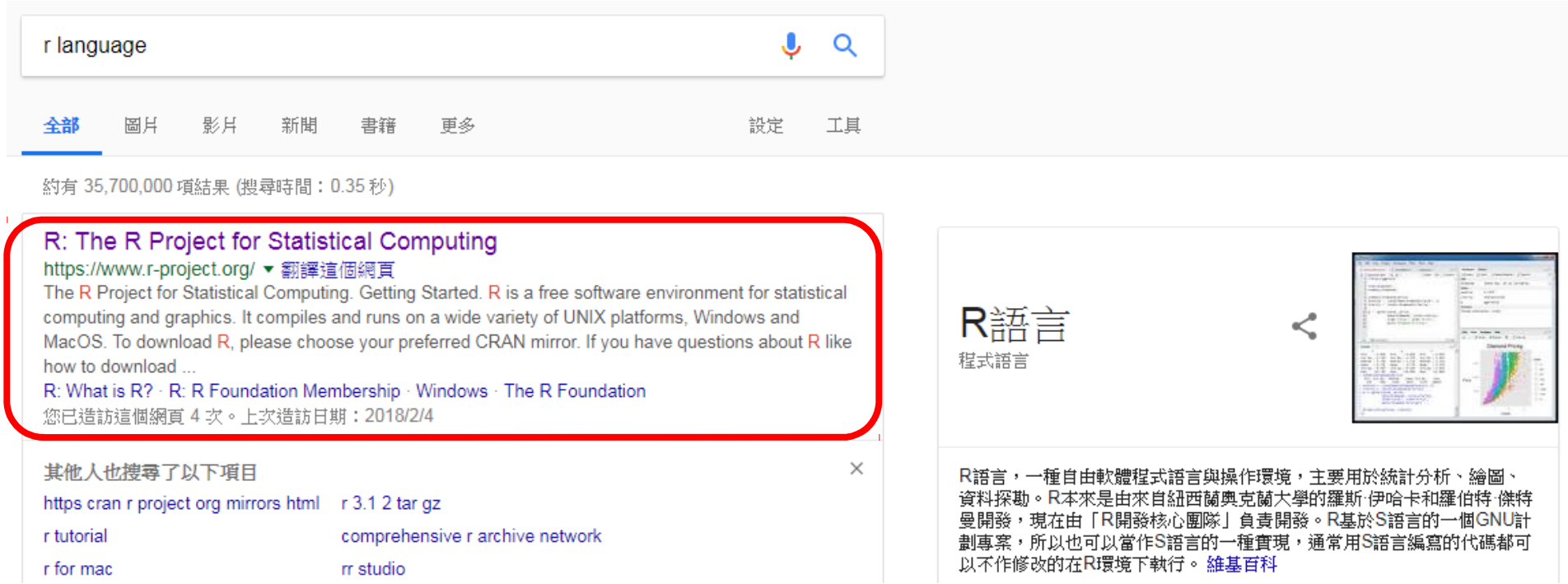
Chapter 2

START TO R

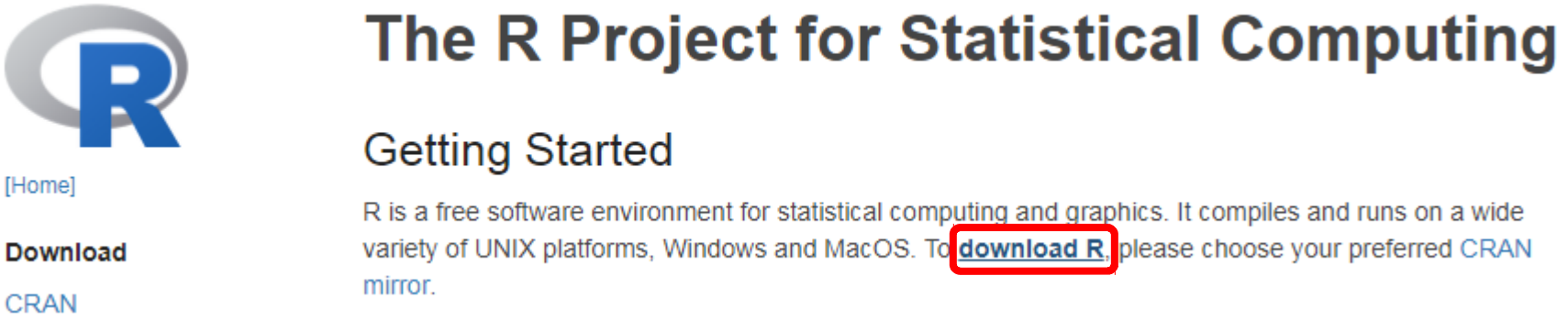
下載並安裝 R

1. Google R



下載並安裝 R

2. 滑鼠移到 download R (找到 Taiwan 的伺服器)



Taiwan

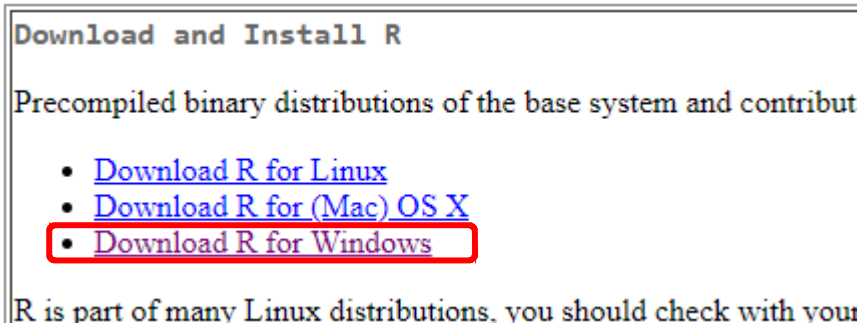
https://ftp.yzu.edu.tw/CRAN/
http://ftp.yzu.edu.tw/CRAN/
http://cran.csie.ntu.edu.tw/

