Introduction to Functions

INTERMEDIATE R

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DataCamp Instructor

Functions

- You already know 'em!

- Create a list: `list()`

- Display a variable: `print()`
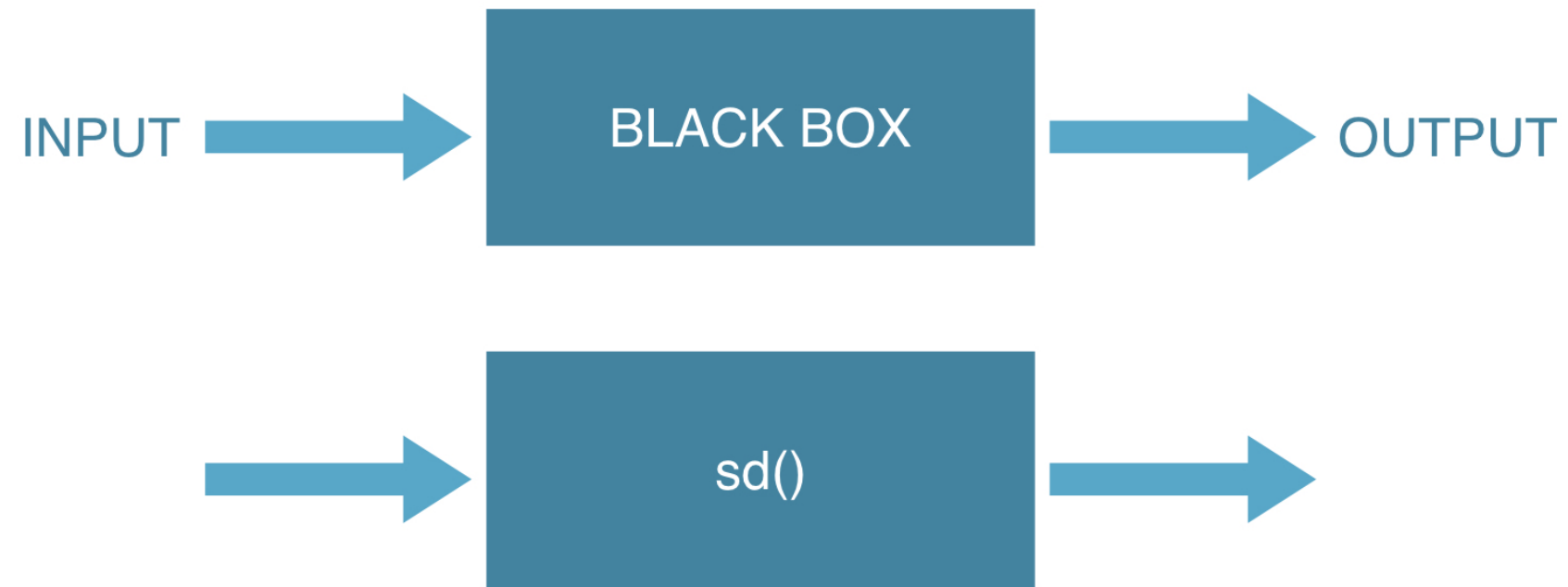
Black box principle

