

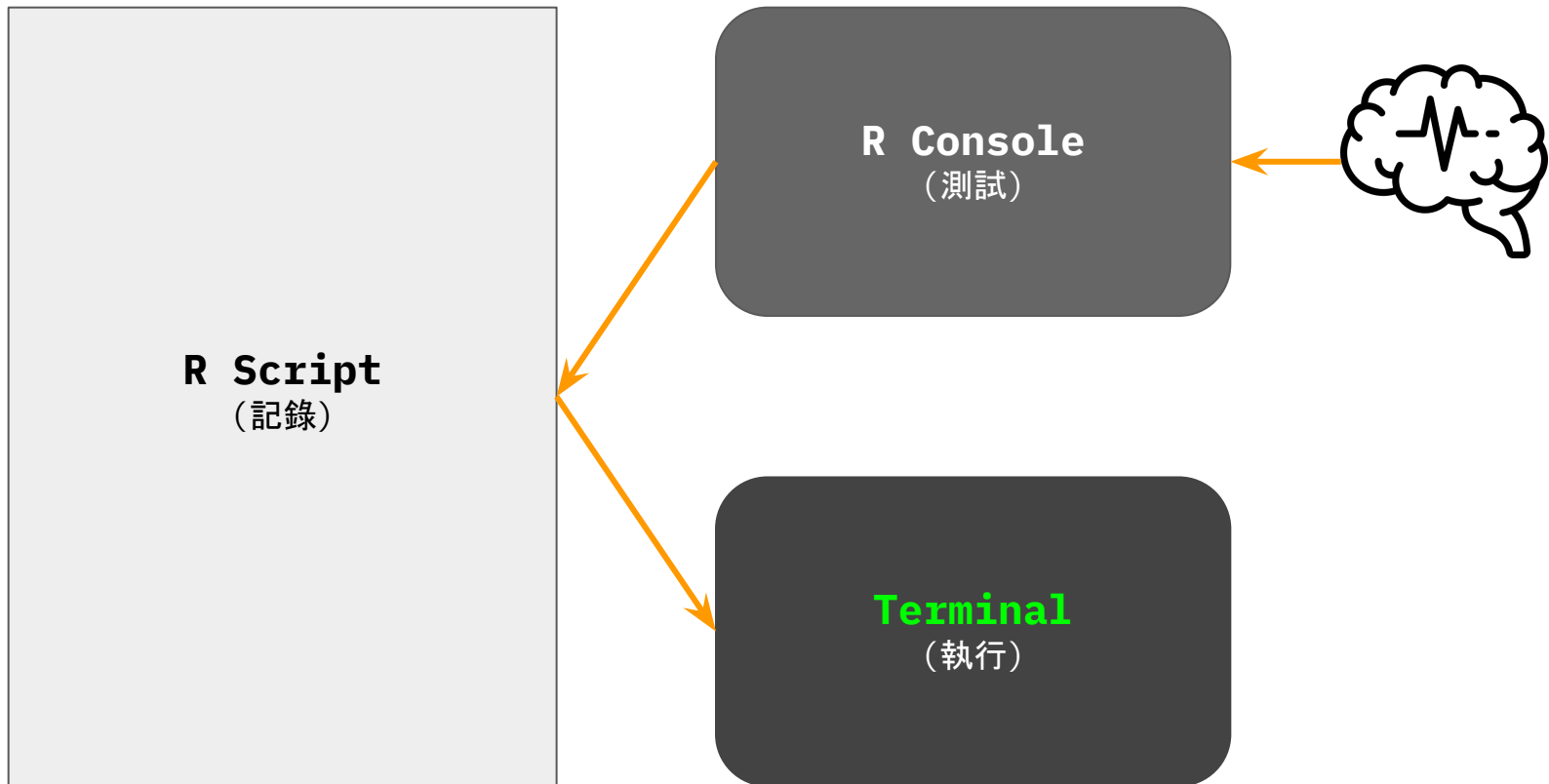
Lab 02

Base R (I)

