

Week 2 Quiz

The answers to the following [21] questions should be placed in a single R script. Place your R script in a public repository on github and submitting a link to the script here. Label your answers using comments so that they can be clearly and quickly found within the script.

Week 2 quiz is due end of day on Friday September 5th. Solutions to all quiz exercises will be posted on Saturday September 6th. Your grade will be based on two randomly selected exercises.

1. Create a vector that contains 20 numbers. (You may choose whatever numbers you like, but make sure there are some duplicates.)
2. Use R to convert the vector from question 1 into a character vector.
3. Use R to convert the vector from question 1 into a vector of factors.
4. Use R to show how many levels the vector in the previous question has.
5. Use R to create a vector that takes the vector from question 1 and performs on it the formula $3x^2 - 4x + 1$.
6. Implement ordinary least-squares regression in matrix form: $\hat{\beta} = (X^T X)^{-1} X^T y$. As a useful double check you should be able to run your regression on the matrices X and y to get $\hat{\beta}$ below:

$$X = \begin{bmatrix} 1 & 5 & 8 \\ 1 & 4 & 9 \\ 1 & 6 & 4 \\ 1 & 2 & 7 \\ 1 & 3 & 4 \\ 1 & 2 & 9 \\ 1 & 7 & 6 \\ 1 & 8 & 4 \end{bmatrix}, \quad y = \begin{bmatrix} 45.2 \\ 46.9 \\ 31.0 \\ 35.3 \\ 25.0 \\ 43.1 \\ 41.0 \\ 35.1 \end{bmatrix}, \quad \hat{\beta} = \begin{bmatrix} 3.153126 \\ 1.983743 \\ 3.999539 \end{bmatrix}$$

7. Create a named list. That is, create a list with several elements that are each able to be referenced by name.
8. Create a data frame with four columns – one each character, factor (with three levels), numeric, and date. Your data frame should have at least 10 observations (rows).
9. Illustrate how to add a row with a value for the factor column that isn't already in the list of levels. (Note: You do not need to accomplish this with a single line of code.)
10. Show the code that would read in a CSV file called **temperatures.csv** from the current working directory.
11. Show the code that would read in a TSV file called measurements.txt from a directory other than the working directory on your local machine.
12. Show the code that will read in a delimited file with a pipe separator (the "|" symbol) from a website location. (You may make up an appropriate URL.)
13. Write a loop that calculates 12-factorial.
14. Use a loop to calculate the final balance, rounded to the nearest cent, in an account that earns 3.24% interest compounded monthly after six years if the original balance is \$1,500.
15. Create a numeric vector of length 20 and then write code to calculate the sum of every third element of the vector you have created.
16. Use a for loop to calculate $\sum_{i=1}^{10} x^i$ for the value $x = 2$.
17. Use a while loop to accomplish the same task as in the previous exercise.
18. Solve the problem from the previous two exercises without using a loop.
19. Show how to create a numeric vector that contains the sequence from 20 to 50 by 5.
20. Show how to create a character vector of length 10 with the same word, "example", ten times.
21. Show how to take a trio of input numbers a, b, and c and implement the quadratic equation.