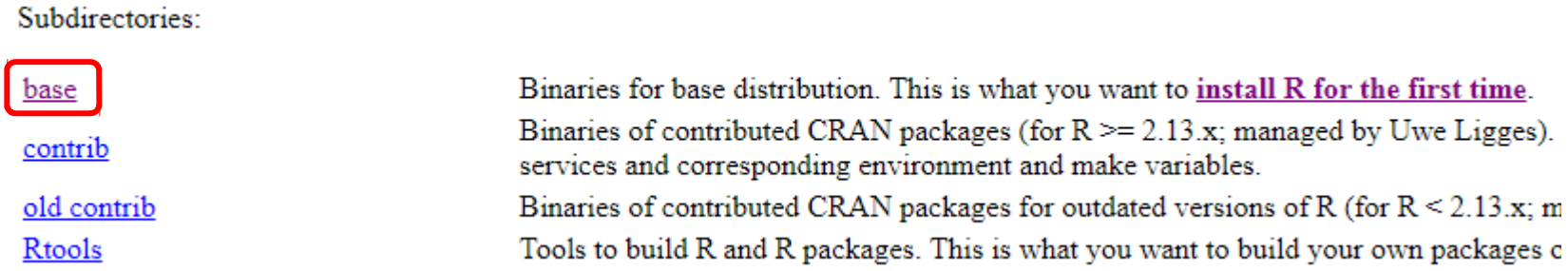
Department of Computer Science and Engineering, Yuan Ze University
Department of Computer Science and Engineering, Yuan Ze University
National Taiwan University, Taipei