函數, 向量, 資料類型, 條件式

工具: RStudio, R Markdown

撰寫 R 必備的 3 樣工具

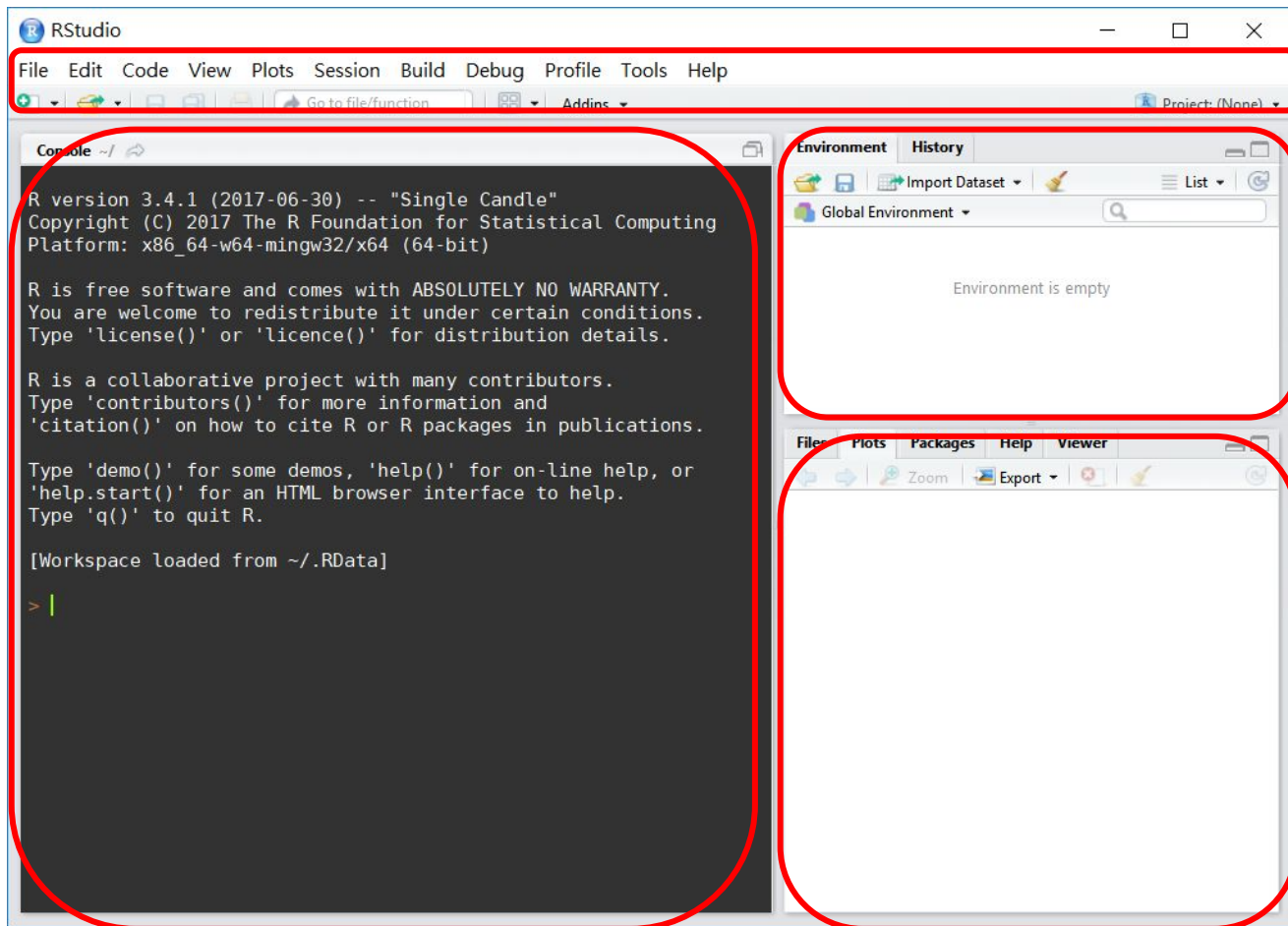


RStudio

選單功能

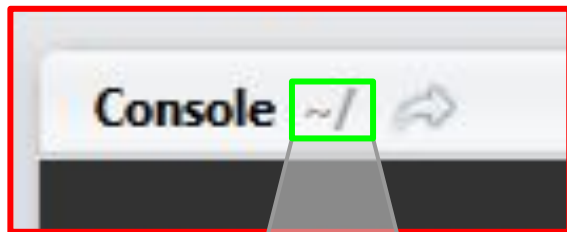
Console
(執行 R)

Source
(R Script)

