syntax for
15 authoring HTML, PDF, and MS Word documents. For more details on using R
16 Markdown see <http://rmarkdown.rstudio.com>.
17
18 When you click the Knit button a document will be generated that
19 includes both content as well as the output of any embedded R code chunks
20 within the document. You can embed an R code chunk like this:
21
22 {r cars}
23 summary(cars)
24
25
26 ## Including Plots
27
28 You can also embed plots, for example:
29
30 {r pressure, echo=FALSE}
31 plot(pressure)
```

The file name 'myRMD\_Tips.Rmd' is highlighted in red in the top right corner of the editor window.



# 練習：我的R Markdown學習密笈

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## 我的R Markdown學習密笈

Department of Statistics, National Taipei University

吳漢銘

08 一月 2021

- 1 Markdown Syntax 語法
  - 1.1 標題
- Header 1 標題1 (不標號)
  - Header 2 標題2 (不標號)
    - Header 3 標題3
  - 1.2 列舉: 項目符號清單
  - 1.3 列舉: 編號清單
- 2 程式碼
  - 2.1 文中程式指令
  - 2.2 內嵌程式碼 (code inline)
  - 2.3 code chunk 程式區塊 (列出程式碼)
  - 2.4 code chunk 程式區塊 (印出提示符號)
  - 2.5 code chunk 程式區塊 (不列出程式碼)
  - 2.6 程式碼照印 (verbatim)
- 3 表格
  - 3.1 手繪表格
  - 3.2 原本的資料框( data.frame )表格
  - 3.3 knitr::kable的表格
  - 3.4 xtable::xtable的表格
- 4 圖形
  - 4.1 基礎圖形(Base Graphics)
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```
myRMD_Tips.Rmd x
1 ---
2 title: "我的R Markdown學習密笈"
3 subtitle: "Department of Statistics, National Taipei University"
4 author: "吳漢銘"
5 date: "`r format(Sys.time(), '%d %B %Y')`"
6 output:
7   bookdown::html_document2:
8     toc: true
9     toc_depth: 3
10    number_sections: true
11    theme: united
12    highlight: tango
13 ---
14
15 <!-- 全域設定 -->
16 {r setup, include=FALSE}
17 knitr::opts_chunk$set(echo = TRUE)
18
19
```



## 1 Markdown Syntax 語法

### 1.1 標題

Header 1 標題1 (不標號)

Header 2 標題2 (不標號)

Header 3 標題3

Header 4 標題4

Header 5 標題5

Header 6 標題6

### 1.2 列舉: 項目符號清單

- Plain text 一般文字
  - *italics* and *italics*
  - 斜體和 斜體
  - *italics* 斜體
    - **bold** and **bold**
    - 粗體和粗體
- 顏色(html): 這裡是綠色的字。

### 1.3 列舉: 編號清單

1. superscript<sup>2</sup>, 上標<sup>2</sup>
2. subscript<sub>2</sub>, 下標<sub>2</sub>
  - i. 這裡是RStudio連結。
  - ii. 我的網站: <http://www.hmww.idv.tw>
    - A. endash: -- 連接號: --
    - B. emdash: --- 破折號: ---
    - C. ellipsis: ... 省略符號: ...
    - D. strikethrough, 刪除線

End a line with two spaces to start a new paragraph. 使用兩列空格來結束一行，開始新的的段落。

```
20 <!--
21 #####
22 # 第一章: Markdown Syntax #
23 # 這註解是個人風格，也不一定照著做 #
24 #####
25 -->
26
27 # Markdown Syntax 語法 {#Syntax}
28
29 ## 標題
30 # Header 1 標題1 (不標號) {.unnumbered}
31 ## Header 2 標題2 (不標號) {-}
32 ### Header 3 標題3 {-}
33 #### Header 4 標題4 {-}
34 ##### Header 5 標題5 {-}
35 ##### Header 6 標題6 {-}
36
37
38 ## 列舉: 項目符號清單
39 * Plain text 一般文字
40   + italics and italics
41   + *斜體* 和 _斜體_
42   + <em>italics 斜體 </em>
43     - bold and bold
44     - 粗體 和 粗體
45 * 顏色(html): <span style="color: green;">這裡是綠色的字</span>。
46
47
48 ## 列舉: 編號清單
49 1. superscript^2^, 上標^2^
50 2. subscript~2~, 下標~2~
51   i) 這裡是[RStudio](http://www.rstudio.com)連結。
52   ii) 我的網站: <a href="http://www.hmww.idv.tw">http://www.hmww.idv.tw
53       A. endash: -- 連接號: --
54       B. emdash: --- 破折號: ---
55       C. ellipsis: ... 省略符號: ...
56       D. strikethrough, 刪除線
57
58
59 End a line with two spaces to start a new paragraph.
60 使用兩列空格來結束一行，開始新的的段落。
61
```