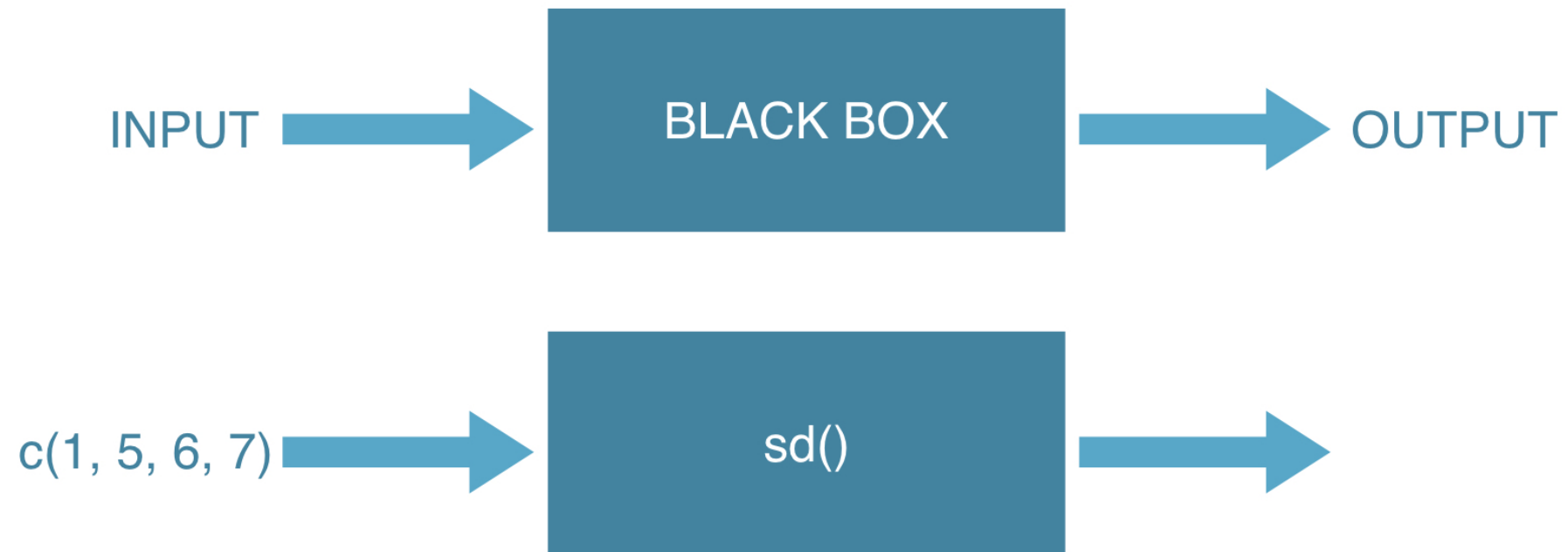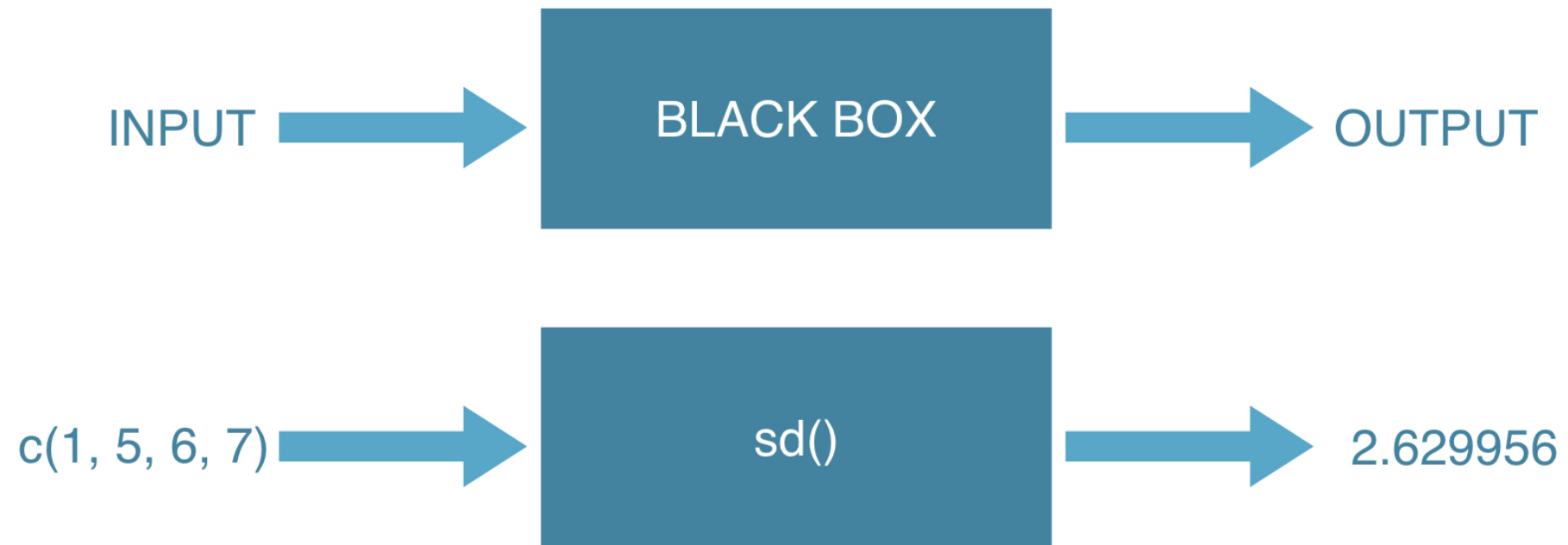# Black box principle

INPUT

Black box principle

INPUT → PROCESSING

Black box principle

INPUT → **PROCESSING** → OUTPUT

Black box principle

Black box principle

INPUT → **BLACK BOX** → OUTPUT

c(1, 5, 6, 7) → **sd()** →

Black box principle

Call function in R

```r
sd(c(1, 5, 6, 7))
```

```
2.629956
```

```r
values <- c(1, 5, 6, 7)
sd(values)
```

```
2.629956
```

```r
my_sd <- sd(values)
my_sd
```

```
2.629956
```

Function documentation

```
help(sd)
?sd
```

```
sd(x, na.rm = FALSE)
```

RDocumentation

Search all packages and functions

stats (version 3.6.2)

sd: Standard Deviation

Description

This function computes the standard deviation of the values in `x`. If `na.rm` is `TRUE` then missing values are removed before computation proceeds.