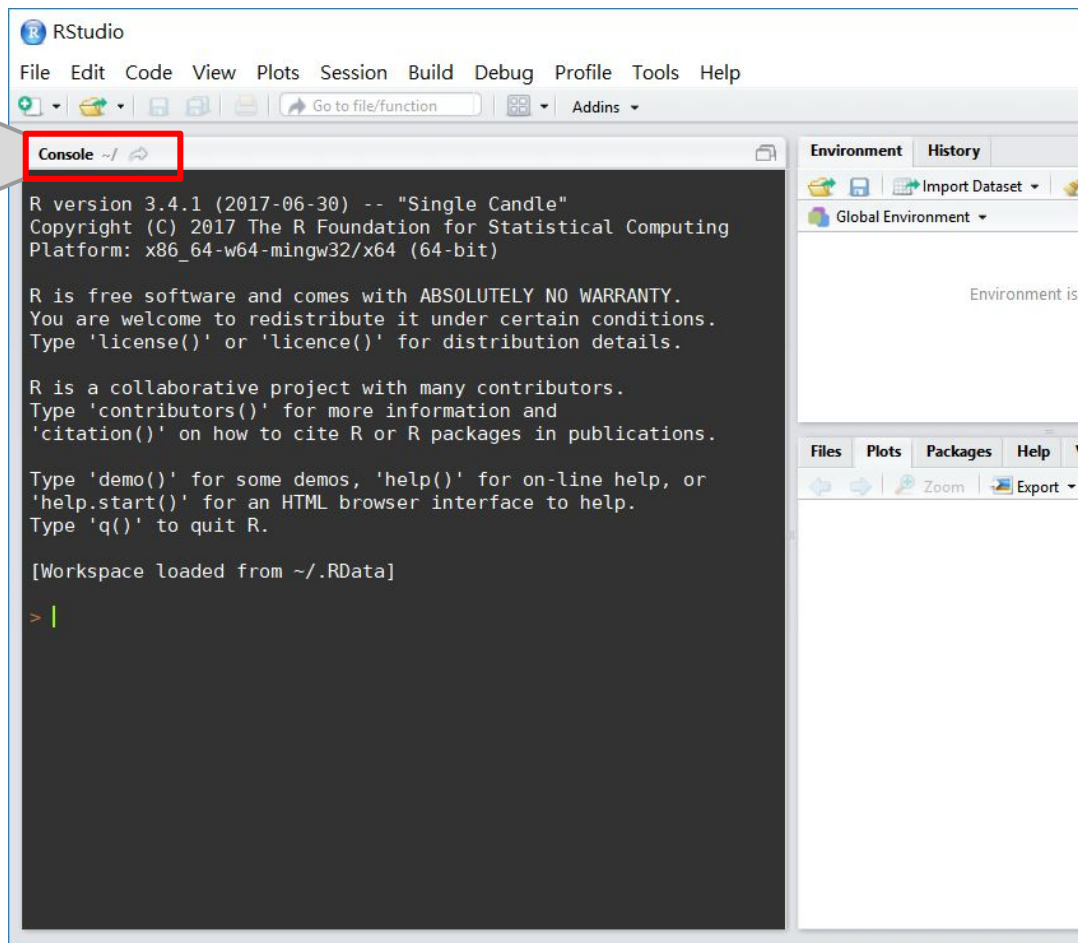


Environment
History

Files,
Plots,
Packages,
Help,
Viewer



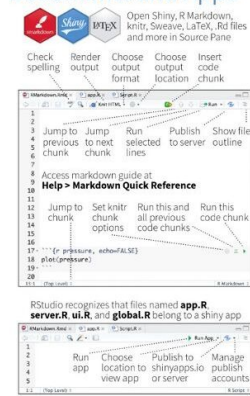
工作目錄
路徑



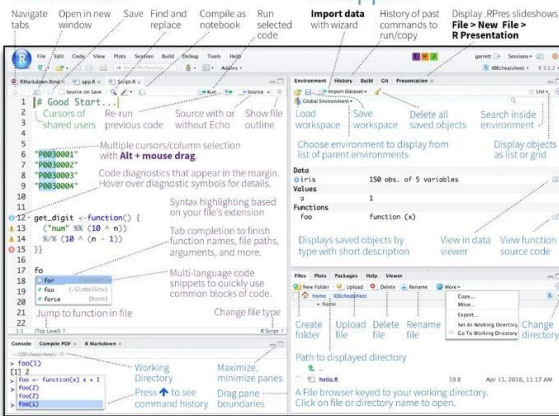
RStudio Cheat Sheet

RStudio IDE :: CHEAT SHEET

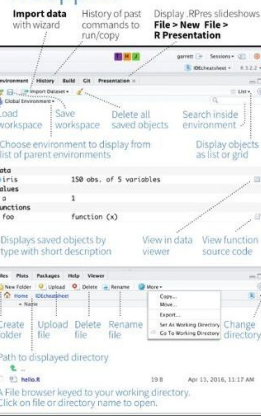
Documents and Apps



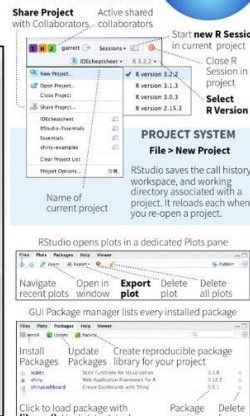
Write Code



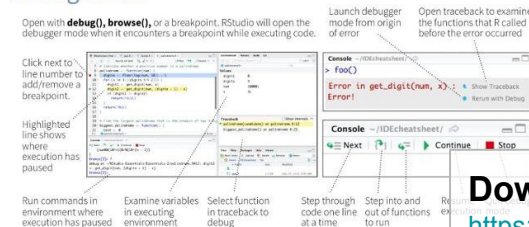
R Support



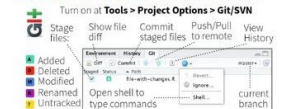
Pro Features



Debug Mode



Version Control with Git or SVN



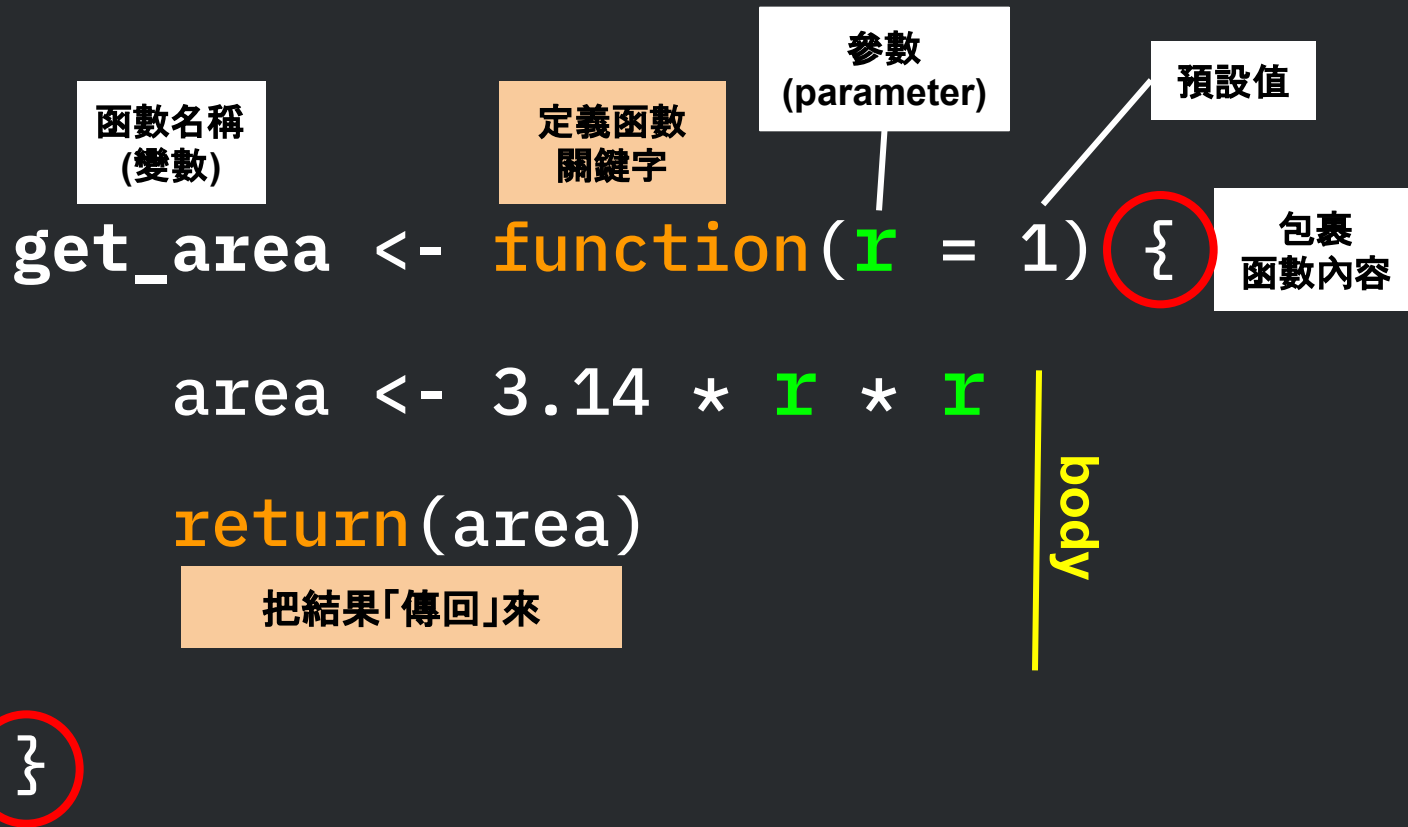
Package Writing



Download:

<https://resources.rstudio.com/rstudio-cheatsheets/rstudio-ide-cheat-sheet>

自訂函數 (Function)



Function Arguments

```
fun <- function(p1, p2, p3) {...}
```

```
fun(1, 2, p2 = 3)
```

1. 先指派**有名字的** (Named) Arguments
2. 再**依序**指派剩下的 Arguments

```
fun(1, 2, p2 = 3)
```

先指派

Named Arguments

3

p1

p2

p3

```
fun (1, 2, p2 = 3)
```

指派 1st
Unnamed Argument

1

p1

3

p2

p3

```
fun(1, 2, p2 = 3)
```

指派 2nd
Unnamed Argument

1

p1

3

p2

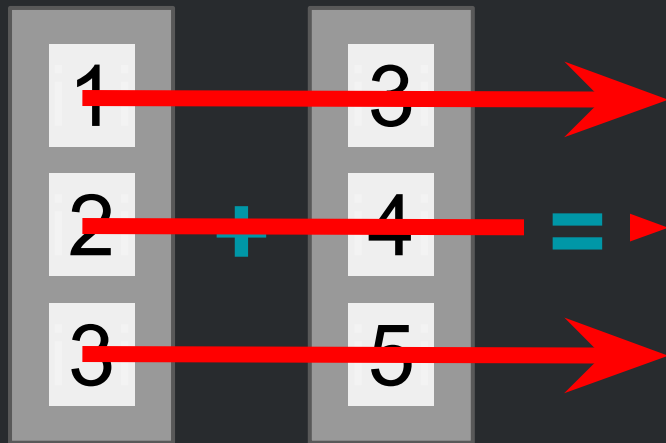
2

p3

向量 (Vector)

Vector

- Basic units in R
- `length()`
- 4 種 (最常見的) 類型
 - Integer
 - Double
 - Logical
 - Character