## 2 程式碼

### 2.1 文中程式指令

我最常用的R指令是 `str`，最好的用的是 `apply` 系列指令。

### 2.2 內嵌程式碼 (code inline)

整數1連加到100的總和是 5050, R 語言的程式碼是 `sum(1:100)`。

### 2.3 code chunk 程式區塊 (列出程式碼)

```
paste("Hello", "World!")
```

```
## [1] "Hello World!"
```

### 2.4 code chunk 程式區塊 (印出提示符號)

```
> paste("Hello", "World!")
```

```
## [1] "Hello World!"
```

### 2.5 code chunk 程式區塊 (不列出程式碼)

```
## [1] "Hello World!"
```

### 2.6 程式碼照印 (verbatim)

```
# 109-1-R-exam2
# ex1(a)
my.inverse <- function(n){
  cat("計算反矩陣\n")
  cat("請輸入", n, " by ", n, "之矩陣:")
  m <- matrix(scan(), ncol=n, nrow=n)
  list(Mat=m, Mat.inverse=solve(m))
}

my.inverse(n=3)
```

```
64 <!--
65 #####
66 # 程式碼 #
67 # #
68 #####
69 -->
70 # 程式碼
71
72
73 ## 文中程式指令
74 我最常用的R指令是`str`，最好的用的是`apply`系列指令。
75
76 ## 內嵌程式碼 (code inline)
77 整數1連加到100的總和是 `r sum(1:100)`，`R`語言的程式碼是`sum(1:100)`。
78
79
80 ## code chunk 程式區塊 (列出程式碼)
81 ```{r}
82 paste("Hello", "World!")
83 ```
84
85 ## code chunk 程式區塊 (印出提示符號)
86 ```{r prompt=TRUE}
87 paste("Hello", "World!")
88 ```
89
90 ## code chunk 程式區塊 (不列出程式碼)
91 ```{r eval=TRUE, echo=FALSE}
92 paste("Hello", "World!")
93 ```
94
95 ## 程式碼照印 (verbatim)
96 ```
97
98 # 109-1-R-exam2
99 # ex1(a)
100 my.inverse <- function(n){
101   cat("計算反矩陣\n")
102   cat("請輸入", n, " by ", n, "之矩陣:")
103   m <- matrix(scan(), ncol=n, nrow=n)
104   list(Mat=m, Mat.inverse=solve(m))
105 }
106
107 my.inverse(n=3)
108 ```
```

# 表格

## 3 表格

### 3.1 手繪表格

| Table Header | Second Header |
|--------------|---------------|
| Table Cell   | Cell 2        |
| Cell 3       | Cell 4        |

### 3.2 原本的資料框(data.frame)表格

```
head(airquality) # don't work in R Markdown
```

Ozone Solar.R Wind Temp Month Day 1 41 190 7.4 67 5 1 2 36 118 8.0 72 5 2 3 12 149 12.6 74 5 3 4 18 313 11.5 62 5 4 5 NA NA 14.3 56 5 6 28 NA 66 5 6

### 3.3 knitr::kable的表格

```
mydata <- airquality[1:4, ]
knitr::kable(mydata, caption = "Table with kable")
```

Table 3.1: Table with kable

|   | Ozone | Solar.R | Wind | Temp | Month |
|---|-------|---------|------|------|-------|
| 1 | 41    | 190     | 7.4  | 67   | 5     |
| 2 | 36    | 118     | 8.0  | 72   | 5     |
| 3 | 12    | 149     | 12.6 | 74   | 5     |
| 4 | 18    | 313     | 11.5 | 62   | 5     |

### 3.4 xtable::xtable的表格

```
# install.packages("xtable")
library(xtable)
print(xtable(mydata, caption = "Table with xtable"), type = "html")
```

|   | Ozone | Solar.R | Wind  | Temp | Month | Day |
|---|-------|---------|-------|------|-------|-----|
| 1 | 41    | 190     | 7.40  | 67   | 5     | 1   |
| 2 | 36    | 118     | 8.00  | 72   | 5     | 2   |
| 3 | 12    | 149     | 12.60 | 74   | 5     | 3   |
| 4 | 18    | 313     | 11.50 | 62   | 5     | 4   |

