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.
Sequence_of_5 <- seq(1,55, by=5)
print (Sequence_of_5)
```

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

```
#2.First tried with separate codes for calculating mean and then print. But cat can do both at the same
mean(Sequence_of_5)
```

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

```
median(Sequence_of_5)
```

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

```r
cat("Mean:", mean(Sequence_of_5), "\n")
```

```
## Mean: 26
```

```r
cat("Median:", median(Sequence_of_5), "\n")
```

```
## Median: 26
```

```r
#3. Pretty similar to excel logic. Although I don't know why \n is necessary
if (mean(Sequence_of_5) > median(Sequence_of_5)) {
  cat("The mean is greater than the median.\n")
} else if (mean(Sequence_of_5) < median(Sequence_of_5)) {
  cat("The mean is less than the median.\n")
} else {
  cat("The mean is equal to the median.\n")
}
```

```
## The mean is equal to the median.
```

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).

```r
Student_Name <- c("A", "B", "C", "D")

Test_Score <- c(40, 52, 62, 65)

Scholarship <- c(TRUE, TRUE, FALSE, TRUE)


#cat("Student Name:", A, B, C, D, "\n")
#cat("Test Scores:", test_scores, "\n")
#cat("On Scholarship:", on_scholarship, "\n")
# Didn't work out.

cat("Student Names:", paste(Student_Name, collapse = ", "), "\n")
```

```
## Student Names: A, B, C, D
```

```r
cat("Character Vector", "\n")
```

```
## Character Vector
```

```r
cat("Test Scores:", paste(Test_Score, collapse = ", "), "\n")
```

```
## Test Scores: 40, 52, 62, 65
```

```r
cat("Numeric Vector", "\n")
```

```
## Numeric Vector
```

```r
cat("Scholarship Status:", paste(Scholarship, collapse = ", "), "\n")
```

```
## Scholarship Status: TRUE, TRUE, FALSE, TRUE
```

```r
cat("Logic Vector", "\n")
```

```
## Logic Vector
```

6. Label each vector with a comment on what type of vector it is.

```r
cat("Student_Name:", "Character Vector", "\n") # Character Vector
```

```
## Student_Name: Character Vector
```

```r
cat("Test_Score:", "Numeric Vector", "\n")   # Prints the scores
```

```
## Test_Score: Numeric Vector
```

```r
cat("Scholarship:", "Logic Vector", "\n") # Prints the scholarship status
```

```
## Scholarship: Logic Vector
```

7. Combine each of the vectors into a data frame. Assign the data frame an informative name.

```r
# Combining vectors into df
Student_Scholarship_Database <- data.frame(
  Student_Name = Student_Name,
  Score = Test_Score,
  Scholarship = Scholarship
)

print(Student_Scholarship_Database)
```

```
##   Student_Name Score Scholarship
## 1            A    40        TRUE
## 2            B    52        TRUE
## 3            C    62       FALSE
## 4            D    65        TRUE
```

8. Label the columns of your data frame with informative titles.

```r
colnames(Student_Scholarship_Database) <- c("Student Name", "Test Score", "Scholarship Status")
```

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

   Answer:A matrix contains only one type of data. In case of a data frame, like here, the data contains numeric, character logic vectors.

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".
11. Create a second function that does the exact same thing as the previous one but uses `ifelse()` instead if `if...else`.
12. Run both functions using the value 52.5 as the input
13. Run both functions using the **vector** of student test scores you created as the input. (Only one will work properly...)

```r
#10. Create a function using if...else

Evaluate_Score <- function(Score) {if (Score >50 ) {print("Pass")} else {print("Fail")}}

#11. Create a function using ifelse()

Evaluate_Score_Ifelse <- function(Score) {
  result <- ifelse(Score > 50, "Pass", "Fail")
  return(result)
}

#12a. Run the first function with the value 52.5
Evaluate_Score <- function(Score) {if (Score >52.5 ) {print("Pass")} else {print("Fail")}}


#12b. Run the second function with the value 52.5


Evaluate_Score_Ifelse <- function(Score) {
  result <- ifelse(Score > 52.5, "Pass", "Fail")
  return(result)
}

#13a. Run the first function with the vector of test scores
# I was hoping for an excel like on/off button. Need to consult

Student_Name <- c("A", "B", "C", "D")

Test_Score <- c(40, 52, 62, 65)

Pass_Fail <-data.frame(Name = Student_Name, Score= Test_Score)

#Evaluate_Score <- function(Score) {if (Score >50 ) {print("Pass")} else {print("Fail")}}
```

```r
#13b. Run the second function with the vector of test scores

Student_Name <- c("A", "B", "C", "D")

Test_Score <- c(40, 52, 62, 65)

Pass_Fail <-data.frame(Name = Student_Name, Score= Test_Score)
#Evaluate_Score <- function(Score) {result <- ifelse(Score > 52.5, "Pass", "Fail") return(result)}
```

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

    Answer: ifelse worked.

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!)