

PROG102: Functions

Writing your own functions in R

MARINCS 100B | Intro to Marine Data Science | Winter 2025

Key concepts

2 Purposes:

- 1) Hide the details-
encapsulation
- 2) Apply the same code
to new inputs



Easy to read

Cognitive load <7 items

Taking a bunch of info
and putting it into easy
to read format
while remaining
professional -
encapsulation

Reusable

Use parameters -
Inputs --- Outputs
New inputs gives us
new outputs

Syntax

- 1) Name
- 2) Function
- 3) Parameters ()
- 4) Body {}
- 5) Return output

Demo in R

Recap

Functions make code readable by hiding details “Encapsulation”

Functions make code reusable by allowing different inputs
“parameters”

Syntax - every function definition has five parts

New vocabulary and lingering questions


New vocabulary

parameters
Encapsulation

Lingering questions

Exercises

Label the five parts of this function:



```
first_and_last <- function(s) {  
  first_char <- substr(s, 1, 1)  
  last_char <- substr(s, nchar(s), 1)  
  result <- paste(first_char, last_char)  
  return(result)  
}
```

Exercises

Match the function bodies on the left with the name that describes what they're doing on the right.

```
function(x) {  
  result <- x + 1  
  return(result)  
}
```

double

```
function(a) {  
  result <- a * 2  
  return(result)  
}
```

hypotenuse_length

```
function(a, b) {  
  c_squared <- a^2 + b^2  
  result <- sqrt(c_squared)  
  return(result)  
}
```

increment

Exercises

Write a function that turns a vector into a palindrome. For example, it should turn 1 2 3 into 1 2 3 3 2 1. Hint: you'll have to use a function called `rev()`. Choose a short but descriptive name for your function.

PROG102: Functions

How functions execute

Key concepts

The black box

Demo in R

Recap

New vocabulary and lingering questions

New vocabulary

Lingering questions

Exercises

- What value does the following code yield?
- How could you change `fish_mass` so the code yields 12 instead?
- How could you change the body of the function so the code yields 12?

```
fish_mass <- 5
temperature <- 20
fish_growth <- function(mass, temp) {
  growth <- 2 + 0.2 * temp
  mass <- mass + growth
  return(mass)
}
fish_growth(fish_mass, temperature)
```

Exercises

In your own words, why does running this code generate an error?

```
calc_volume <- function(height, width, depth) {  
  area <- height * width  
  volume <- area * depth  
  return(volume)  
}  
vol <- calc_volume(3, 5, 1)  
area
```

PROG102: Functions

Default and named parameters

Key concepts

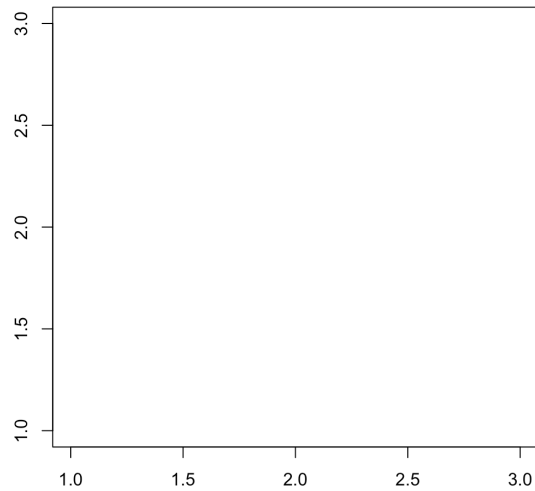
Default and named parameters

```
round(x, digits = 0)
```

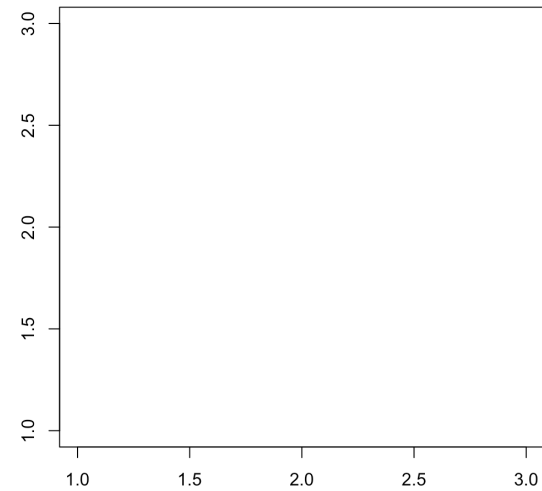
Long parameter lists

```
plot(x, y = NULL, type = "p", xlim = NULL, ylim = NULL,  
     log = "", main = NULL, sub = NULL, xlab = NULL, ylab = NULL,  
     ann = par("ann"), axes = TRUE, frame.plot = axes,  
     panel.first = NULL, panel.last = NULL, asp = NA,  
     xgap.axis = NA, ygap.axis = NA,  
     ...)
```

```
plot(c(1, 2, 3), c(3, 2, 1))
```



```
plot(c(1, 2, 3), c(3, 2, 1),  
     xlab = "x", ylab = "y")
```



Demo in R

Triple dots

```
max(..., na.rm = FALSE)
```

```
paste(..., sep = " ", collapse = NULL, recycle0 = FALSE)
```

Recap

New vocabulary and lingering questions

New vocabulary

Lingering questions

Exercises

R represents *missing* data with the value NA. Say you're doing an experiment and you miss the second observation. In R you can write that as `c(1, NA, 3, 4)`.

Most summary functions, like `mean()`, `max()`, and `median()`, have a parameter called `na.rm`. What does this parameter do? What is its default value? How would you get the maximum value of the vector `c(1, NA, 3, 4)`?