Element-wise operation

資料類型

(Data Types)

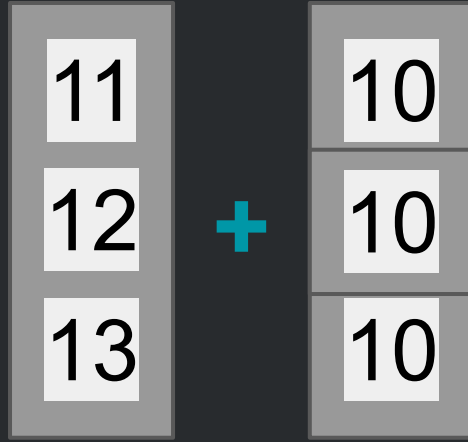
Logical Operators

Operator	語法	意義
>	<code>a > b</code>	a 大於 b？
>=	<code>a >= b</code>	a 大於或等於 b？
<	<code>a < b</code>	a 小於 b？
<=	<code>a <= b</code>	a 小於或等於 b？
==	<code>a == b</code>	a 等於 b？
!=	<code>a != b</code>	a 不等於 b？
<code>%in%</code>	<code>a %in% c(a, b, c)</code>	a 屬於 c(a, b, c)？

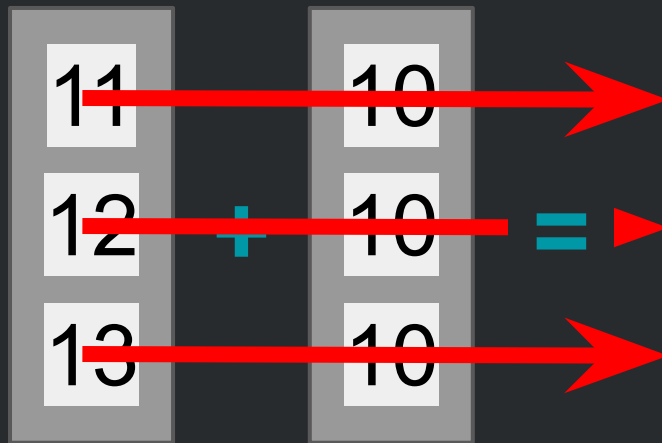
Boolean Operators

Operator	語法	意義
<code>&</code>	<code>cond1 & cond2</code>	且 (and)
<code> </code>	<code>cond1 cond2</code>	或 (or)
<code>!</code>	<code>!cond1</code>	非 (~)
<code>any()</code>	<code>any(cond1, cond2, cond3, ...)</code>	至少一個為真？
<code>all()</code>	<code>all(cond1, cond2, cond3, ...)</code>	全為真？
<code>xor()</code>	<code>xor(cond1, cond2)</code>	cond1 與 cond2 其中一個為真？

Recycling



Recycling



Element-wise operation

paste0(

"a"

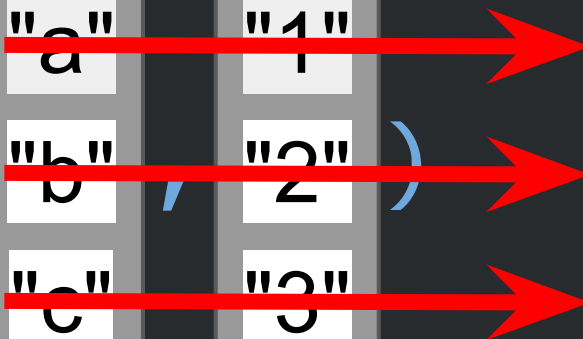
"1"

"b"

"2"

"c"

"3"



paste0()

paste0(

"a"

"1"

"b"

"1"

"c"

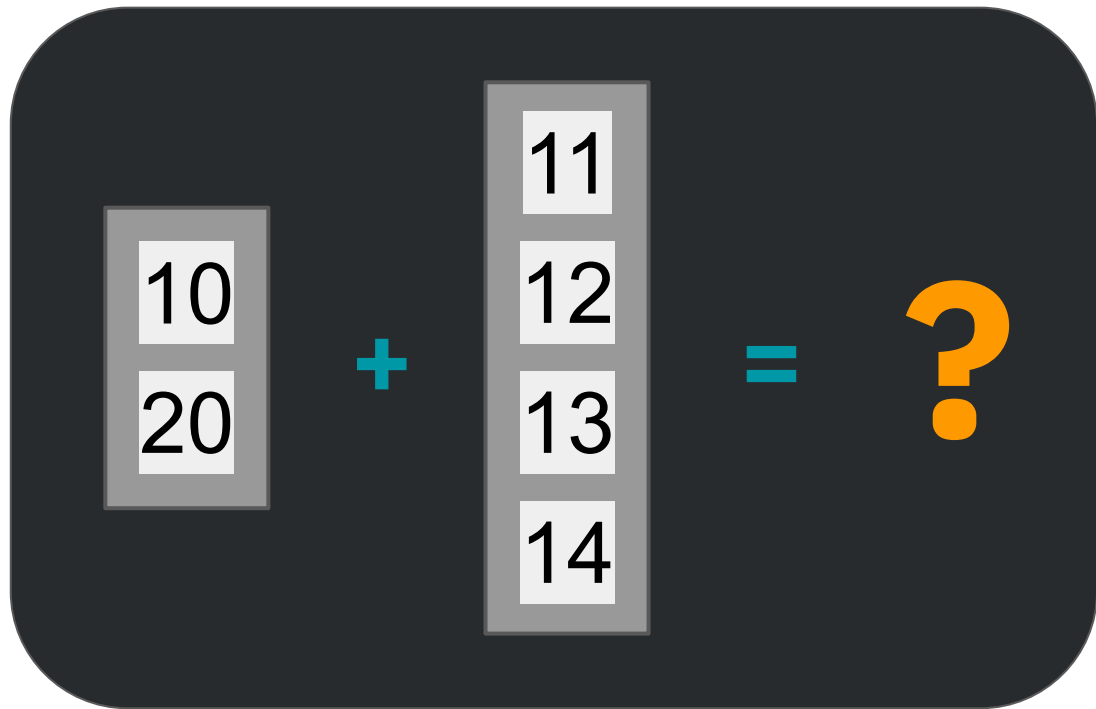
"1"

