**Lab 2: Data Types and Data Structures**

**Instructions**

* Create a Quarto document called *Lab 2: Data Types and Data Structures*
* Copy the questions/prompts with the numbers/letters into the markdown file as text (i.e., in between code chunks, without any #). Use a header for each question #.
* Provide the code responses into code chunks directly beneath the questions (or beneath the text if the question requires both verbal and code answers).
* Submit both a knitted .html (or .docx) file and your .qmd file to ELMS before 11:59pm.
* *See ‘lab assignment demo’ file (.qmd) on ELMS or RStudio Server for an example.* *Do not directly edit this file, instead create your own markdown file, copy the content from the demo and edit that.*

**Questions**

1. Data types:

a. What data types exist in R?

b. What command(s) can you use to find out what data type R has associated with your variable?

2. Data types:

a. What data structures exist in R?

b. What command(s) can you use to find out what data structure R has associated with your object?

3. Vectors: What command can you use to create vectors in R? Provide an example by creating a vector in a code chunk different from those used during class and verify (with code) it is a vector.

4. Matrices:

a. Create a matrix of numbers called ‘mat\_example’ with the numbers from 1 to 16 spread across 4 columns and 4 rows. Verify (with code) it is a matrix.

b. How do you access all the items in row 4?

c. How do you access the item in the first column and last row? If possible, do not use 4 to index the last row. (Think: General code!)

5. Create a list named ‘list\_example’. It has two elements named ‘letters’ and ‘numbers’, which are vectors of individual letters from ‘a’ to ‘c’ and of individual digits from 1 to 10, respectively. Verify (with code) it is a list.

6. Data frames:

a. Explain in your own words what a data frame is.

b. Create the following data frame ‘data\_example’ and display it. Verify (with code) it is a data frame.

|  |  |  |  |
| --- | --- | --- | --- |
| studentID | state | age | dorm |
| 1 | MD | 18 | 1 |
| 2 | NJ | 21 | 1 |
| 3 | DC | 22 | 0 |
| 4 | MD | 19 | 0 |
| 5 | VA | 19 | 1 |

c. Show two ways in which you can access the studentID column. Check and print what data structure each one produces. (Hint: Check with class() or is.vector(), … etc.)

d. Show how you would convert that ‘studentID’ column into a character vector.

e. Bonus question (for style points): The variable ‘dorm’ indicates whether each student lives in a dorm (1 = lives in dorm, 0 = does not live in dorm). What data type would also be appropriate for the ‘dorm’ variable? What function would you use to convert it into that data type?