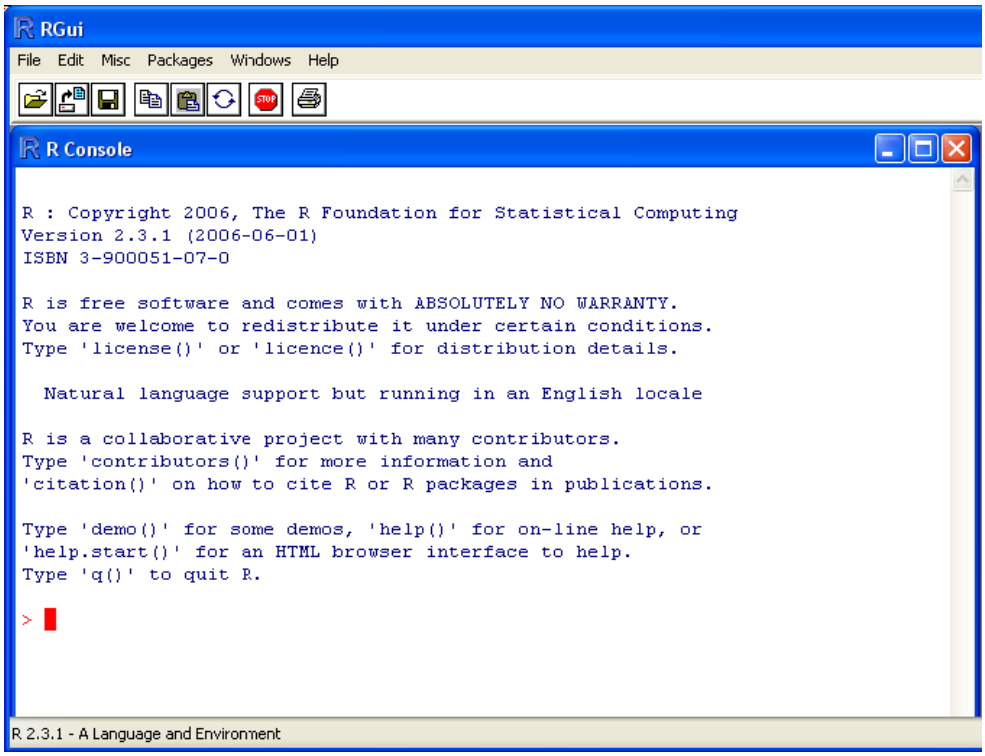
Learn R in 15 Minutes

0. Download R for free via http://cran.r-project.org/ and install it.

1. Start R under Windows:



2. Use R as a calculator.

Type your commands after the command line prompt ">" and press the **Enter** key. The result appears on the screen after "[**1**]". Everything starting with "#" is for explanatory purpose only and will not be executed by R. For examples,

```
> 2+3-1
[1] 4
> 2*3/4
[1] 1.5
> 2^3           # 2 to the 3rd power
[1] 8
> sqrt(10)      # square root of 10
[1] 3.162278
> 10^(1/3)      # cube root of 10
[1] 2.154435
> choose(5,2)   # 5 choose 2
[1] 10
> factorial(5)  # 5!
```

```
[1] 120
> (choose(6,2)*7*3 + 6*choose(7,2)*3 + 6*7*choose(3,2))/choose(16,4)
[1] 0.45
> abs(-10)      # absolute value of -10
[1] 10
> exp(1)        # exponential function
[1] 2.718282
> log(3)        # natural logarithm
[1] 1.098612
> pi
[1] 3.141593
> sin(pi/2)     # sine function
[1] 1
> asin(1)/pi    # arc-sine function
[1] 0.5
```

For more trigonometric functions, try `help(sin)`.

3. Use R to plot functions

For example, to plot the function "$x\sin(x)$":

```
>f <- function(x) { x*sin(x); }  # define the function f(x)=x*sin(x)
>plot(f,-20*pi,20*pi) # plot f between -20*pi and 20*pi
>abline(0,1,lty=2)    # add a dash line with intercept 0 and slope 1
>abline(0,-1,lty=2)   # add a dash line with intercept 0 and slope -1
```

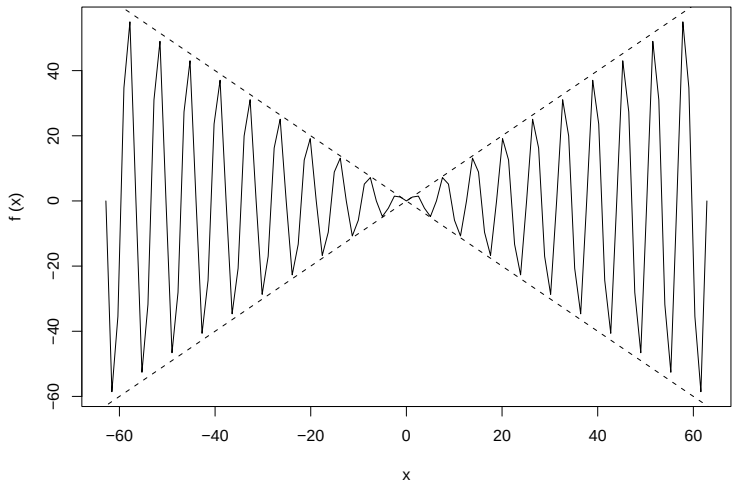


Figure 1: Function $x\sin(x)$

For more examples, see [1], Chapter 3.