下載並安裝 R

3. 下載 windows (base) 版本

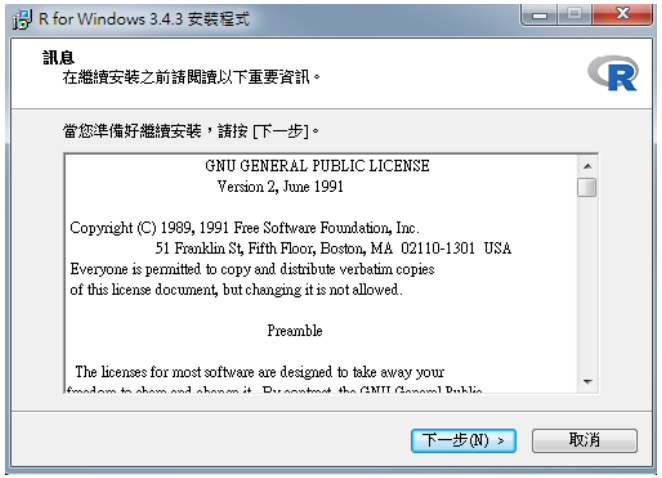
Linux / Mac OSX 請自選

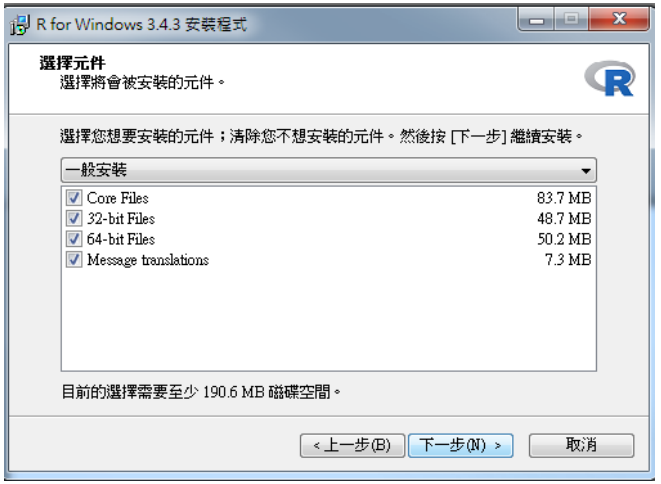


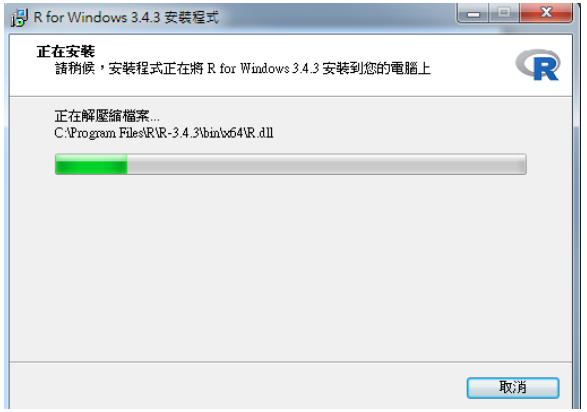


下載並安裝 R

4. 下一步 Repeat





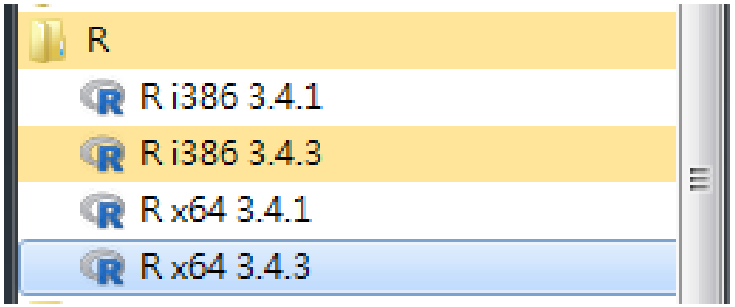


Hello R

1. 開始 -> 所有程式 -> R

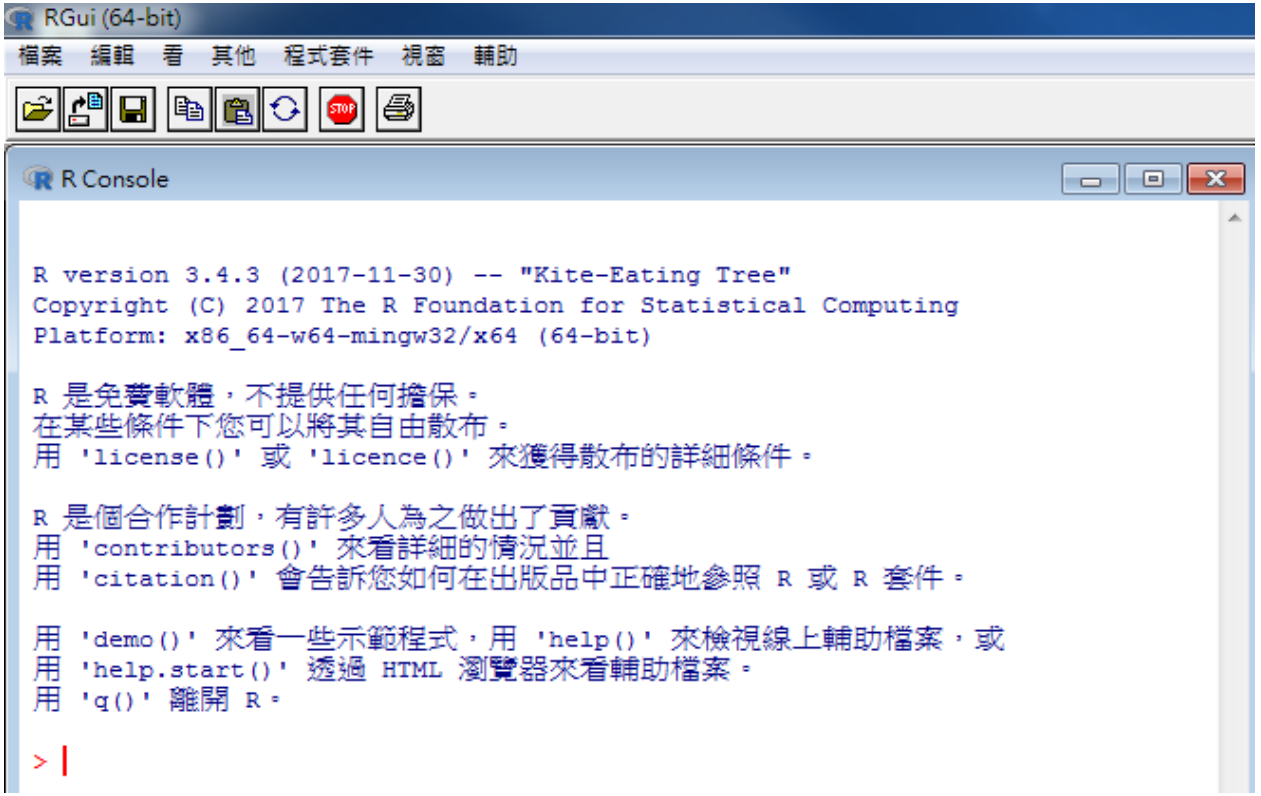
   32bit -> i386 3.4.3

   64bit -> x64 3.4.3



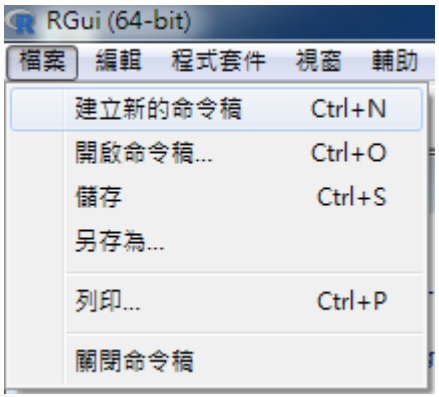
Hello R

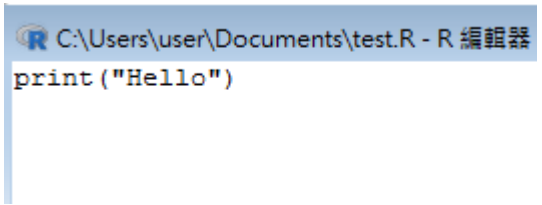
2. 開始 -> 所有程式 -> R

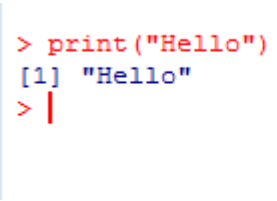


Hello R

3. 開啟新檔 輸入 print(“Hello”), 存檔後按下 ctrl + F5 (執行)