Table with xtable

```
110 <!--
111 #####
112 # 表格 #
113 # #
114 #####
115 -->
116 # 表格
117
118
119 ## 手繪表格
120 Table Header | Second Header
121 -----|-----
122 Table Cell   | Cell 2
123 Cell 3      | Cell 4
124
125
126 ## 原本的資料框('data.frame')表格
127 ```{r results = 'asis'}
128 head(airquality) # don't work in R Markdown
129 ```
130
131 ## knitr::kable的表格
132 ```{r airquality, results = 'asis'}
133 mydata <- airquality[1:4, ]
134 knitr::kable(mydata, caption = "Table with kable")
135 ```
136
137 ## xtable::xtable的表格
138 ```{r results = "asis"}
139 # install.packages("xtable")
140 library(xtable)
141 print(xtable(mydata, caption = "Table with xtable"), type = "html")
142 ```
143
```

## 4 圖形

### 4.1 基礎圖形(Base Graphics)

```
attach(iris)
par(mfrow=c(1, 2))
plot(Sepal.Length, col=iris$Species, main="Index Plot")
hist(Sepal.Length, main="Histogram")
```

```
145 <!--
146 #####
147 # 圖形 #
148 # #
149 #####
150 -->
151 # 圖形
152
153
154 ## 基礎圖形(Base Graphics)
155 ```{r iris-plot, fig.cap="The iris data."}
156 attach(iris)
157 par(mfrow=c(1, 2))
158 plot(Sepal.Length, col=iris$Species, main="Index Plot")
159 hist(Sepal.Length, main="Histogram")
160`
```

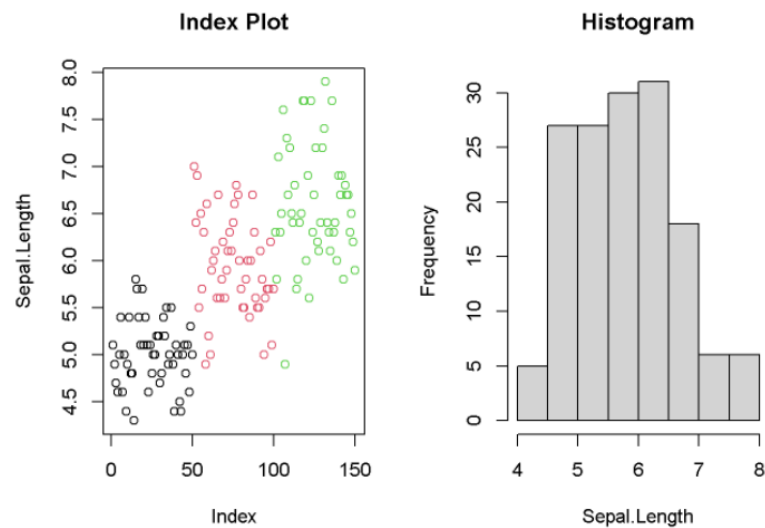


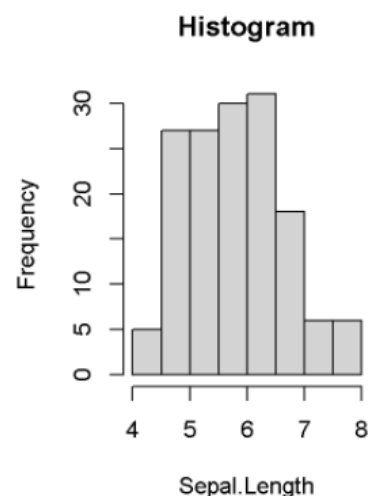
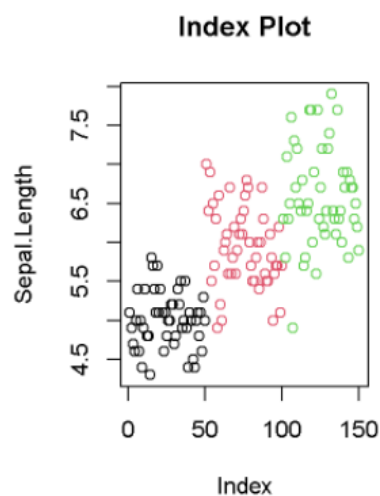
Figure 4.1: The Iris data.

