

Base R

Cheat Sheet

Getting Help

Accessing the help files

?mean
Get help of a particular function.
help.search('weighted mean')
Search the help files for a word or phrase.
help(package = 'rpart')
Find help for a package.

More about an object

str(iris)
Get a summary of an object's structure.
head(iris)
Look on the top of the object.

Using Libraries

install.packages('rpart')
Download and install a package from CRAN.
Mirrors: if not sure, choose the first.
update.packages('rpart')
Update a package from CRAN.

library(rpart)
Load the package into the session, making all its functions available to use.

rpart::rpart()
Use a particular function from a package.

Working Directory

getwd()
Find the current working directory (where inputs are found and outputs are sent).
setwd('C://file/path')
Change the current working directory.

Vectors

Creating Vectors

c(2, 4, 6)	2 4 6	Join elements into a vector
2:6	2 3 4 5 6	An integer sequence
seq(2, 3, by=0.5)	2.0 2.5 3.0	A complex sequence
rep(1:2, times=3)	1 2 1 2 1 2	Repeat a vector
rep(1:2, each=3)	1 1 1 2 2 2	Repeat elements of a vector

Vector Functions

sort(x) Return x sorted.	rev(x) Return x reversed.
table(x) See counts of values.	unique(x) See unique values.

Selecting Vector Elements

By Position

x[4]	The fourth element.
x[-4]	All but the fourth.
x[2:4]	Elements two to four.
x[-(2:4)]	All elements except two to four.
x[c(1, 5)]	Elements one and five.

By Value

x[x == 10]	Elements which are equal to 10.
x[x < 0]	All elements less than zero.
x[x %in% c(1, 2, 5)]	Elements in the set 1, 2, 5.

Named Vectors

x['apple']	Element with name 'apple'.
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Programming

For Loop

```
for (variable in sequence){  
  Do something  
}
```

Example

```
for (i in 1:4){  
  j <- i + 10  
  print(j)  
}
```

```
ifelse(condition, what_if_yes,  
        what_if_no)
```

Example

```
ifelse(i > 3, 'Yes', 'No')
```

If Statements

```
if (condition){  
  Do something  
} else {  
  Do something different  
}
```

Example

```
if (i > 3){  
  print('Yes')  
} else {  
  print('No')  
}
```

Functions

```
function_name <- function(var){  
  Do something  
  return(new_variable)  
}
```

Example

```
square <- function(x){  
  squared <- x*x  
  return(squared)  
}
```

Reading and Writing Data

Input	Ouput	Description
df <- read.table('file.txt')	write.table(df, 'file.txt')	Read and write a delimited text file.
..., header=TRUE	..., row.names=FALSE, quote=FALSE, ...	important options
load('file.RData')	save(df, file = 'file.Rdata')	Read and write an R data file, a file type special for R.

Conditions	a == b	Are equal	a > b	Greater than	a >= b	Greater than or equal to	is.na(a)	Is missing
	a != b	Not equal	a < b	Less than	a <= b	Less than or equal to	is.null(a)	Is null

Types

Converting between common data types in R. Can always go from a higher value in the table to a lower value.

<code>as.logical</code>	TRUE, FALSE, TRUE	Boolean values (TRUE or FALSE).
<code>as.numeric</code>	1, 0, 1	Integers or floating point numbers.
<code>as.character</code>	'1', '0', '1'	Character strings. Generally preferred to factors.
<code>as.factor</code>	'1', '0', '1', levels: '1', '0'	Character strings with preset levels. Needed for some statistical models.

Math Functions

<code>log(x)</code>	Natural log.	<code>sum(x)</code>	Sum.
<code>exp(x)</code>	Exponential.	<code>mean(x)</code>	Mean.
<code>max(x)</code>	Largest element.	<code>median(x)</code>	Median.
<code>min(x)</code>	Smallest element.	<code>quantile(x)</code>	Percentage quantiles.
<code>round(x, n)</code>	Round to n decimal places.	<code>rank(x)</code>	Rank of elements.
<code>signif(x, n)</code>	Round to n significant figures.	<code>var(x)</code>	The variance.
<code>cor(x, y)</code>	Correlation.	<code>sd(x)</code>	The standard deviation.