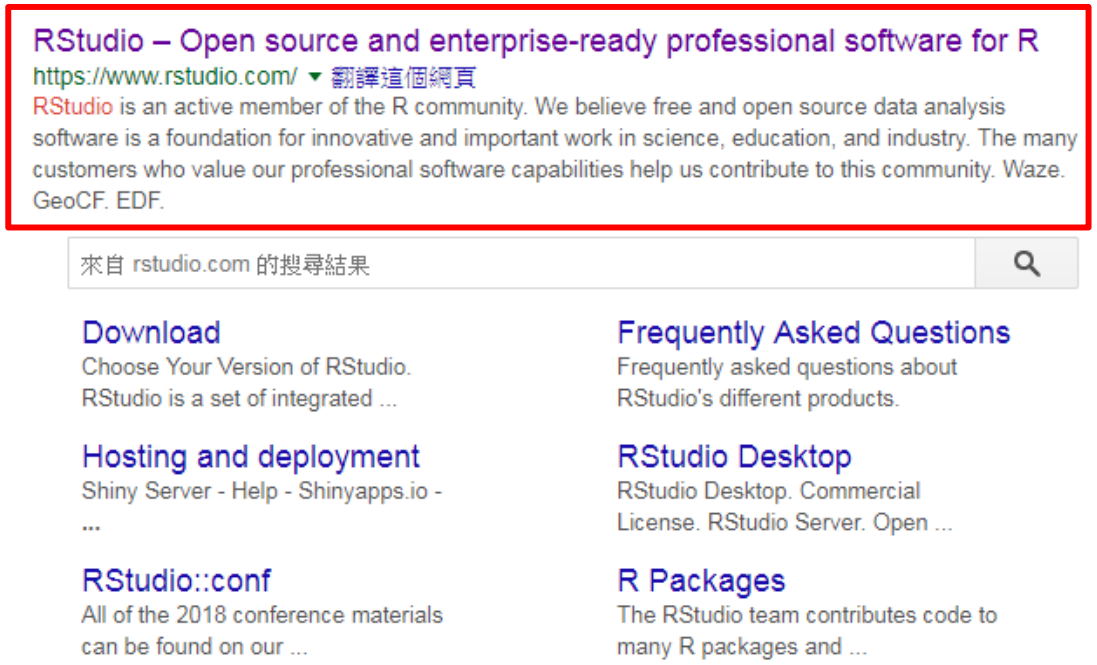




介紹一個好東西 RStudio

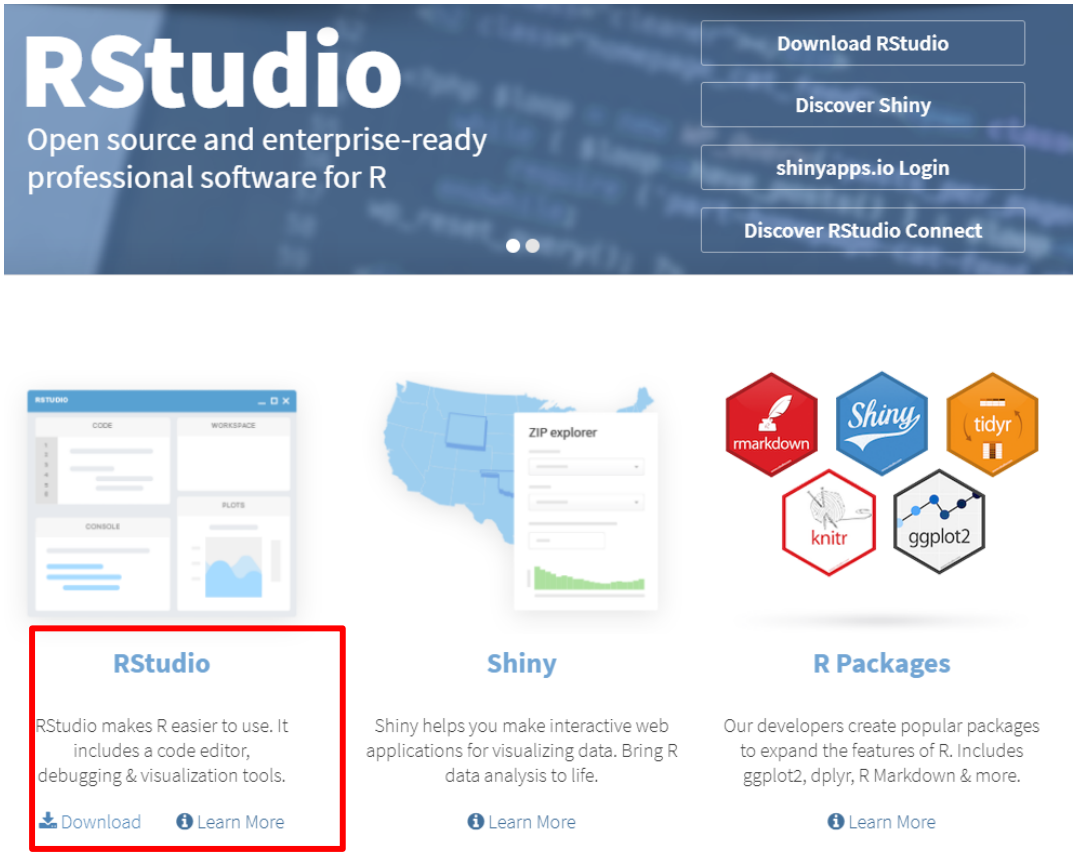
下載並安裝 RStudio

1. Google RStudio



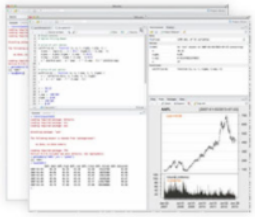
下載並安裝 RStudio

2. 滑鼠移到 Download



下載並安裝 RStudio

3. 有五種版本 選 Desktop Free 就好



Choose Your Version of RStudio

RStudio is a set of integrated tools designed to help you be more productive with R. It includes a console, syntax-highlighting editor that supports direct code execution, and a variety of robust tools for plotting, viewing history, debugging and managing your workspace. Learn More about RStudio features.