,

)

Recycling

Pop Quiz



A	B	C	D
21	21	21	21
31	32	22	32
		23	23
		24	34

Pop Quiz

10
20
10

+

11
12
13
14

= ?

A	B	C	D
21 31	21 32	21 22 23 24	21 32 23 34

Pop Quiz

10

20

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+

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=

?

A

B

C

D

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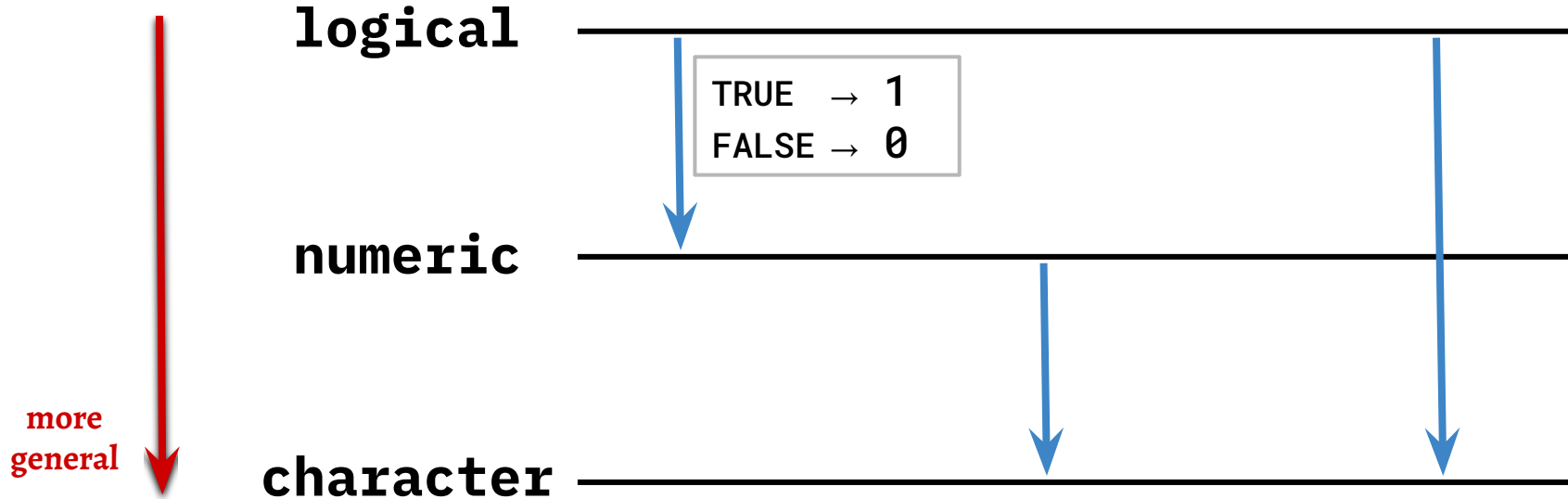
21

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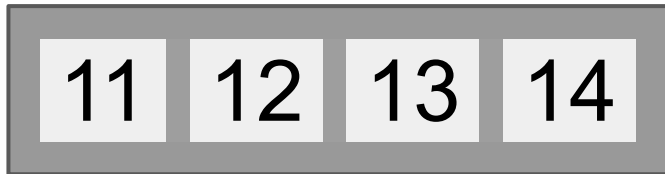
34

Rules of Coercion



Subsetting a vector

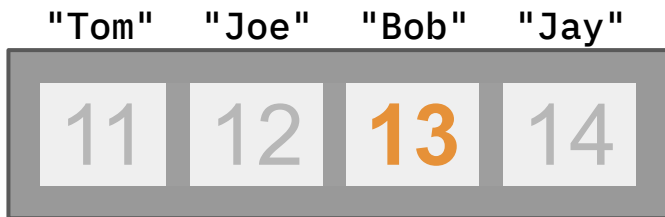
3 種篩選方式



vec



vec[3]



vec["Bob"]



vec[c(T , F , T , F)]

