

# Assignment 2: Coding Basics

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## OVERVIEW

This exercise accompanies the lessons/labs in Environmental Data Analytics on coding basics.

## Directions

1. Rename this file `<FirstLast>_A02_CodingBasics.Rmd` (replacing `<FirstLast>` with your first and last name).
2. Change “Student Name” on line 3 (above) with your name.
3. Work through the steps, **creating code and output** that fulfill each instruction.
4. Be sure to **answer the questions** in this assignment document.
5. When you have completed the assignment, **Knit** the text and code into a single PDF file.
6. After Knitting, submit the completed exercise (PDF file) to Canvas.

## Basics, Part 1

1. Generate a sequence of numbers from one to 55, increasing by fives. Assign this sequence a name.
2. Compute the mean and median of this sequence.
3. Ask R to determine whether the mean is greater than the median.
4. Insert comments in your code to describe what you are doing.

```
#1. Computing the sequence of between 1 to 55, increasing by 5
```

```
five <- seq(1,55,5)
five
```

```
## [1] 1 6 11 16 21 26 31 36 41 46 51
```

```
#2. Calculating the mean of the sequence
```

```
mean = mean(five)
mean
```

```
## [1] 26
```

```
median = median(five)
median
```

```
## [1] 26
```

*#3. Determining whether the mean is greater than the median*

```
a = mean > median
a
```

```
## [1] FALSE
```

*## Basics, Part 2*

5. Create three vectors, each with four components, consisting of (a) student names, (b) test scores, and (c) whether they are on scholarship or not (TRUE or FALSE).
6. Label each vector with a comment on what type of vector it is.

*# Vectors ----*

```
V1 <- c("Jack", "Jill", "John", "Joe") # Vector type: Character
V1
```

```
## [1] "Jack" "Jill" "John" "Joe"
```

```
V2 <- c(60, 65, 47, 80) # Vector type: Numeric
V2
```

```
## [1] 60 65 47 80
```

```
V3 <- c(TRUE,FALSE,TRUE,FALSE) # Vector type: Logical
V3
```

```
## [1] TRUE FALSE TRUE FALSE
```

7. Combine each of the vectors into a data frame. Assign the data frame an informative name.
8. Label the columns of your data frame with informative titles.

```
student_data <- data.frame(Name = V1, Score = V2, Scholarship = V3)
student_data
```

```
##   Name Score Scholarship
## 1 Jack    60         TRUE
## 2 Jill    65        FALSE
## 3 John    47         TRUE
## 4 Joe     80        FALSE
```

9. QUESTION: How is this data frame different from a matrix?

Answer: A data frame can store multiple data types (character, numeric, logical) in different columns, whereas a matrix can only contain a single data type across all elements.

10. Create a function with one input. In this function, use `if...else` to evaluate the value of the input: if it is greater than 50, print the word “Pass”; otherwise print the word “Fail”.

```
check <- function(value)
if (value > 50) {
  print("Pass")
} else {
  print("Fail")
}
```

11. Create a second function that does the exact same thing as the previous one but uses `ifelse()` instead of `if...else`.

```
check2 <- function(value)
  print(ifelse(value > 50, "Pass", "Fail"))
```

12. Run both functions using the value 52.5 as the input

```
value = 52.5
a = check(value)
```

```
## [1] "Pass"
```

```
b = check2(value)
```

```
## [1] "Pass"
```

13. Run both functions using the **vector** of student test scores you created as the input. (Only one will work properly...)

```
#c = check(V2)
```

```
d = check2(V2)
```

```
## [1] "Pass" "Pass" "Fail" "Pass"
```

14. QUESTION: Which option of `if...else` vs. `ifelse` worked? Why? (Hint: search the web for “R vectorization”)

Answer: only the one using `ifelse()` works properly because `if...else` does not handle vectors element-wise.

**NOTE** Before knitting, you’ll need to comment out the call to the function in Q13 that does not work. (A document can’t knit if the code it contains causes an error!)