**Drill 1: Basic R Operations (For R Programming Course)**

**Objective:**

Reinforce fundamental R concepts, including basic syntax, data types, subsetting, and vectorized operations. Learners will apply these concepts by writing R code and saving their work systematically in their GitHub repository.

**Important Note:**

While Coursera provides structured content, you are expected to **take charge of your learning experience**. This means intentionally stepping outside of the material provided and learning new things on your own. If you encounter concepts you are unfamiliar with, use online resources such as the **R Documentation**, RStudio’s help feature, Stack Overflow, or other tutorials to complete the tasks.

**1. Open Your R Project**

* Open **RStudio**.
* Go to **File > Open Project**.
* Browse to your **local GitHub repository** (data-science-specialization) created in **Drill 2** of *The Data Scientist's Toolbox*.
* Select the R project (data-science-specialization.Rproj) and open it.
* Your workspace is now ready to begin working on this drill.

**2. Navigate to the Repository**

* Inside **RStudio’s File Pane**, navigate to the folder **02-r-programming/drills**.
* If the drills folder does not exist, create it.

**3. Write Your First R Script**

**Note:** For each task below, use **comments (####)** in the script to create a header for that section. These headers will appear in the Contents Pane in RStudio, allowing for better navigation. To make a header, wrap the heading content in four # symbols, e.g..



To view the Contents Pane, press **Control + Shift + O** (Windows) or **Command + Shift + O** (Mac).

Create a new **R script** called **drill1\_basic\_operations.R** inside **02-r-programming/drills**. Complete the following tasks:

**Task 1: Basic Arithmetic Operations**

* Create a variable **x** and assign it a numeric value.
* Perform basic arithmetic operations on x:
  + Addition
  + Multiplication
  + Subtraction
  + Division
* Print the results of each operation.

**Task 2: Working with Vectors**

Create and print the following vectors:

* **num\_vector**: A numeric vector containing at least five numbers.
* **char\_vector**: A character vector containing three different words.
* **log\_vector**: A logical vector containing alternating TRUE and FALSE values.

**Task 3: Data Types and Attributes**

* Use the functions class(), length(), and str() to inspect the properties of the vectors created in Task 2.

**Task 4: Vectorized Operations**

* Square all elements of **num\_vector.**
* Add **num\_vector** to another numeric vector of the same length.
* Multiply **num\_vector** by a scalar value.
* Print the results.

**Task 5: Creating and Working with Matrices**

Create a 3x3 matrix named **matrix\_data** with numbers from 1 to 9.

Extract and print:

* The second row of **matrix\_data**.
* The first column of **matrix\_data**.

Compute and print:

* The row sums of **matrix\_data** using the apply() function.
* The column means of **matrix\_data** using the apply() function.

**Task 6: Data Frames**

Create a data frame named **students\_data** with the following columns:

* Name (character vector): "Alice", "Bob", "Charlie".
* Age (numeric vector): 25, 30, 35.
* Grade (character vector): "A", "B", "A".
* Print students\_data.

Extract and print:

* The Age column from **students\_data** using $ notation.
* The second row from **students\_data** using indexing.

**Task 7: Subsetting and Filtering Data**

* Extract and print all students in **students\_data** who have a Grade of "A".
* Extract and print all students in **students\_data** who are older than 27.
* Remove the **Grade** column from **students\_data** and store the result in a new data frame called students\_no\_grade.

**4. Use Git for Version Control**

* Open **GitHub Desktop** and ensure it is pointing to your cloned repository.
* **Stage the changes**:
  + GitHub Desktop will detect the new file **drill1\_basic\_operations.R** in the drills folder as "Uncommitted Changes."
  + Review the changes to ensure the file is included.
* **Commit the changes**:
  + Use the following **commit message template**:
    - **Summary (First Line)**: *R Programming - Added drill1\_basic\_operations.R*
    - L**onger Message (Optional)**: *Added drill1\_basic\_operations.R to the drills folder in the R Programming course. This script includes basic arithmetic operations, vector manipulation, data frame creation, subsetting, and matrix operations, which are essential foundations in R.*
* **Push the changes**:
  + Click **Push Origin** in GitHub Desktop to upload the changes to your online repository.

**5. Verify and Submit**

* Ensure your repository now includes the following structure:

A close-up of a computer code

Description automatically generated

* Indicate via email that your repository has been updated for grading.