條件式

(if-else)

x 等於 -1

```
x <- -1
```

```
if (x > 0) {
```

```
    print("x is positive")
```

```
} else if (x < 0) {
```

```
    print("x is negative")
```

```
} else {
```

```
    print("x equals zero")
```

```
}
```

```
print("I'm always printed")
```


x 等於 0

```
x <- 0
```

```
if (x > 0) {
```

```
    print("x is positive")
```

```
} else if (x < 0) {
```

```
    print("x is negative")
```

```
} else {
```

```
    print("x equals zero")
```

```
}
```

```
print("I'm always printed")
```

回傳 TRUE 或 FALSE

```
if (<條件 1>) {
```

<Some Code>

回傳 TRUE 或 FALSE

```
} else if (<條件 2>) {
```

<Some Code>

```
} else {
```

<Some Code>

```
}
```

只有一個區塊會被執行

R Markdown



File --> New File --> R Markdown...

R Markdown 的結構

yaml:
控制文件格式

```
1 ---
2 title: "Untitled"
3 author: "Yongfu Liao"
4 date: "9/18/2019"
5 output: html_document
6 ---
```

```
8 ## R Markdown
9
10 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>.
11
```

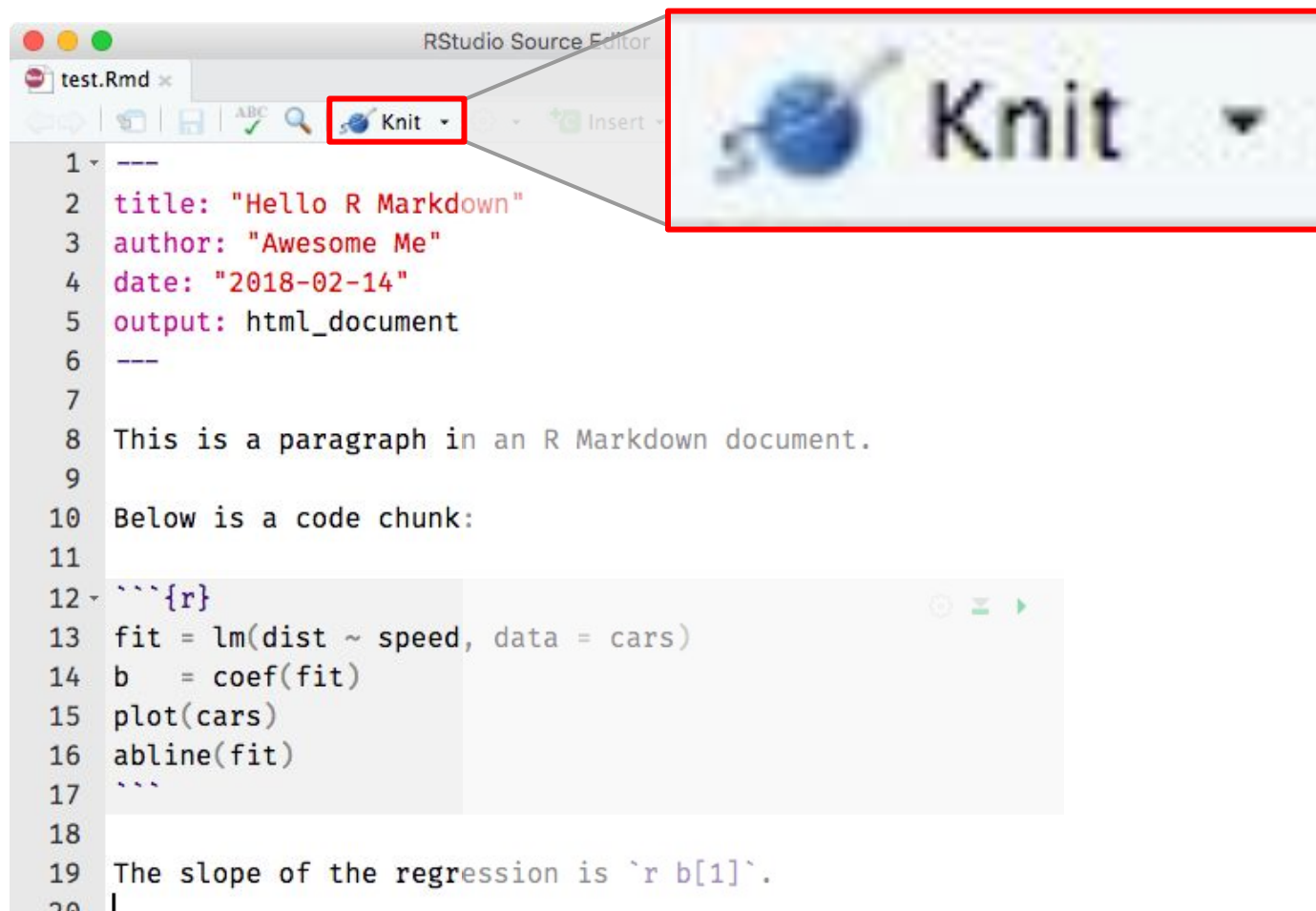
```
12 ```{r cars}
13 summary(cars)
14 ```
```

```
16 ## Including Plots
17
18 You can also embed plots, for example:
19
```

Markdown
內文

R Code Chunk:
可執行 R 語言的區塊

輸出 R Markdown



R Markdown :: CHEAT SHEET

.Rmd files - 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.

