Getting help

help(topic),?topic	specific documentation about a topic
help.search("topic")	searches the help system for "topic"
demo(topic)	runs demonstration for topic
example(topic)	runs examples for topic

System, Input- output

date()	current date and time
proc.time()	CPU time already taken
system("command")	executes operating system command
getwd()	retrieves the working directory
setwd("dir")	sets the working directory to "dir"
save(file,…), load(file)	saves objects (…) in binary file; loads all objects from file
write.table(x,file)	writes object x as a dataframe to a table
read.table(file)	reads table from space-delimited file, aligned in columns
read.csv(file),read.delim(file)	reads table comma- delimited or tab-delimited file
library(pack),require(pack)	loading existing package

Special characters

<-	assignment statement (also allowed: =, ->, <<-,->>)
[]	indexing of arrays, matrices, dataframes, lists
()	encloses function input variables
{}	embraces statements (e.g. loops, function definition, if)
…	unspecified function input variables
;	separates statements written on a single line
#	demarcates comment
$	extracting elements from lists, data frames

Special numbers

pi	π
.Machine	numerical characteristics of machine
NaN, Inf, NA	Not-a-Number, Infinity, Not Available
NULL	empty vector, array, ….

Data creation, conversion, selection

c()	combines elements in a vector
cbind(),rbind()	binds matrices, dataframes,… columnwise or rowwise
vector,matrix(),array()	creates a vector, matrix, or array
list()	creates a list
data.frame()	creates a data frame
from:to	generates a sequence; increment is 1 or -1
seq(from,to)	generates a sequence; increment or length can be specified
rep()	generates replicates
rev(x), sort(x)	reverses, sorts a sequence
diag()	creates diagonal matrix or extracts diagonal of existing

length(A)	returns length of vector, matrix, array, list or dataframe A
dim(A)	returns dimension of matrix or array A
nrow(A),ncol(A)	number of rows and columns of matrix A
NROW(A),NCOL(A)	number of rows and columns of matrix or vector A
rownames(A),colnames(A)	names of rows and columns of matrix A
as.array(),as.vector(),… as.integer(),as.numeric(), as.logical(),as.double(),…	converts to certain type
is.integer(),is.numeric(), …	tests for type
is.nan, is.null,is.na	tests for NaN, NULL and NA
is.infinite,is.infinite	tests for infinite (Inf) and finite

x[n], x[-n]	select nth element, all but nth element from vector x
x[1:n], x[-(1:n)]	select first n elements, all but first n elements from x
x[c(1,4,6)]	select element 1,4 and 6 from vector x
x[x>3 & x<5]	select elements that meet condition
which(x==a)	returns indices to values x that meet the condition
match()	finds positions of matches in a table
x %in% y	finds matches of x in y; returns true or false
x[x %in% y]	selects elements from x that match elements in y
A[i,j], A[,j], A[i,]	selects element i,j, the jth column, i-th row from matrix A
A[,1:3]	selects columns 1,2,3 from matrix A
A["name",]	selects row named "name" from matrix A
D$name, D[["name"]]	selects column named "name" from data frame D
L[n],L[[n]]	selects n-th element from list L
L[["name"]], L$name	selects element of list L named "name"

print(o), format(o)	prints object o to screen, formats object

Operators, maths

+, -, *, /, ^	usual operators. For tables and arrays element-wise
abs,sign,sqrt,log,log10,exp	elemental functions
cos,sin,tan, acos,asin,atan,atan2	trigonometric functions
min(x),max(x),range(x)	minimum, maximum of x and c(min(x),max(x))
which.min(x),which.max(x)	returns index to minimum and maximum of x
pmin(),pmax()	elementwise minimum and maximum (returns vector)
sum(x),prod(x)	sum and product of x
cumsum(x),cumprod(x)	cumulative sum and product of x
cummin(x),cummax(x)	cumulative min and max of x
diff(x)	differences of x
mean(x),median(x),sd(x)	mean, median and standard deviation of x
cov(x,y),cor(x,y)	variance - covariance and correlation matrix
Re(x),Im(x)	real, and imaginary part of complex number