Variable Assignment

```
> a <- 'apple'
> a
[1] 'apple'
```

The Environment

<code>ls()</code>	List all variables in the environment.
<code>rm(x)</code>	Remove x from the environment.
<code>rm(list = ls())</code>	Remove all variables from the environment.

Warnings: if you do not understand them, ignore but find out the reason (later)

Matrices

```
m <- matrix(x, nrow = 3, ncol = 3)
Create a matrix from x.
```



`m[2,]` - Select a row



`m[, 1]` - Select a column



`m[2, 3]` - Select an element

`t(m)`

Transpose

`m %*% n`

Matrix Multiplication

`solve(m, n)`

Find x in: $m \cdot x = n$

Lists

```
l <- list(x = 1:5, y = c('a', 'b'))
A list is collection of elements which can be of different types.
```

`l[[2]]`

Second element of l.

`l[1]`

New list with only the first element.

`l$x`

Element named x.

`l['y']`

New list with only element named y.

Data Frames

```
df <- data.frame(x = 1:3, y = c('a', 'b', 'c'))
A special case of a list where all elements are the same length.
```

x	y
1	a
2	b
3	c

List subsetting

`df$x`



`df[[2]]`



Understanding a data frame

`View(df)`

See the full data frame.

`head(df)`

See the first 6 rows.

Matrix subsetting

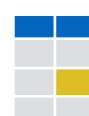
`df[, 2]`



`df[2,]`



`df[2, 2]`

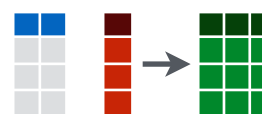


`nrow(df)`
Number of rows.

`ncol(df)`
Number of columns.

`dim(df)`
Number of columns and rows.

`cbind` - Bind columns.



`rbind` - Bind rows.



also see `apply()` and `sapply()`

Strings

<code>paste(x, y, sep = ' ')</code>	Join multiple vectors together.
<code>paste(x, collapse = ' ')</code>	Join elements of a vector together.
<code>grep(pattern, x)</code>	Find regular expression matches in x.
<code>gsub(pattern, replace, x)</code>	Replace matches in x with a string.
<code>toupper(x)</code>	Convert to uppercase.
<code>tolower(x)</code>	Convert to lowercase.
<code>nchar(x)</code>	Number of characters in a string.

Factors

<code>factor(x)</code>	<code>cut(x, breaks = 4)</code>
Turn a vector into a factor. Can set the levels of the factor and the order.	Turn a numeric vector into a factor but 'cutting' into sections.

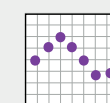
Statistics

<code>lm(x ~ y, data=df)</code> Linear model.	<code>t.test(x, y)</code> Perform a t-test for difference between means.	<code>prop.test</code> Test for a difference between proportions.
<code>glm(x ~ y, data=df)</code> Generalised linear model.	<code>pairwise.t.test</code> Perform a t-test for paired data.	<code>aov</code> Analysis of variance.
<code>summary</code> Get more detailed information out a model.		

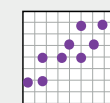
Distributions

	Random Variates	Density Function	Cumulative Distribution	Quantile
Normal	<code>rnorm</code>	<code>dnorm</code>	<code>pnorm</code>	<code>qnorm</code>
Poisson	<code>rpois</code>	<code>dpois</code>	<code>ppois</code>	<code>qpois</code>
Binomial	<code>rbinom</code>	<code>dbinom</code>	<code>pbinom</code>	<code>qbinom</code>
Uniform	<code>runif</code>	<code>dunif</code>	<code>punif</code>	<code>qunif</code>

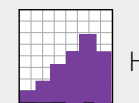
Plotting



`plot(x)`
Values of x in order.



`plot(x, y)`
Values of x against y.



`hist(x)`
Histogram of x.

also see `boxplot()` and `dotchart()`