	RStudio Desktop Open Source License	RStudio Desktop Commercial License	RStudio Server Open Source License	RStudio Server Pro Commercial License	RStudio Server Pro + RStudio Connect Commercial License
	FREE	$995 per year	FREE	$9,995 per year	$29,995 per year
	DOWNLOAD	BUY	DOWNLOAD	DOWNLOAD	TALK
	Learn More	Learn More	Learn More	Learn More	Learn More
Integrated Tools for R	●	●	●	●	●

RStudio

RStudio Desktop 1.1.423 — Release Notes

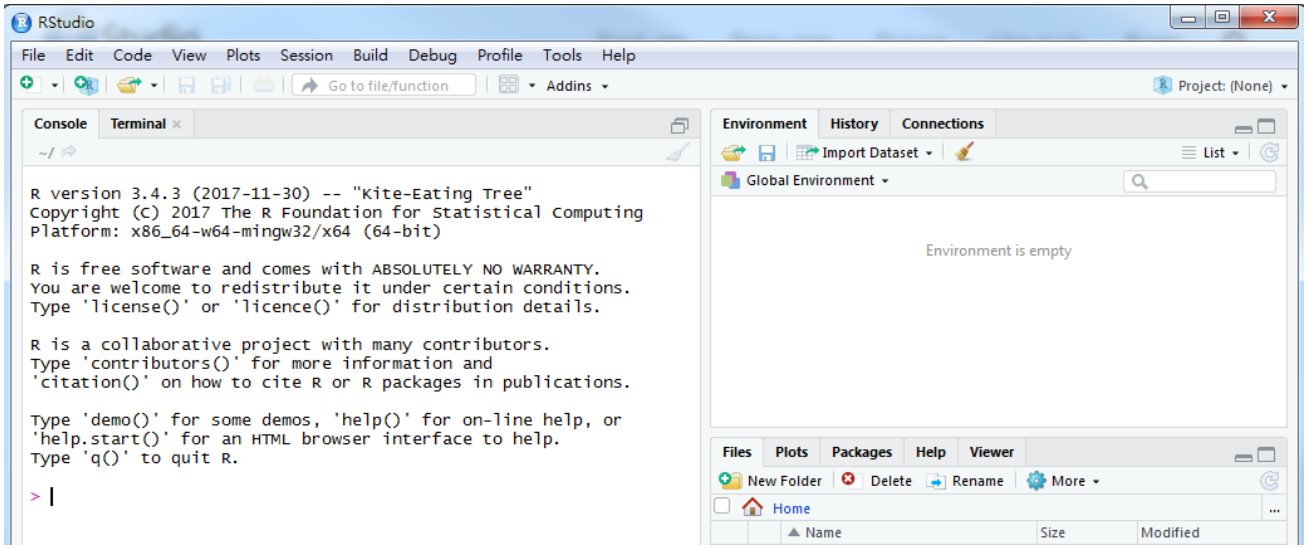
RStudio requires R 3.0.1+. If you don't already have R,

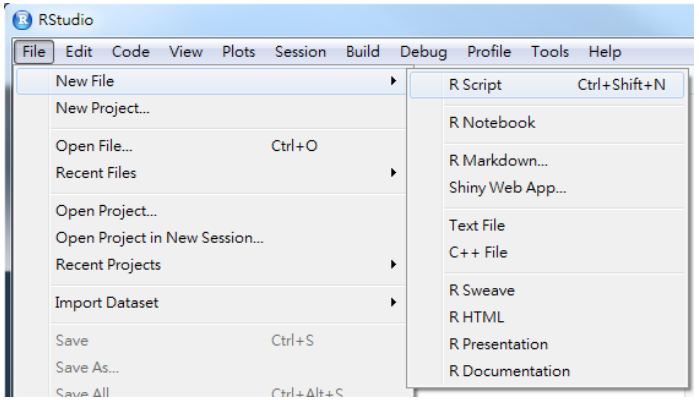
Installers for Supported Platforms

Installers
RStudio 1.1.423 - Windows Vista/7/8/10

如何在 RStudio 上執行 R

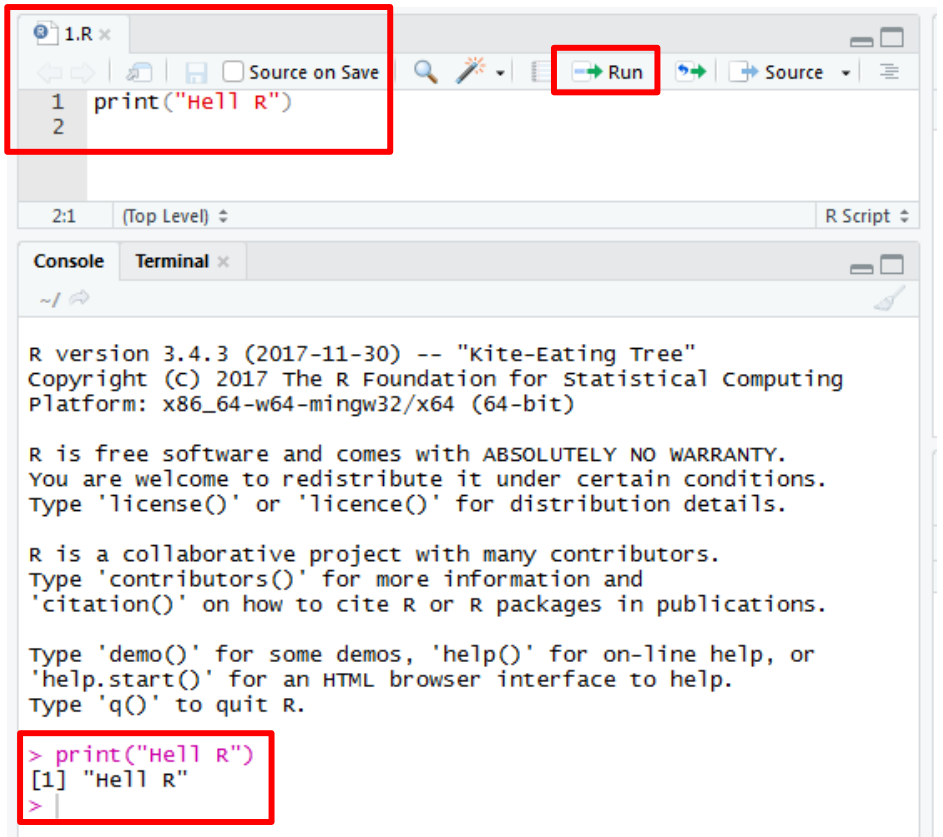
1. 打 Rstudio, 選 R Script





如何在 RStudio 上執行 R

2. 輸入 print(“Hello R”) 存檔後並執行



如何在 RStudio 上執行 R

3. 若要執行多行程式 選擇要執行的程式 點選執行或 Ctrl+ Enter

```
1  print("Hello R")
2  print("Hello Data Mining")
3  print("Hello NKUST")
```

