Functions in R

Day 1 - Introduction to Data Analysis with R

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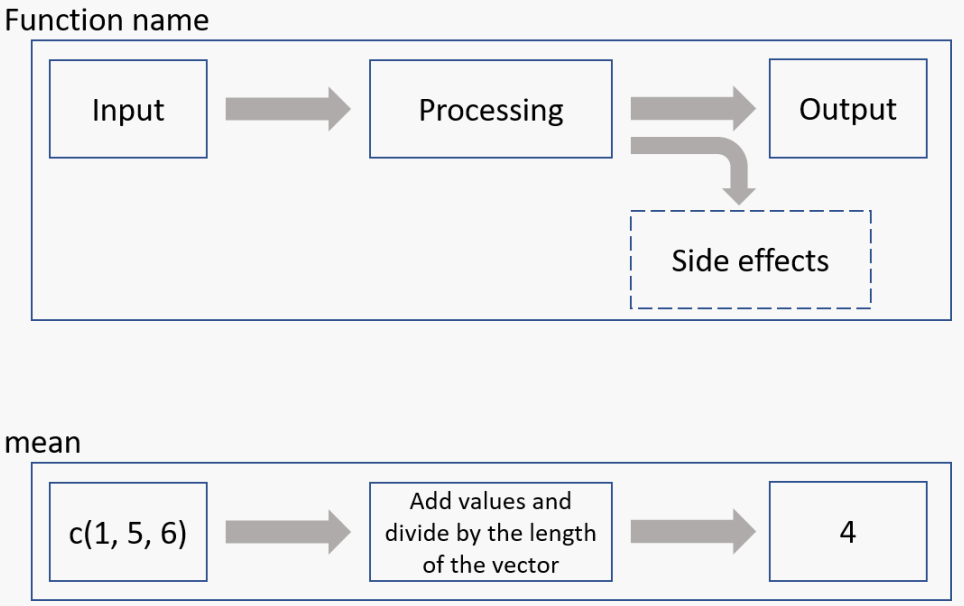
Functions in R

Functions make multiple operations available under one command.

Functions:

- Have a **name**
- Have (0, 1, or any number of) **arguments as input**
- They calculate something using the arguments
- They have a **return value** (the output)
- Can have **side effects** (like plotting)



General structure of a function call: function_name (argument = value)

The mean function

function_name (argument = value)

mean (x = c(1,5,6))

```
mean(x = c(1,5,6)) # or short: mean(c(1,5,6))
#> [1] 4
```

- Arguments can also be variables
- The output of a function can be stored in a variable

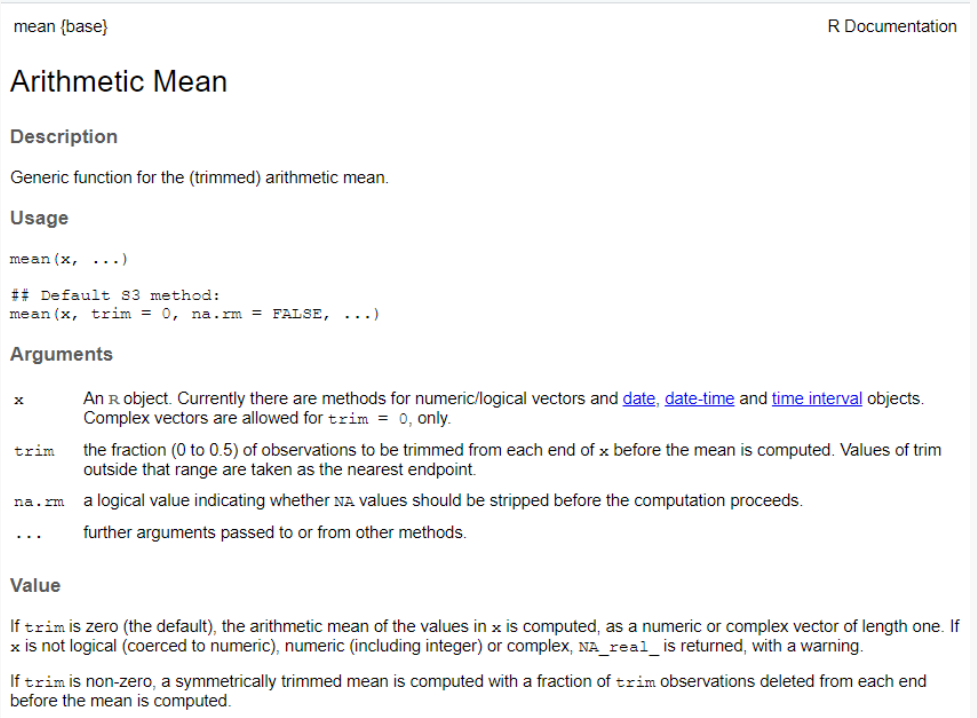
```
values <- c(1,5,6)
result <- mean(x = values)
result
#> [1] 4
```

The mean function

But what does the mean function do? What are the arguments that I can use?

