

**Note 1:** Object names are indicated by quotations (“ ”) within the following questions for clarity – DO NOT INCLUDE THESE QUOTATION IN YOUR R SCRIPT WHEN NAMING YOUR OBJECTS, IT WILL RUIN YOUR CODE

**Note 2:** IF YOU DO NOT NAME ALL OBJECTS EXACTLY AS SPECIFIED IN THE DIRECTIONS (SPELLING AND CAPITALIZATION COUNT), THE ENTIRE QUESTION WILL BE A 0 (NO EXCEPTIONS)!

### Question 1

- Create the following three scalar objects: “X”=2 , “Y”=19, “Z”=30
- Create the new variable “A” =  $X*Y+Z*(Y+Z)$
- Finally, create the variable “AA” =  $(A - Y)/\sqrt{A - Y}$

### Question 2

- Create the following variables: “P”=  $15 \geq 15$ , “Q” =  $0 < 0$ , “R”=  $2 \neq 1$
- Determine if the following are TRUE or FALSE and save them as variables (named a2, b2, c2, and d2 respectively)
  - “a2” =  $P$  and  $Q$  or  $R$
  - “b2” = not  $P$  and not  $Q$  or  $R$
  - “c2” =  $P$  or not ( $R$  and  $Q$ ) or not not  $R$
  - “d2” = not ( $R$  and  $R$ ) and not ( $Q$  or  $Q$ ) or  $P$

### Question 3

Do the following commands in order, and save all answers as objects with the names indicated in the question.

- Create a numeric vector using this code `c(3,2,3,8,4,6,2,6,4,3,3,8,3,2,7)` and assign it to the variable “N”
- Take the absolute value of the difference between the median and standard deviation of “N”, rounded to four significant figures and save this value as “Nsd”
- Saving your answer as “NU,” update the third, fifth and twelfth elements of “N” with 1’s (ones) in two lines of code (DO NOT OVERWRITE YOUR ORIGINAL VECTOR, N!) (Hint: run `NU <- N` before changing your elements)
- Create “L” using the new “NU”; create a logical vector that determines if each input is equal to 3. Assign this logical vector to the variable “L”
- Use a certain function we talked about in chapter 4 on “L” to calculate the number of TRUEs in “L” and save this value to the object “SL”
- Sort the new “NU” from largest to smallest, and assign it to the variable “S”

### Question 4 (3)

Create a vector with twenty elements: all of the integers in ascending order from 26 to 45 and assign this vector to the variable “E”

Create another vector with twenty elements: all of the decimal decrements (each element is 0.1 less than the one before it) from 3.03 to 1.1 and assign this vector to the variable “FF”  
 Create another vector with twenty elements: each element is the geometric mean (square root of the product) of the corresponding elements in vectors “E” and “FF”. Assign this vector to the variable “G”. For example, the first element of “G” should be  $\sqrt{26 \times 3.0} = 8.831761$ .  
 calculate the value of the standard deviation of “G” rounded to 4 decimal places and save this value as “H”

### Question 5

Use these three lines of code to create three vectors:

```
U <- c(1,4,5,6,7,2,3,5)
```

```
V <- c(4,7,8,3,9,0,1,4)
```

```
W <- c(2,5,3,7,6,4,9,8)
```

- First, save the data type of “W” and an object named, “TW”
- Next, transform each of these vectors into 4×2 matrices, where the elements are distributed across the rows.
- Finally, concatenate these matrices into one big matrix named “UVW” where the matrix “U” is on left, “V” is in the middle, and “W” is on the right.
  - a. Save the data type of “UVW” as the new object “Cmat”
  - b. Save the dimensions of “UVW” as the new object “Dmat”
  - c. Save the element of “UVW” that is on the third row and fourth column as the new object “Emat”

### Question 6

Create this matrix using any method and save it as an object named, “mat6”

```
mat6 =  $\begin{bmatrix} 15.0 & 14.7 & 14.4 & 14.1 & 13.8 \\ 13.5 & 13.2 & 12.9 & 12.6 & 12.3 \\ 12.0 & 11.7 & 11.4 & 11.1 & 10.8 \end{bmatrix}$ 
```

- a. Create a new object named, “mat6U”, which updates the entire third row of “mat6” to 0 (zeros) (DO NOT OVERWRITE YOUR ORIGINAL MATRIX, “mat6”!)
- b. Find the median of each column of “mat6” in one command and save this value to the new object “mat6M”
- c. Turn the transpose of “mat6” into a data frame and assign it to the variable “mat6T”

### Question 7

Import the file attached to this quiz, named “MonSal.csv” into R, while assigning it to the new variable named “monSal”