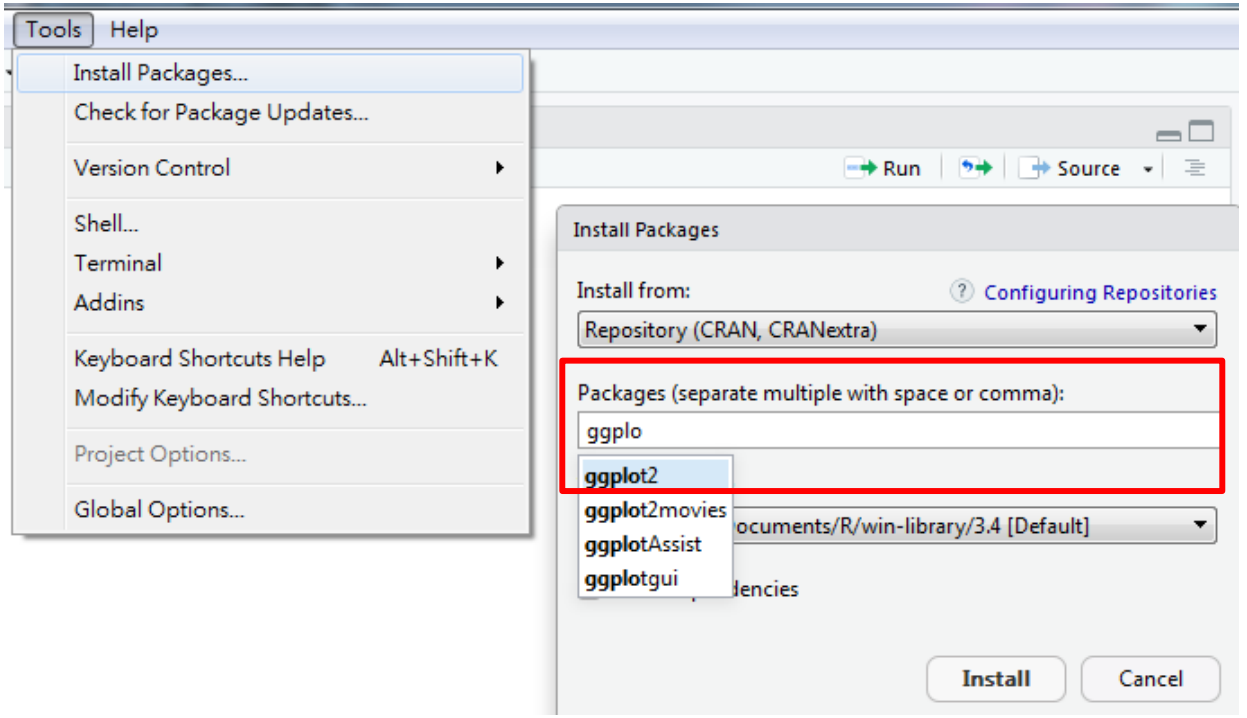
```
> print("Hello R")
[1] "Hello R"
> print("Hello Data Mining")
[1] "Hello Data Mining"
> print("Hello NKUST")
[1] "Hello NKUST"
>
```