→ Call the function help using ?

```
?mean
```



mean {base} R Documentation

Arithmetic Mean

Description

Generic function for the (trimmed) arithmetic mean.

Usage

```
mean(x, ...)

## Default S3 method:
mean(x, trim = 0, na.rm = FALSE, ...)
```

Arguments

x	An R object. Currently there are methods for numeric/logical vectors and date, date-time and time interval objects. Complex vectors are allowed for trim = 0, only.
trim	the fraction (0 to 0.5) of observations to be trimmed from each end of x before the mean is computed. Values of trim outside that range are taken as the nearest endpoint.
na.rm	a logical value indicating whether NA values should be stripped before the computation proceeds.
...	further arguments passed to or from other methods.

Value

If trim is zero (the default), the arithmetic mean of the values in x is computed, as a numeric or complex vector of length one. If x is not logical (coerced to numeric), numeric (including integer) or complex, NA_real_ is returned, with a warning.

If trim is non-zero, a symmetrically trimmed mean is computed with a fraction of trim observations deleted from each end before the mean is computed.

Function arguments

- Arguments are the **input** to a function
- Functions can provide **default values** for some arguments
- Default values for arguments are indicated in the function help

```
mean(x, trim = 0, na.rm = FALSE, ...)
```

Arguments

`x`	An **R** object. Currently there are methods for numeric/logical vectors and date, date-time and time interval objects. Complex vectors are allowed for `trim = 0`, only.
`trim`	the fraction (0 to 0.5) of observations to be trimmed from each end of `x` before the mean is computed. Values of trim outside that range are taken as the nearest endpoint.
`na.rm`	a logical evaluating to `TRUE` or `FALSE` indicating whether `NA` values should be stripped before the computation proceeds.
`...`	further arguments passed to or from other methods.

Function arguments

What happened here?

```
# NA is a missing value
values <- c(1, 5, 6, NA)
mean(x = values)
#> [1] NA
```

→ `na.rm` argument is `FALSE` by default.

Set it to `TRUE` if you want to calculate the mean despite missing values:

```
mean(x = values, na.rm = TRUE)
#> [1] 4
```

Arguments with default values are optional, arguments without default values are not!

```
mean()
#> Error in mean.default(): argument "x" is missing, with no default
```

Function arguments

Argument matching can be achieved by **position** or by **name**

```
mean(x, trim = 0, na.rm = FALSE, ...)
values <- c(1, 5, 6, NA)
```

These calls to mean all are the same:

```
mean(values, , TRUE) # by position
mean(x = values, na.rm = TRUE) # by name
mean(values, na.rm = TRUE) # a mix of both
```

Function arguments

Argument matching can be achieved by **position** or by **name**

Named arguments are (generally) preferred

- Easier to remember
- Easier to read
- Some functions have a lot of arguments

```
mean(x = values, na.rm = TRUE) # by name
```

However, it is common to match the first argument by position (especially when the first argument is the data)

```
mean(values, na.rm = TRUE) # a mix of both
```

Where do functions come from?

Base R functions: built into R

```
mean() # calculate mean
seq()  # generate a sequence of values
```

From **additional packages**

- Packages must be installed first
- Call a function from a package using `packageName::functionName()`
- Load the package with `library(packageName)` and then use the function

```
# use read_csv function from readr pack
readr::read_csv()

# or use library()
library(readr)
read_csv()
```

Custom functions:

Write your own functions and then use them in the code

```
# custom function that prints input in
my_function <- function(x) {
  return(x + 5)
}
my_function(5)
```

Summary

> R basics - Functions

Summary

- Functions take **input** in the form of (named) arguments, calculate something and **return** a result
- Functions are called by their name, followed by parentheses:
  `functionName(argument1 = value, argument2 = value, ...)`
- Functions from additional packages can be called in two ways:
  - `packageName::functionName()`
  - first load the package with `library(packageName)` then call the function anywhere in the script with `functionName()`
- Call `?functionName` to open the help of a function