

# Creating your own functions

## Learning the basics of R - Part 3

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# Outline

- Why write functions
- When to write functions
- How to write functions
- Practical session

# Why write functions

- Allow automation of common tasks in a more powerful and general way than *copy-and-pasting*,
  - You can give a function an evocative name that makes your code easier to understand;
  - As requirements change, you only need to update code in one place, instead of many.
  - You eliminate the chance of making incidental mistakes when you copy and paste (i.e. updating a variable name in one place, but not in another).
- Fewer global variables: When you run a function, the intermediate variables that it creates are not stored in your global environment. This saves memory and keeps your global environment cleaner.
- Better documentation: Well documented functions help the user understand the steps of your processing.
- Easier to maintain / edit: When you create a function for a repeated task, it is easy to edit that one function. Then every location in your code where that same task is performed is automatically updated.

# When to write functions

You should consider writing a function whenever you've copied and pasted a block of code more than twice (i.e. you now have three copies of the same code).

For example, take a look at this code.

What does it do?

```
df <- data.frame(  
  a = c(1, 2, 1, 1, 1, 2, 1, 1, 2, 2),  
  b = c(2, 2, 2, 1, 1, 1, 1, 2, 1, 2),  
  c = c(1, 2, 1, 1, 2, 1, 2, 1, 2, 2)  
)  
  
df$a <- ifelse(df$a == 2, 0, df$a)  
df$b <- ifelse(df$b == 2, 0, df$b)  
df$c <- ifelse(df$c == 2, 0, df$c)
```

# When to write functions

Original data:

##		a	b	c
## 1		1	2	1
## 2		2	2	2
## 3		1	2	1
## 4		1	1	1
## 5		1	1	2
## 6		2	1	1
## 7		1	1	2
## 8		1	2	1
## 9		2	1	2
## 10		2	2	2

Recoded data:

##		a	b	c
## 1		1	0	1
## 2		0	0	0
## 3		1	0	1
## 4		1	1	1
## 5		1	1	0
## 6		0	1	1
## 7		1	1	0
## 8		1	0	1
## 9		0	1	0
## 10		0	0	0

This is a good example of when writing a function will be useful/beneficial.

# How to write functions

We can create a function called `recode_values()`:

```
recode_values <- function(x) {  
  ifelse(x == 2, 0, x)  
}
```

And apply it to the same data as follows:

```
df$a <- recode_values(df$a)  
df$b <- recode_values(df$b)  
df$c <- recode_values(df$c)
```

We get:

##		a	b	c
##	1	1	0	1
##	2	0	0	0
##	3	1	0	1
##	4	1	1	1
##	5	1	1	0
##	6	0	1	1
##	7	1	1	0
##	8	1	0	1
##	9	0	1	0
##	10	0	0	0

# How to write functions

- You need to pick a name for the function. In the example I used `recode_values` because this function recodes the values based on a specified rule (i.e., value of 2 is converted to 0).
- You list the inputs, or **arguments**, to the function inside `function`. Here we have just one argument. If we had more the call would look like `function(x, y, z)`.
- You place the code you have developed in body of the function, a `{` block that immediately follows `function(...)`.

**Questions?**



# Practical session

We'll work through *Exercise 2 - Manipulating objects and creating new functions* in Practical R for Epidemiologists (<https://practical-r.org/exercise2.html>) as a GitHub Classroom assignment

# Thank you!

Slides can be viewed at <https://oxford-ihtm.io/open-reproducible-science/session4.html>

PDF version of slides can be downloaded at <https://oxford-ihtm.io/open-reproducible-science/pdf/session4-r-basics-part3.pdf>

R scripts for slides available [here](#)