
Lecture 5: More R

For each question below, write the R code you would use and record the result when appropriate. Answer in complete sentences when asked to explain.

Part 1: Sequences and Replication

1. Without typing all of the values manually, create a vector called `data1` using the `seq()` function so that it contains

210, 195, 180, 165, 150, 135, 120, 105, 90, 75, 60

- (a) Display the vector.
 - (b) Determine the length of the vector.
 - (c) Display only the 2nd through 6th elements.
 - (d) Display all values except the 1st and last elements.
2. Without typing all of the values manually, create a vector called `data2` using the `rep()` function so that it contains

4, 4, 4, 9, 9, -1, -1, -1, -1, 12, 12

- (a) Display the vector.
- (b) Explain what the `times` argument is doing in your code.
- (c) Create a second vector called `data3` by subtracting `data2` from `data1`.

Part 2: Named Vectors and Pattern Matching

3. Create a vector called `planets` with the values

88, 225, 365, 687, 4333, 10759, 30687

Assign the names

"Mercury", "Venus", "Earth", "Mars", "Jupiter", "Saturn", "Uranus"

- (a) Display the vector.
 - (b) Display the values for "Earth" and "Saturn" using their names.
 - (c) Display the values for the 1st, 4th, and 6th elements using numeric indexing.
 - (d) Determine the mean of the values in `planets`.
4. Use `grep()` with the names of `planets` to answer the following:
- (a) Display the planet names that start with the letter `M`.
 - (b) Display the planet names that end with the letter `s`.
 - (c) Display the planet names that contain the pattern `"ar"`.
 - (d) Display the planet names that contain either the letter `t` or the letter `n`.
 - (e) Calculate the mean of the values whose names contain `"ar"` or `"er"`?

Part 3: Letters and Indexing

5. Using the built-in `letters` and `LETTERS` vectors, answer the following:

- (a) Display the 2nd, 8th, 14th, and 20th lowercase letters.
- (b) Display the capital letters from the 10th through the 15th positions.
- (c) Use indexing with `LETTERS` to spell the word `CODE`.
- (d) Display every other lowercase letter from `letters`.
- (e) Display all lowercase letters except those in positions 1, 5, 9, 15, and 21.

Part 4: Logical Vectors and Special Functions

6. Create the vector

```
temps <- c(72, 68, 75, 81, 68, 90, 74, 81, 77, 68, 95, 72)
```

Then answer the following:

- (a) Display the logical vector for `temps >= 80`.
- (b) Determine how many values are greater than or equal to 80.
- (c) Display only the values that are greater than or equal to 80.

(d) Display the values that are less than 70 or greater than 90.

(e) Display the values that are between 72 and 81 inclusive.

7. Using the same `temps` vector, answer the following with special functions:

(a) Use `which()` to determine the indices where the value is exactly 68.

(b) Use `duplicated()` to determine which values are duplicates.

(c) Use `unique()` to display the distinct values.

(d) Use `any()` to determine if any values are below 65.

(e) Use `all()` to determine if all values are less than 100.

Part 5: Built-In Data and Sampling

8. The built-in vector `state.name` contains the names of the 50 U.S. states. Use it to answer the following:

(a) Display all states that start with the letter `N`.

(b) Display all states that end with the letter `a`.

(c) Display all states that contain the pattern "or".

(d) Display all states that contain either "New" or "North".

9. Use the function `sample()` to answer the following:

(a) Randomly select 8 values from the numbers 1 through 20 without replacement.

(b) Randomly select 12 letters from `LETTERS` with replacement.

(c) Use `set.seed(123)` and then sample 6 values from the vector

```
c("Red", "Blue", "Green", "Yellow")
```

with replacement.

(d) Run the same code from part (c) a second time. What do you notice?

(e) Open up the documentation and skim through it by typing in the following command: `?sample`

Part 6: Reflection

10. In one or two sentences, explain one function from today's lecture that you think will be especially useful later in data science and why.