## 4.2 基礎圖形(Base Graphics) (控制大小)

```
attach(iris)
```

```
## The following objects are masked from iris (pos = 3):  
##  
##      Petal.Length, Petal.Width, Sepal.Length, Sepal.Width, Species
```

```
par(mfrow=c(1, 2))  
plot(Sepal.Length, col=iris$Species, main="Index Plot")  
hist(Sepal.Length, main="Histogram")
```

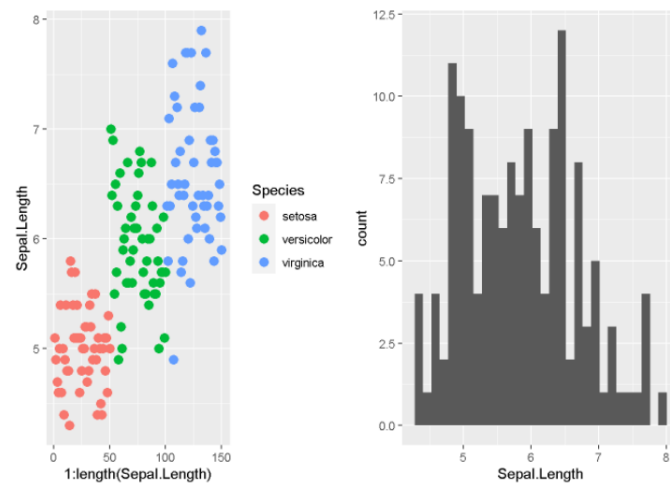


```
162  
163 - ## 基礎圖形(Base Graphics) (控制大小)  
164 - {r fig.height = 4, fig.width = 6}  
165 attach(iris)  
166 par(mfrow=c(1, 2))  
167 plot(Sepal.Length, col=iris$Species, main="Index Plot")  
168 hist(Sepal.Length, main="Histogram")  
169 -
```

## 4.3 ggplot2圖形(置中)

```
# install.packages("ggplot2")
# install.packages("gridExtra")
#library(ggplot2)
suppressMessages(require(ggplot2))
library(gridExtra)
p1 <- ggplot(iris, aes(x=1:length(Sepal.Length), y=Sepal.Length,
                      color=Species)) + geom_point(size=3)
p2 <- ggplot(iris, aes(x=Sepal.Length)) +
  geom_histogram()
grid.arrange(p1, p2, nrow=1, ncol=2)
```

## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.



```
170
171- ## ggplot2圖形(置中)
172- ``{r fig.align = "center"}
173 # install.packages("ggplot2")
174 # install.packages("gridExtra")
175 #library(ggplot2)
176 suppressMessages(require(ggplot2))
177 library(gridExtra)
178 p1 <- ggplot(iris, aes(x=1:length(Sepal.Length), y=Sepal.Length,
179                      color=Species)) + geom_point(size=3)
180 p2 <- ggplot(iris, aes(x=Sepal.Length)) +
181   geom_histogram()
182 grid.arrange(p1, p2, nrow=1, ncol=2)
183
184
```



```
185
186 ## 圖片
187 image 圖片: ![這是R語言的官方標誌](Rlogo.png) {width=30%}
188
189
190 ## 圖片(利用knitr)
191 {r, out.width='25%', fig.align="center", fig.cap="R的Logo"}
192 knitr::include_graphics("Rlogo.png")
193
```

## 4.4 圖片

Image 圖片:



## 4.5 圖片(利用knitr)

```
knitr::include_graphics("Rlogo.png")
```



Figure 4.2: R的Logo



## 5 數學式

### 5.1 文中數式

圓面積:  $A = \pi \times r^2$ , 平均數  $\bar{X} = \frac{\sum_{i=1}^n x_i}{n}$ .

### 5.2 單獨數式 (無編號)

這是常態分佈的機率密度函數:

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

### 5.3 單獨數式 (有編號)

以下是有數學式編號的範例:

$$\Theta = \begin{pmatrix} \alpha & \beta \\ \gamma & \delta \end{pmatrix}$$
$$E = mc^2$$

```
195 <!--
196 #####
197 # 數學式 #
198 # #
199 #####
200 -->
201 # 數學式
202
203
204 ## 文中數式
205 圓面積: $A = \pi \times r^2$, 平均數 $\bar{X} = \frac{\sum_{i=1}^n x_i}{n}$.
206
207
208 ## 單獨數式 (無編號)
209 這是常態分佈的機率密度函數:
210 \[
211 f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}}
212 \]
213
214
215 ## 單獨數式 (有編號)
216
217 以下是有數學式編號的範例:
218 \begin{equation}
219 \Theta =
220 \begin{pmatrix}
221 \alpha & \beta \\
222 \gamma & \delta
223 \end{pmatrix} \quad (\#eq:matrix)
224 \end{equation}
225
226
227 \begin{equation}
228 E = mc^2
229 \quad (\#eq:emc)
230 \end{equation}
231
```



## 6 其它

三個以上的連續星號(\*)產生一水平線:

三個以上的連續減號(-)產生一斷頁(Page Break):