Save the following with the object names indicated in quotes (*rounded to the 1st decimal digit*):

- “Aug” = The number of *entries* that occurred in August
- “SDsale” = The standard deviation of sales amounts
- “Rsale” = The range of sales amounts

### Question 8

Create a bar graph to show the sum of sales grouped by months using “monSal” provided in question 13. Your bar graph should have:

- "Month" as the label for the x-axis,
- "Total Sales" as the label for the y-axis,
- "Total Sales of Each Month in 2019" as the label for the graph
- Names for each of the bars according to their factor ordered chronologically (this is discussed in a video and uses one simple option in your plotting command)

### Question 9

Create a histogram using sales from “monSal” provided in question 13. Your histogram should have:

- "Sales" as the label for the x-axis and
- "Histogram of Sales in 2019" as the label for the graph.

### Question 10

Import the file attached to this quiz, named “Q10.csv” into R, while assigning it to the new variable named “Q10”

Assume that the first column is X and the second column is Y.

In either way discussed in the videos, calculate the  $R^2$  value and save it to the new object “D” (I’m also surprised that I hadn’t used that variable name yet!)

### Question 11

Run an ordinary linear regression of the variable Y on X and assign this model to the variable “XY”. Save the following objects with the names indicated in quotations, while being sure to round your answers to the 3rd decimal digit: [Note: you can round them by yourself. You do not need to run a code for it]

- “Ixy” = The intercept value
- “Bxy” = The coefficient on the covariate
- “CCxy” = The correlation coefficient

### Question 12

Create a scatterplot using the data from the previous question that has:

- X on its horizontal axis, labeled "Regressor"
- Y on its vertical axis, labeled "Regressand"
- Graph labeled "Simple Linear Regression Model"
- A red regression line

### Question 13

Create a vector with forty elements: starting with 2.8 to 18.4 with increments of 0.4 (each element is 0.4 greater than the element before it). Assign this vector to the variable “J”.

Create a for loop named “loop13” to transform each element to be the natural log of the original value times its position in the vector. For example, the last element should be transformed into  $\ln(18.4 \times 40) = 6.60123$  and the first element should be transformed into  $\ln(2.8 \times 1) = 1.029619$  – save this new vector of transformed values to “Jnew” (don’t forget the help function, ?)

Use mathematical and vector functions we talked about in the materials to calculate and save the following based on the transformed “Jnew”:

- “Jf” = The floor of the maximum of “Jnew”
- “Jc” = The ceiling of the minimum of “Jnew”
- “Jv” = The variance of “Jnew” rounded to 4 significant figures

#### Question 14

Peter the Anteater applied for a loan of 10,000 dollars from the bank. At the start of each year (including the first year) Peter the Anteater pays 800 dollars to the bank, and hence decreases the balance of the loan, so at the end of the first year, the balance becomes  $10,000 - 800 = 9,200$ .

Create a while loop named “loop14” to calculate and show the number of years it will take for Peter the Anteater to pay off the loan, given that he sticks to this payment plan – store the answer in the object named, “YearsPaid”

#### Question 15

Create a univariate function that uses number of milliliters (ml) as input and outputs the equivalent number of teaspoons (tsp) – name this function, “ml\_tsp”

*Use the conversion rate 1tsp=4.92892ml.*

Saving your answer as the new object, “TSP” – use 236 as input and round the output to four significant figures (the rounded output is what gets saved as “TSP”)

#### Question 16

The cost of the “market basket” is the sum of (units of a good consumed times the unit price of that good) across goods (it’s an econ thing).

Create a multivariate function with four inputs: units of housing consumed, unit price of housing, units of beverages consumed, unit price of beverages (these can be labeled in anyway you like).

Your output should be the cost of the market basket, assuming that housing and beverages are the only goods consumed in the market.

**Save your function with the name “basketMaker”**

Saving your output as the new object, “B” – use the following as inputs:

0.24 units of housing consumed, with each unit costing 392.19 dollars and 85.72 units of beverages consumed with each unit costing 3.17 dollars

Round the output to two significant figures (the rounded output is what gets saved as “B”)

#### Question 17

Create a multivariate if-else ladder function and name your function “loop17”

Make sure your loop can tell us whether its three inputs (*in order*) sum to less than 100, sum to more than 100, or sum to exactly 100, while printing the answer in the following way:

For example: inputs (1,2,3) will have an output "Less than 100".

For example: inputs (100,200,300) will have an output "Greater than 100".

For example: inputs (60,30,10) will have an output "Equals 100".

Save the output of this function, using (6,48,46) as inputs, as the new object “Q17”

(Spelling and capitalization matters!)