%*%, %x%	matrix multiplication, kronecker tensor product
t(A), solve(A)	transpose of matrix A, inverse of matrix A
solve(A,b)	solves linear system Ax=b for x
svd(A),qr(A),chol(A)	singular value, QR, cholesky decomposition of matrix A
eigen(A),det(A)	eigenvalues and eigenvectors, determinant of matrix A
rowSums(A),colSums(A)	sums of rows or columns for matrix or array A
rowMeans(A),colMeans(A)	means of rows or columns for matrix or array A
apply(),lapply(),tapply()	apply one function over specific elements of an object
summary()	compute summary statistics of data and function results
aggregate()	compute summary statistics of data subsets
table()	creates a frequency distribution
outer(X,Y,fun)	performs 2-valued function to all combinations of X,Y
expand.grid()	makes all combinations of vectors
<, <=, >, >=	greater than, greater or equal, less than, less or equal
= =, !=,!,	equal, not equal, not,
&, | , xor |	and, or, exclusive or
any(), all()	true if any or all values of a vector are true
unique(A)	returns unique values from A
duplicated(A)	returns index to duplicated values from A

strings

paste()	concatenate elements and converts to string
substr(),strsplit()	substrings, splitting strings
grep(),gsub()	finds matches, replaces matches within a string
tolower(), toupper()	uppercase, lowercase conversion
nchar()	number of characters in string

plotting

plot(x), plot(x,y)	univariate, bivariate plot
curve(fun)	curve of function
matplot(A,B)	one bivariate plot of all columns of A vs all columns of B
pairs(A)	all possible bivariate plots between columns of A
hist(x),barplot(x),pie(x)	histogram of frequencies, bar plot and pie diagram
boxplot(x)	box-and-whisker plot
contour(), filled.contour()	contour plots of x,y,z data
image()	similar as filled.contour, smoother graphs, but less flexible
persp()	three-dimensional graph of x-y-z data
points(),lines(),segments()	adds points, lines or segments to existing plot
abline()	adds horizontal,vertical line, linear regression line,…
rect(),polygon()	adds a filled rectangle or polygon
text(),mtext()	adds text in plot or in margin
legend()	adds a legend to a plot
par()	specification of graphical parameters

parameters common to many plotting functions or specified with par():

adj,font	adjustment (left,centred,…), font of text
cex	size of text and symbols
col	the color of symbols, lines, text,..
lty,lwd	the line type and line width of lines
pch	the type of symbol (integer between 1,25); 15:19 nice
las	orientation of axis labels
mfcol,mfrow	multiple columns or rows on a figure

programming

function(arg) expr	function definition
if, else, else if	conditionally execute statements
ifelse(cond,yes,no)	if condition is true/false, executes statement ‘yes’/’no’
for (el in seq) expr	repeat expressions for each element in sequence
while (cond) expr	repeat expression while condition is true
repeat {expr}	repeat expression until break encountered
break	terminates execution of for, while, repeat loops
next	transfers execution to next iteration in loops
return(value)	returns value to invoking function
stop(),warning(),message()	display fatal errors (and abort) or diagnostic message
with(data,expr)	makes ‘data’ available to expression

miscellaneous

rnorm(),runif()	normally distributed and uniformly distributed numbers
optim(),nlm()	optimization (finding minimum, maximum)
approx()	linear interpolation
uniroot()	solves nonlinear equation

package deSolve

ode	initial value problems of ordinary differential equations
ode.1D	IVP of 1-D systems of differential equations
ode.2D	IVP of 2-D systems of differential equations

package rootSolve

multiroot	finds n roots of n nonlinear equations
steady	Steady-state of systems of differential equations
steady.1D	Steady-state of 1-D systems of differential equations
steady.2D	Steady-state of 2-D systems of differential equations