如何在 RStudio 上執行 R

4. 若要執行某一行程式 把滑鼠指向該行程式並執行

如何在 RStudio 安裝套件

1. Tool -> Install Packages -> 輸入套件名稱 (ex. ggplot2)



如何在 RStudio 安裝套件

2. 在 Console 會看到 相關的套件會一併安裝

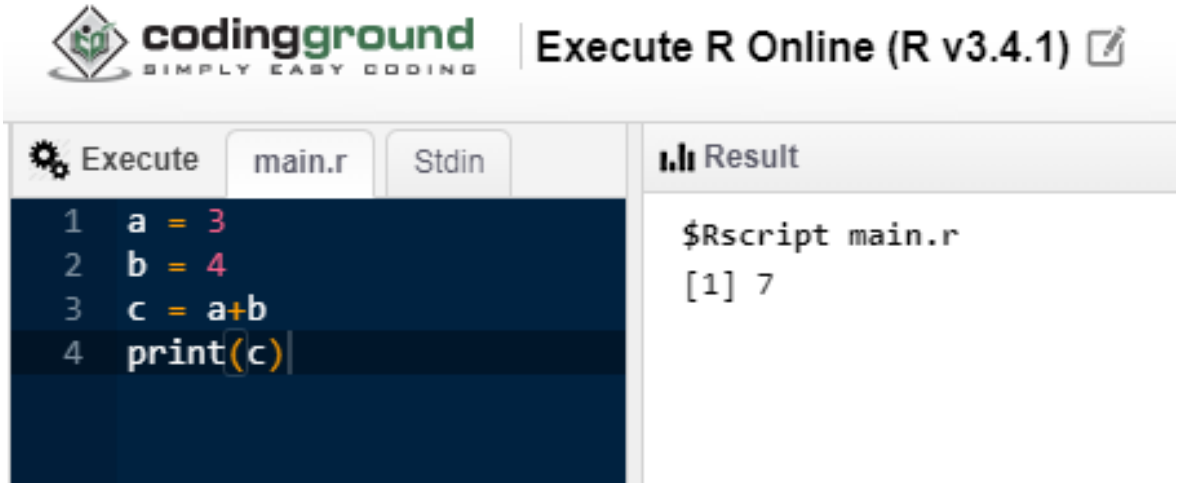
```
> install.packages("ggplot2")
Installing package into 'C:/Users/user/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
also installing the dependencies 'colorspace', 'assertthat', 'utf8', 'Rcpp', 'RColorBrewer', 'dichromat', 'munsell', 'labeling', 'R6
', 'viridisLite', 'cli', 'crayon', 'pillar', 'rlang', 'digest', 'gtable', 'plyr', 'reshape2', 'scales', 'tibble', 'lazyeval'

trying URL 'https://cran.rstudio.com/bin/windows/contrib/3.4/colorspace_1.3-2.zip'
Content type 'application/zip' length 447069 bytes (436 KB)
downloaded 436 KB
package 'colorspace' successfully unpacked and MD5 sums checked
package 'assertthat' successfully unpacked and MD5 sums checked
package 'utf8' successfully unpacked and MD5 sums checked
package 'Rcpp' successfully unpacked and MD5 sums checked
package 'RColorBrewer' successfully unpacked and MD5 sums checked
package 'dichromat' successfully unpacked and MD5 sums checked
package 'munsell' successfully unpacked and MD5 sums checked
package 'labeling' successfully unpacked and MD5 sums checked
package 'R6' successfully unpacked and MD5 sums checked
package 'viridisLite' successfully unpacked and MD5 sums checked
package 'cli' successfully unpacked and MD5 sums checked
package 'crayon' successfully unpacked and MD5 sums checked
package 'pillar' successfully unpacked and MD5 sums checked
package 'rlang' successfully unpacked and MD5 sums checked
package 'digest' successfully unpacked and MD5 sums checked
package 'gtable' successfully unpacked and MD5 sums checked
package 'plyr' successfully unpacked and MD5 sums checked
package 'reshape2' successfully unpacked and MD5 sums checked
package 'scales' successfully unpacked and MD5 sums checked
package 'tibble' successfully unpacked and MD5 sums checked
package 'lazyeval' successfully unpacked and MD5 sums checked
package 'ggplot2' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
        C:\Users\user\AppData\Local\Temp\RtmpC4QnI1\downloaded_packages
```

線上編輯器

Codingground (http://www.compileonline.com/execute_r_online.php)



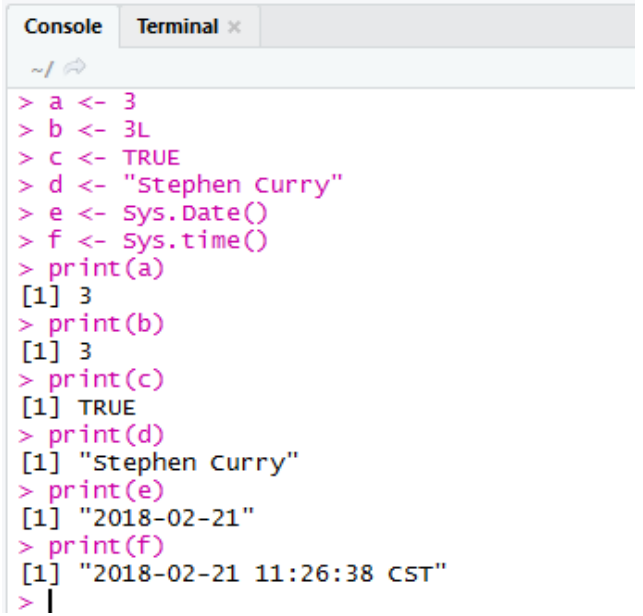
Any Questions !?

資料型態

數值型別 (numeric Type)

型態	Example
數值	2
整數	3L
布林	TRUE
文字	“Stephen Curry”
日期	Sys.Date()
時間	Sys.time()

```
1  a <- 3
2  b <- 3L
3  c <- TRUE
4  d <- "Stephen Curry"
5  e <- Sys.Date()
6  f <- Sys.time()
7  print(a)
8  print(b)
9  print(c)
10 print(d)
11 print(e)
12 print(f)
13
```

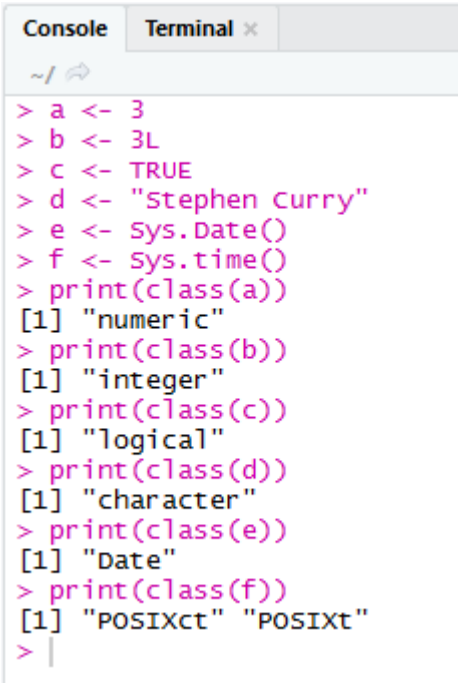


資料型態

數值型別 (numeric Type) – 查詢型態：class

型態	Example
數值	2
整數	3L
布林	TRUE
文字	“Stephen Curry”
日期	Sys.Date()
時間	Sys.time()

```
1  a <- 3
2  b <- 3L
3  c <- TRUE
4  d <- "Stephen Curry"
5  e <- Sys.Date()
6  f <- Sys.time()
7  print(class(a))
8  print(class(b))
9  print(class(c))
10 print(class(d))
11 print(class(e))
12 print(class(f))
13
```



賦值 ：assign

R 語言裡，賦值指令是「 <- 」，後面放變數數值，也可以使用 “ =“

```
Iverson <- 3
Iverson = 3
```

```
1  Iverson <-3
2  AI =3
3
4  print(Iverson)
5  print(AI)
```

```
> Iverson <-3
> AI =3
>
> print(Iverson)
[1] 3
> print(AI)
[1] 3
>
```

