

# 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)

```
# Enter code here
for (x in c(3, 6, 9)) {
  print(x)
}
```

#### 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])
}
```

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

```
# Enter code here
# 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
```

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

```
# Example 1 for data_type=double
sample_means <- vector("double", length = 5)
# Example 2 for data_type=double
sample_means <- double(5)
# 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)) {
  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)

```
# Slide 23
# 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)
# Compute median
sample_summary(sample_sizes,median)
# Compute sd
sample_summary(sample_sizes,sd)
```

# C. while loop

## 7. while loop (Slides #27)

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

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