**block quote** 這裡是引用區塊

這是第一句話，以下有二列空白。

這是第二句話，上面有二列空白。

加一條灰色水平線(html碼):

```
235 <!--
236 #####
237 # 其它 #
238 # #
239 #####
240 -->
241 # 其它
242
243
244 三個以上的連續星號(*)產生一水平線:
245
246 *****
247
248 三個以上的連續減號(-)產生一斷頁(Page Break):
249
250 -----
251
252
253 > block quote 這裡是引用區塊
254
255
256
257 這是第一句話，以下有二列空白。
258 <br><br/><br><br/>
259 這是第二句話，上面有二列空白。
260
261
262 加一條灰色水平線(html碼):
263 <hr style="border:1px solid gray"> </hr>
264
265
266 這是需要註解的一句話 footnote ^[這裡是註解]
267
```



這是需要註解的一句話Footnote<sup>1</sup>

## 7 引用

- 標題引用: Markdown Syntax 語法在第1章。
- 圖形引用: See Figure 4.1
- 表格引用: See Table 3.1
- 數學式引用: See Equation (5.1)

1. 這裡是註解↩

```
269 <!--
270 #####
271 # 參考書目                                     #
272 #                                             #
273 #####
274 -->
275 # 引用
276
277 * 標題引用: Markdown Syntax 語法在第\@ref(Syntax)章。
278 * 圖形引用: See Figure \@ref(fig:iris-plot)
279 * 表格引用: See Table \@ref(tab:airquality)
280 * 數學式引用: See Equation \@ref(eq:matrix)
281
```

# Visual Markdown Editing

<https://rstudio.github.io/visual-markdown-editing>

source or visual mode.

**Visual R Markdown**

RStudio v1.4 includes a new visual markdown editing mode. Highlights:

- Visual editing for all of Pandoc markdown, including tables, divs/spans, and more.
- Extensive support for citations, including integration with Zotero and DOIs or searches of PubMed, Crossref, and DataCite.
- Scientific and technical writing features, including cross-references, for execution, and embedded LaTeX.
- Writing productivity features, including real time spell-checking and code execution.
- Tight integration with source editing (editing location and undo/redo switching between modes).
- Rich keyboard support. In addition to traditional shortcuts, you can use visual shortcuts to edit tables, divs, and more.

Visual markdown editing is currently only available in the [preview release](#) of RStudio. You can download the desktop version of the preview release here:

| Platform            | Download                                    | Size | SHA-256     |
|---------------------|---|------|-------------|
| Windows 10/8/7      | <a href="#">RStudio-1.4.1098.exe</a>        | 150M | 54490b34... |
| MacOS 10.13+        | <a href="#">RStudio-1.4.1098.dmg</a>        | 146M | fd44c159... |
| Ubuntu 18/Debian 10 | <a href="#">rstudio-1.4.1098-amd64.deb</a>  | 116M | 0eb1c160... |
| Fedora 28/Red Hat 8 | <a href="#">rstudio-1.4.1098-x86_64.rpm</a> | 132M | 51e830b8... |

RStudio Desktop 1.3.1093

2021/01/07

**Filtering joins**

Filtering joins match observations in the same way as [mutating joins](#), but affect the observations, not the variables<sup>1</sup>. There are two types:

| Function                     | Symbol               | Description  |
|------------------------------|----------------------|--|
| <code>semi_join(x, y)</code> | $x \ltimes y$        | Keeps all observations in <code>x</code> that have a match in <code>y</code> |
| <code>anti_join(x, y)</code> | $x \triangleright y$ | Drops all observations in <code>x</code> that have a match in <code>y</code> |

Graphically, a semi-join looks like this:

```
{r, echo = FALSE, out.width = NULL}
knitr::include_graphics("diagrams/join-semi.png")
```

Only the existence of a match is important; it doesn't matter which observation is matched. This means that filtering joins never duplicate rows like mutating joins do:

<http://www.hmwu.idv.tw>





# pagedreport Package

- **pagedreport**: pagedreport is an R package to help you make beautiful PDF-based reports from RMarkdown.
- <https://pagedreport.rfortherestofus.com/>
- <https://rfortherestofus.com/2021/01/announcing-pagedreport/>

```
remotes::install_github("rfortherestofus/pagedreport", ref = "main")
```

其它問題:

- 中文目錄問題
- 用R安裝，`install.packages("rmarkdown", depdnecies=T)`
- bookdown，ggplot2要裝
- miktex 若是選自己使用
- mac os: mactex
- PDF若不跑不順，可在表頭加「documentclass:ctexart」，可不用寫Latex到YAML。