

Week-6: Code-along

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19-09-2023

II. Code to edit and execute using the Code-along-6.Rmd file

A. for loop

1. Simple for loop (Slide #6)

```
for (x in c(3, 6, 9)) {  
  print(x)  
}
```

```
## [1] 3  
## [1] 6  
## [1] 9
```

2. for loops structure (Slide #7)

```
# Left-hand side code: for loop for passing values  
for (x in 1:8) {print(x)}
```

```
# Right-hand side code: for loop for passing indices  
for (x in 1:8)  
{y <- seq(from=100,to=200,by=5)  
  print(y[x])}
```

```
## [1] 100  
## [1] 105  
## [1] 110  
## [1] 115  
## [1] 120  
## [1] 125  
## [1] 130  
## [1] 135
```

3. Example: find sample means (Slide #9)

```
# 1. determine what to loop over
sample_sizes <- c(5, 10, 15, 20, 25000)
# 2. pre-allocate space to store output
sample_means <- double(length(sample_sizes))
for (i in seq_along(sample_sizes)) {
  sample_means[i] <- mean(rnorm(sample_sizes[i]))
}
sample_means
```

```
## [1]  0.26894842 -0.50044572 -0.03492562  0.32095079  0.01119278
```

4. Alternate ways to pre-allocate space (Slide #12)

```
# Example 3 for data_type=double
sample_means <- rep(0, length(sample_sizes))
```

```
# Initialisation of data_list
data_list <- vector("list", length = 5)
```

5. Review: Vectorized operations (Slide #18)

```
# Example: bad idea!
# Vector with numbers from 7 to 11
a <- 7:11
# Vector with numbers from 8 to 12
b <- 8:12
# Vector of all zeros of length 5
out <- rep(0L, 5)
# Loop along the length of vector a
for (i in seq_along(a)) {
  # Each entry of out is the sum of the corres
  out[i] <- a[i] + b[i]
}
out
```

```
# Taking advantage of vectorization
# Vector with numbers from 7 to 11
a <- 7:11
# Vector with numbers from 8 to 12
b <- 8:12
out <- a + b
out
```

B. Functionals

6. for loops vs Functionals (Slides #23 and #24)

```
#Initialise a vector with the size of 5 different samples
sample_sizes <- c(5, 10, 15, 20, 25000)
# Create a functional- function inside a function
sample_summary <- function(sample_sizes, fun) {
  # Initialise a vector of the same size as sample_sizes
  out <- vector("double", length(sample_sizes))
  # Run the for loop for as long as the length of sample_sizes
  for (i in seq_along(sample_sizes)) {
    # Perform operations indicated fun
    out[i] <- fun(rnorm(sample_sizes[i]))
  }
  return(out)
}
```

```
# Slide 24
#Compute mean
sample_summary(sample_sizes,mean)
```

```
## [1] -0.040455693  0.111540195  0.119436554 -0.052273892 -0.004701512
```

```
# Compute median
sample_summary(sample_sizes,median)
```

```
## [1] -0.09206974 -0.61914997 -0.27436722  0.04988681  0.01152745
```

```
# Compute sd
sample_summary(sample_sizes,sd)
```

```
## [1] 0.8266881 1.0275778 1.2136073 0.9228322 0.9983626
```

C. while loop

7. while loop (Slides #27)

```
# Left-hand side code: for loop
for(i in 1:5){
  print(i)
}
```

```
## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
```

```
# Right-hand side code: while loop
i <- 1
while (i <= 5) {
  # body
  print(i)
  i <- i + 1
}
```