4. Use R for data analysis

For example,

```
> library(MASS)   # load package "MASS" for data set "hills"
> summary(hills)  # list summary statistics of variables in "hills"
      dist            climb          time
 Min.   : 2.000   Min.   : 300   Min.   : 15.95
 1st Qu.: 4.500   1st Qu.: 725   1st Qu.: 28.00
 Median : 6.000   Median :1000   Median : 39.75
 Mean   : 7.529   Mean   :1815   Mean   : 57.88
 3rd Qu.: 8.000   3rd Qu.:2200   3rd Qu.: 68.63
 Max.   :28.000   Max.   :7500   Max.   :204.62
> cor(hills)      # correlation matrix for "hills"
           dist     climb      time
dist  1.0000000 0.6523461 0.9195892
climb 0.6523461 1.0000000 0.8052392
time  0.9195892 0.8052392 1.0000000
> pairs(hills)    # show scatterplots of variables in "hills"
```

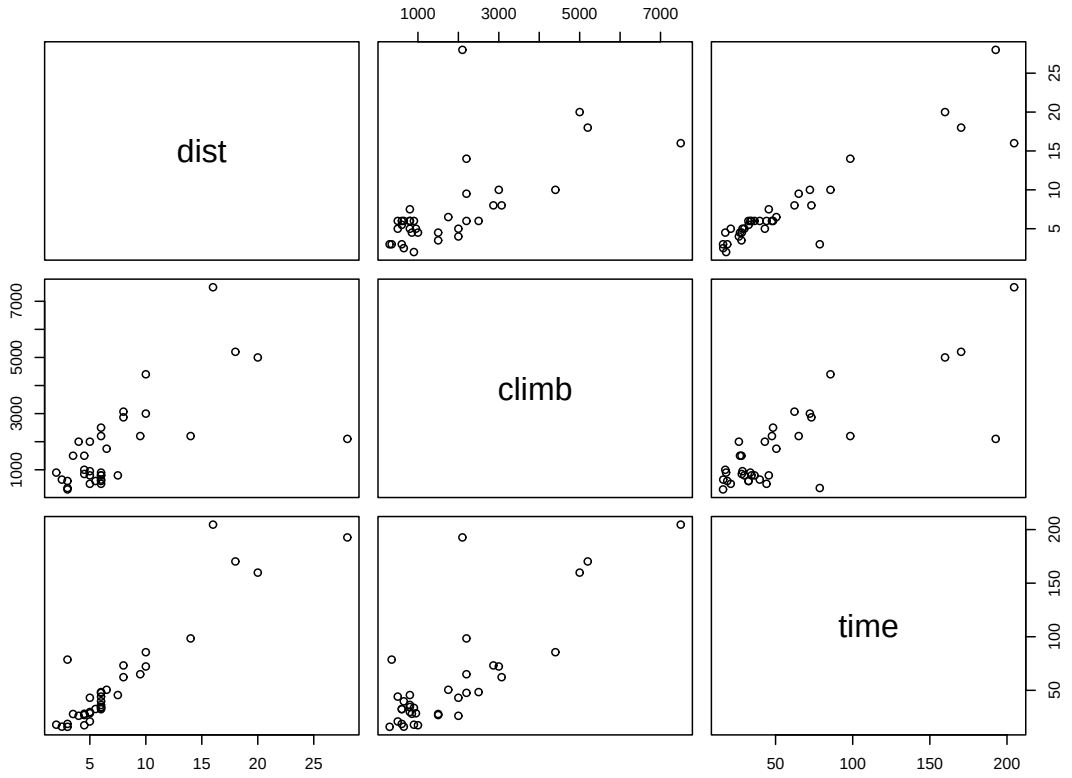


Figure 2: Scatterplots of Variables in Data Set "hills"

For more applications, see [1] and [2].

5. Use R for simulations

For examples,

```
> n <- 100000    # number of random experiments
> x <- c(0,1)    # sample space for tossing a coin, 0--Tail, 1--Head
```

```
> simu <- sample(x, size=n, replace=TRUE)
> sum(simu)      # count number of heads
[1] 49923
> x <- c(1,2,3,4,5,6)  # sample space for casting a die
> simu <- sample(x, size=n, replace=TRUE)
> sum(simu==3)   # count number of "3"
[1] 16506
```

For more information on "`sample`", try "`help(sample)`".

References

[1] Maindonald, J. H. (2004). *Using R for Data Analysis and Graphics: Introduction, Code and Commentary*. Available via http://wwwmaths.anu.edu.au/∼johnm/r/usingR.pdf .

[2] Venables, W. N., Smith, D. M. and the R Development Core Team (2006). *An Introduction to R*. Available via http://cran.r-project.org/doc/manuals/R-intro.pdf .