Reproducible Research - At the click of a button, or the type of a command, you can rerun the code in an R Markdown file to reproduce your work and export the results as a finished report.

Dynamic Documents - You can choose to export the finished report in a variety of formats, including html, pdf, MS Word, or RTF documents; html or pdf based slides, Notebooks, and more.

The screenshot shows the 'About' dialog box in the 'New Project' wizard. The 'Name' field contains 'NewProject', the 'Location' field contains 'C:\Program Files\Microsoft Visual Studio\VC98\Projects', and the 'Project type' dropdown is set to 'Win32 Console Project'. The 'Project type' dropdown menu is open, showing three options: 'Win32 Console Project' (selected), 'Win32 Application Project', and 'Win32 Dynamic Link Library Project'. The 'Project type' field is highlighted with a mouse cursor.

-
- The screenshot displays the RStudio interface with two main panes. The left pane shows the R script editor with the following code:
- ```

1 ## ---- R Markdown ----
2 title: "R Markdown"
3 output: "report.html"
4 set_output_file("report.html")
5 toc: TRUE
6
7
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9
10
11
12
13 ## R Markdown
14
15 This is an R Markdown document.
16 R Markdown is a simple formatting
17 system for authoring HTML, PDF,
18 and MS Word documents.
19
20 ## Cars
21 summary(cars)
22
23 For more details on using R Markdown
24 see http://rmarkdown.rstudio.com
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100

```
- The right pane shows the rendered HTML output, which includes a table of car statistics:
- | ## | Min.    | speed | diat    | ##    | Min. | speed | diat |
|----|---------|-------|---------|-------|------|-------|------|
| ## | Min.    | 14.0  | Min.    | 1.0   | 2.00 |       |      |
| ## | 1st Qu. | 12.0  | 1st Qu. | 24.0  |      |       |      |
| ## | Median  | 13.0  | Median  | 34.0  |      |       |      |
| ## | Mean    | 15.4  | Mean    | 42.98 |      |       |      |
| ## | 3rd Qu. | 15.0  | 3rd Qu. | 54.0  |      |       |      |
| ## | Max.    | 125.0 | Max.    | 120.0 |      |       |      |
- The footer of the rendered document shows the date and time: "Feb 25, 2016, 3:35 PM".

| input - file to render | output_options - List of render options (as in YAML) | output_file | output_dir | params - list of params to use | envir - environment to evaluate code chunks in | encoding - of input file |
|------------------------|------------------------------------------------------|-------------|------------|--------------------------------|------------------------------------------------|--------------------------|
| output_format          |                                                      |             |            |                                |                                                |                          |

**INLINE CODE**  
Insert with ``r<code>``. Results appear as text without code.  
Built with ``r getRversion()`` Built with 3.2.3

One or more lines surrounded with `'''{r}'''`. Place chunk options within curly braces, after `r`. Insert with .

```
Set with knitr::opts_chunk$set(), e.g.
```{r include=FALSE}
knitr::opts_chunk$set(echo=TRUE)
```

- cache** - cache results for future knits (default = FALSE)
- cache.path** - directory to save cached results in (default = "cache/")
- child** - file(s) to knit and then include (default = NULL)
- collapse** - collapse all output into single block (default = FALSE)
- comment** - prefix for each line of results (default = "#")

- echo** - Display code in output document (default = TRUE)
- engine** - code language used in chunk (default = 'R')
- error** - Display error messages in doc (TRUE) or stop render when errors occur (FALSE) (default = FALSE)

fig.cap = NULL
fig.height = 8 inches
fig.width = 10 inches
highlight = FALSE
include = TRUE
pdf = TRUE

Download

```
results (default = 'passdup')
'asis' - passthrough results
'hide' - do not display results
'hold' - put all results below all code
tidy - tidy code for display (default = FALSE)
warning - display code warnings in document
(default = TRUE)
```

Parameterize your documents to reuse with different inputs (e.g., data, values, etc.)

1. **Add parameters** • Create and set parameters in the header as sub-values of `params`
2. **Call parameters** • Call parameter values in code as `params$<name>`
3. **Set parameters** • Set values with `Knit with parameters` or the `params` argument of `render()`:

```
render("doc.Rmd", params = list(n = 1,  
d = as.Date("2015-01-01")))
```

1. Add runtime: shiny to the YAML header.
2. Call Shiny input functions to embed input objects.
3. Call Shiny render functions to embed reactive output.
4. Render with markdown::run or click Run Document in RStudio IDE

<https://resources.rstudio.com/rstudio-cheatsheets/rmarkdown-2-0-cheat-sheet>