Usage

```
sd(x, na.rm = FALSE)
```

Questions

```
sd(x, na.rm = FALSE)
```

- Argument names: x, na.rm

- na.rm = FALSE

- sd(values) works?

Argument matching

```
sd(x, na.rm = FALSE)
```

By position

```
sd(values)
```

By name

```
sd(x = values)
```

na.rm argument

```
values <- c(1, 5, 6, NA)
sd(values)
```

```
NA
```

```
sd(x, na.rm = FALSE)
```

```
sd(values, TRUE)
```

```
2.645751
```

```
sd(values, na.rm = TRUE)
```

```
2.645751
```

sd(values) works?

```r
values <- c(1, 5, 6, 7)
sd(values)
```

```
2.629956
```

```r
sd()
```

```
Error in is.data.frame(x) :
argument "x" is missing, with no default
```

```r
sd(x, na.rm = FALSE)
```

Useful trick

```
args(sd)
```

```
function (x, na.rm = FALSE)
NULL
```

Wrap-up

- Functions work like a black box

- Argument matching: by position or by name

- Function arguments can have defaults

Let's practice!

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Writing Functions

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When write your own?

- Solve a particular, well-defined problem

- Black box principle

- If it works, inner workings less important

The triple() function

The triple() function

```
my_fun <- function(arg1, arg2) {
  body
}
```

The triple() function

```
triple <- function(arg1, arg2) {
  body
}
```

The triple() function

```
triple <- function(x) {
  body
}
```

The triple() function

```r
triple <- function(x) {
  3 * x
}
```

The triple() function

```r
triple <- function(x) {
  3 * x
}
```

```r
ls()
```

```
"triple"
```

```r
triple(6)
```

```
18
```

- Numeric 6 matched to argument x (by pos)

- Function body is executed: 3 * 6
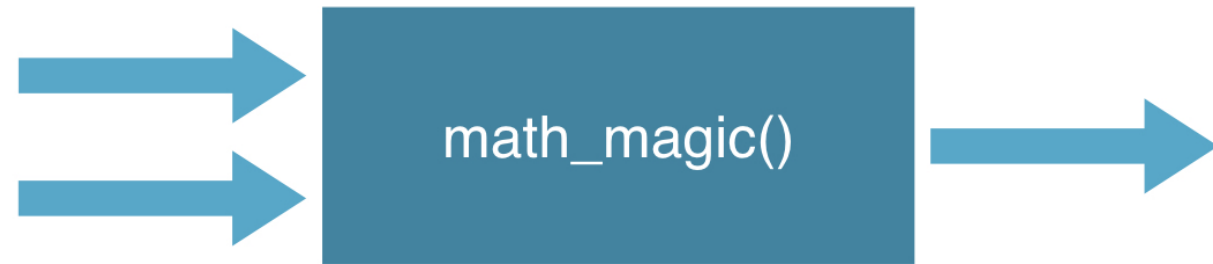
- Last expression = return value

return()

```r
triple <- function(x) {
  y <- 3 * x
  return(y)
}
```
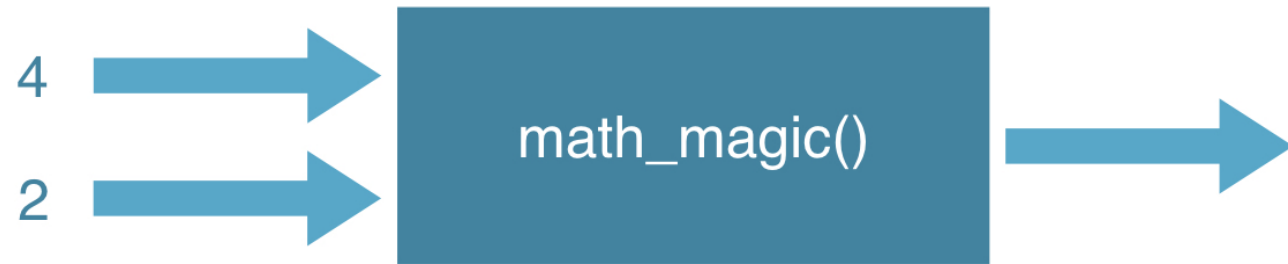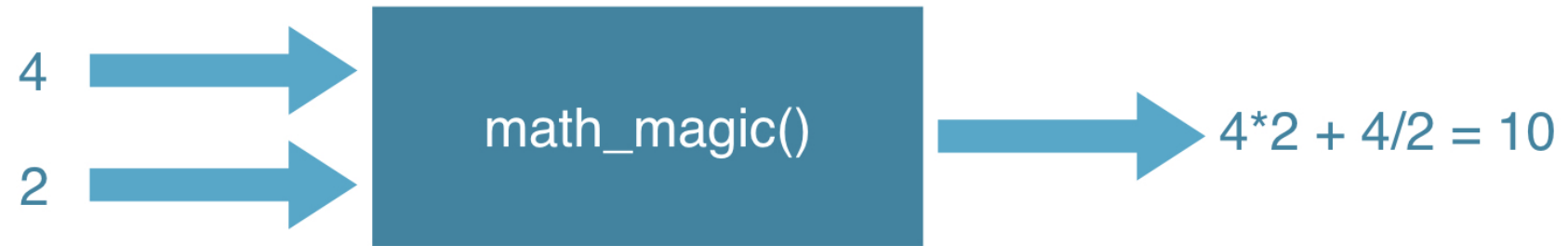
```r
triple(6)
```

```
18
```