數學運算

符號	meaning
+ - * /	
^, **	次方
%%	餘數

```
1  a <- 8
2  b <- 7
3  c = a+b
4  d = a**b
5  e = a^b
6  f = d %% b
7
8  print (c)
9  print (d)
10 print (e)
11 print (f)
12
```

```
Console  Terminal
~/
> a <- 8
> b <- 7
> c = a+b
> d = a**b
> e = a^b
> f = d %% b
>
> print (c)
[1] 15
> print (d)
[1] 2097152
> print (e)
[1] 2097152
> print (f)
[1] 1
>
```

日期轉換

R 語言裡，日期可以轉成整數

預設以 1970 年 1 月 1 日做為 0. 在這之後的日期 +1, 反之則 -1

```
1  date = Sys.Date()
2  int_date = as.integer(date)
3  print(int_date)
4  y = int_date /  365
5  d = int_date %% 365
6
7  print(y)
8  print(d)
```

```
> date = Sys.Date()
> int_date = as.integer(date)
> print(int_date)
[1] 17583
> y = int_date /  365
> d = int_date %% 365
>
> print(y)
[1] 48.1726
> print(d)
[1] 63
>
```

日期轉換

R 語言裡，日期可以轉成整數

預設以 1970 年 1 月 1 日做為 0. 在這之後的日期 +1, 反之則 -1

```
1  date <- as.Date("1984-05-30")
2
3  x <- date +1
4  y <- date +2
5
6  print(x)
7  print(y)
8
```

```
> date <- as.Date("1984-05-30")
>
> x <- date +1
> y <- date +2
>
> print(x)
[1] "1984-05-31"
> print(y)
[1] "1984-06-01"
>
```

時間轉換

R 語言裡，時間也可以轉成整數

預設以 1970 年 1 月 1 日 00 時 00 分 001 秒做為 0. 在這之後的每秒 +1, 反之則 -1

```
1  times <- Sys.time()
2  print (as.integer(times))
3
4  times <- as.POSIXct("2018-02-21 13:33:00", tz= "GMT")
5  x <- times + 10
6  y <- times + 148000000
7  print(x)
8  print(y)
9
```

```
> times <- as.POSIXct("2018-02-21 13:33:00", tz= "GMT")
> x <- times + 10
> y <- times + 148000000
> print(x)
[1] "2018-02-21 13:33:10 GMT"
> print(y)
[1] "2022-10-31 12:39:40 GMT"
>
```

變數判斷

R 語言裡，可以使用內建函數判斷變數是否為某種資料形態

函數	Meaning
is.numeric	是否為數值
is.integer	是否為整數
is.logical	是否為布林
is.character()	是否為文字
inherits(x, what =“Date”)	是否為日期
inherits(x, what =“POSIXct”)	是否為時間

變數判斷

R 語言裡，可以使用內建函數判斷變數是否為某種資料形態

```
1  is.numeric(1)
2  is.integer(3.5L)
3  is.integer(5L)
4  is.logical("false")
5  is.character(30)
6  inherits("2018-02-30", what = "Date")
7  inherits(Sys.time(),   what = "POSIXct")
```

```
Console  Terminal ×
~/
> is.numeric(1)
[1] TRUE
> is.integer(3.5L)
[1] FALSE
Warning message:
integer literal 3.5L contains decimal; using numeric value
> is.integer(5L)
[1] TRUE
> is.logical("false")
[1] FALSE
> is.character(30)
[1] FALSE
> inherits("2018-02-30", what = "Date")
[1] FALSE
> inherits(Sys.time(),   what = "POSIXct")
[1] TRUE
>
```

變數轉換

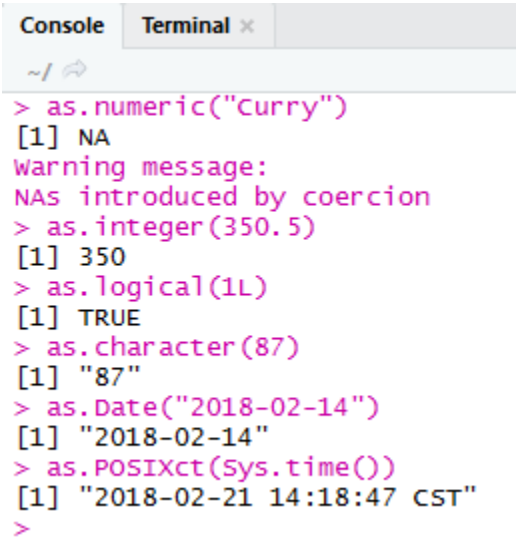
R 語言裡，可以使用 as. 類別名稱 () 進行某種資料形態的轉換

函數	Meaning
as.numeric	轉為數值
as.integer	轉為整數
as.logical	轉為布林
as.character()	轉為文字
as.Date ()	轉為日期
as.POSIXct()	轉為時間

變數轉換

R 語言裡，可以使用 as. 類別名稱 () 進行某種資料形態的轉換

```
1  as.numeric("Curry")
2  as.integer(350.5)
3  as.logical(1L)
4  as.character(87)
5  as.Date("2018-02-14")
6  as.POSIXct(Sys.time())
```



隨堂練習

1. 將身高 , 體重 assign 給 二個變數
2. 算出 BMI

```
> print(bmi)
[1] 29.38776
>
```

隨堂練習

1. 1999 年 9 月 21 日 1 時 47 分 16 秒發生了 921 地震
2. 2018 年 2 月 6 日 23 時 50 分 42 秒發生了花蓮地震
3. 算出這二個地震的時間間隔多久

```
18 年 22 小時 3 分 26 秒
>
```

Hint : 使用 cat 函數來串接字串

Any Questions !?