

Problem set 1

Section 1: Vectors

1. Create a vector with the numbers: 5, 10, 15, 20, 25.
 - Access the 1st, 3rd, and 5th elements.
 - What happens if you try to access the 6th element?
2. Create a vector of the first 8 even numbers.
 - Multiply all values by 3.
 - Add 5 to each element.
3. Create a vector of fruits: "apple", "orange", "grape", "pear".
 - Find which fruit has 5 letters.
 - Replace "pear" with "peach".

Section 2: Data Frames

1. Create a data frame with the following columns:
 - student_id: numbers 1 to 4
 - name: "John", "Sara", "Ali", "Eva"
 - age: 20, 21, 19, 22
 - grade: "A", "B", "C", "A"

Tasks:

- Access the 2nd row.
 - Access the name column.
 - Find the grade of "Eva".
2. Add a new column called passed to the data frame.
 - If grade is "A" or "B", mark "Yes". Otherwise mark "No".
 3. What happens if you try to access row 10 of this data frame?

Section 3: Logical Comparisons

1. Create two vectors:
 - v1 <- c(1, 2, 3)
 - v2 <- c(1, 2, 4)

Tasks:

- Compare them using ==.

- Use identical() — what is the difference?
- 2. Create a vector of numbers from 1 to 20.
 - Which numbers are greater than 10?
 - Which numbers are divisible by 2?

Section 4: Working with Characters

1. Create a vector of names: "Alex", "Robert", "Mia", "Anna".
 - Find the length of each name (nchar()).
 - Which names have 4 letters?
2. Combine numbers and characters in one vector: c(1, 2, "three", 4).
 - What class is this vector?
 - Convert "3rd element" back to numeric. What happens?

Section 5: Importing & Exploring Data

(If you don't have your own file, create a CSV with 3–4 rows in Excel and read it in R.)

1. Import a dataset using read.csv().
 - Check how many rows and columns it has (dim()).
 - Show the first 5 rows (head()).
2. Use summary() and str() to explore your dataset.
 - Which variables are numeric?
 - Which are character?

Section 6: Filtering Data Frames

Using the built-in dataset mtcars:

1. Load it by typing data(mtcars).
 - How many rows and columns does it have?
2. Select only cars with mpg > 25.
3. Select only cars with cyl == 6.
4. Which cars have both mpg > 20 **and** hp > 100?

Challenge Problems (Optional, for deeper practice)

1. Create a vector of 10 random numbers between 1 and 100.
 - Find the maximum and minimum values.
 - Find the position (index) of the maximum value.
2. Create a data frame for a mini class:
 - Name: "Alice", "Bob", "Charlie", "Diana"
 - Math: 90, 80, 70, 95
 - Science: 85, 88, 75, 98

Tasks:

- Add a new column Average with the mean of Math and Science.
 - Which student has the highest average?
3. From the abalone dataset:
- How many rows correspond to "M" (male)?
 - How many to "F" (female)?
 - Find the average length (Length) of "F".