The math_magic() function

The math_magic() function

The math_magic() function

4 → math_magic() → 4*2 + 4/2 = 10

2 →

The math_magic() function

```r
my_fun <- function(arg1, arg2) {
  body
}
```

The math_magic() function

```
math_magic <- function(arg1, arg2) {
  body
}
```

The math_magic() function

```
math_magic <- function(a, b) {
  body
}
```

The math_magic() function

```r
math_magic <- function(a, b) {
  a*b + a/b
}
```

```r
math_magic(4, 2)
```

```
10
```

```r
math_magic(4)
```

```
Error: argument "b" is missing, with no default
```

Optional argument

```r
math_magic <- function(a, b = 1) {
  a*b + a/b
}
```

```r
math_magic(4)
```

```
8
```

```r
math_magic(4, 0)
```

```
Inf
```

Use return()

```r
math_magic <- function(a, b = 1) {
  if(b == 0){
    return(0)
  }
  a*b + a/b
}
```

```r
math_magic(4, 0)
```

```
0
```

Let's practice!

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R Packages

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R Packages

- Where do `mean()`, `list()` and `sample()` come from?

- Part of R packages

- Code, data, documentation and tests

- Easy to share

- Examples: `base`, `ggvis`

Install packages

- `base` package: automatically installed

- `ggvis` package: not installed yet

```
install.packages("ggvis")
```

- CRAN: Comprehensive R Archive Network

Load packages

- load package = attach to search list

```
search()
```

```
".GlobalEnv"   ...   "Autoloads"    "package:base"
```

- 7 packages are attached by default

- ggvis not attached by default

```
ggvis(mtcars, ~wt, ~hp)
```

```
Error: could not find function "ggvis"
```
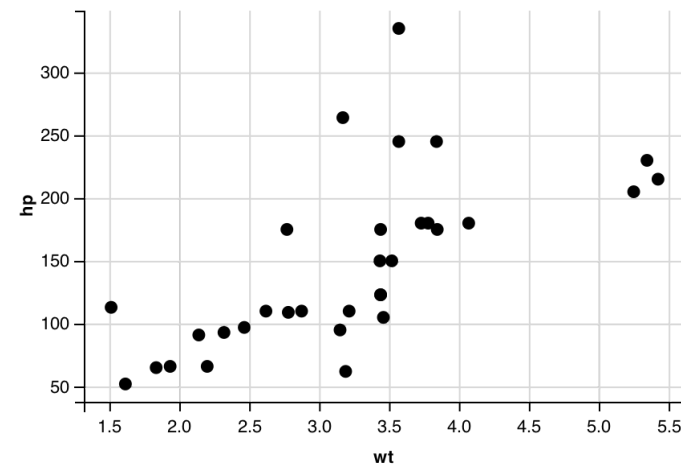
Load packages: library()

```
library("ggvis")
```

```
search()
```

```
".GlobalEnv"   "package:ggvis" ... "package:base"
```

```
ggvis(mtcars, ~wt, ~hp)
```

Load packages: require()

```r
library("data.table")
```

```
Error in library("data.table") :
there is no package called 'data.table'
```

```r
require("data.table")
```

```
Loading required package: data.table
Warning message: ...
```

Load packages: require()

```
result <- require("data.table")
```

```
Loading required package: data.table
Warning message: ...
```

```
result
```

```
FALSE
```

Wrap-up

- Install packages: `install.packages()`

- Load packages: `library()` , `require()`

- Load package = attach package to search list

- Google for cool R packages!

Let's practice!

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