

Week-6: Code-along

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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)

```
for (x in 1:8) {print(x)}
```

```
## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
## [1] 6
## [1] 7
## [1] 8
```

```
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] 0.525200440 -0.145251390 -0.440407612 0.063219672 -0.005296463
```

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

```
# Example 1
sample_means <- vector("double", length = 5)
# Example 2
sample_means <- double(5)
# Example 3
sample_means <- rep(0, length(sample_sizes))
```

```
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
```

```
## [1] 15 17 19 21 23
```

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

```
## [1] 15 17 19 21 23
```

B. Functionals

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

```
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] -0.451180486 -0.171302685 -0.557653588 -0.008605765 0.001432977
```

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

```
## [1] 0.279318066 0.008466741 -0.472136159 -0.173147539 0.005715310
```

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

```
## [1] 0.5210045 0.6779203 0.9033374 1.0157079 0.9994912
```

C. while loop

7. while loop (Slides #27)

```
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 }  
}
```

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