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## Lab 1 Fundamentals

1) Q1 (2 pts.): Explain why the outputs of the two lines are different.

The first line just combines the numbers, while the second line stores the expression "c(1, 2, 3)" as the variable c\_2 due to the quotations around the input.

2) Q2 (1 pt.): Is c\_1 a variable, or a function? How do you know?

It is a function, because the numbers in c(1, 2, 3) are not stored in the value c\_1 and are not individually printed each time the variable is printed.

3) Q3 (1 pt.): Is c\_2 a variable, or a function? How do you know?

c\_2 is a variable, as it stores the expression "c(1, 2, 3)" to be printed each time c\_2 is printed.

4) Q4 (1 pt.): If c\_1 and c\_2 have different values, why?

Because the c\_1 = c(1, 2, 3) did not store the combination, so when you print c\_1, it prints c\_1. When you print c\_2, it prints "c(1, 2, 3)", as that was stored by the expression c\_2 = "c(1, 2, 3)"

5) Q5 What are the dimensions of the matrix (i.e. how many rows and columns)?

The matrix has 1 column, 6 rows

6) Q6 Write R code to retrieve the element of mat\_1 that has a value of 3.

```
mat_1[3]
```

7) Q7 (1pt.): Paste the code you used to create mat\_2.

```
mat_2 = matrix(my_vec, nrow = 2, ncol = 3)
```

8) Q8 (1pt.): Paste the code you used to create mat\_3.

```
mat_3 = matrix(my_vec, nrow = 3, ncol = 2)
```

9) Q9 (1pt.): Did R use rows or columns to recycle the values in my\_vec?

R uses columns to recycle the values of my\_vec.

10) Q10 (1pt.): Create a matrix, mat\_4, with a number of elements that is not a multiple of 3 and paste the code into your report.

```
mat_4 = matrix(my_vec, byrow=TRUE, nrow = 4, ncol = 2)
```

11) Q11 (1pt.): How did R handle the recycling of values of my\_vec in mat\_4?

It warned against the creation of a matrix with a data length that was not a multiple or sub-multiple of the number of rows. It then used the first 2 integers in the vector for filling the final row and omitted the 4 integers that didn't fit using that particular number of rows.

12) Q12 (8 pts.): For each of the 8 lines, answer the following: A. Did the line return a 1: value, 2: error, or 3: NULL? B. What type of subsetting operation was used (or attempted)? C. If it did not return an error describe, in ordinary English, a plausible explanation of how R could have performed the subsetting.

Line 1 – Value, used an operation to retrieve an element from first component of the list, retrieved the only element in the component

Line 2 – Value, used an operation to turn the elements from component 1 into text and then retrieve as a number, was chosen by specifying to return the only element from the first component as a numeric value

Line 3 – NULL, used an operation to retrieve elements from the first component that returned as string values. It did not find any elements that matched the specifics, so it returned a NULL.

Line 4 – Value, used an operation to retrieve element from the component with the name “one”, was chosen by only element in component with specified name

Line 5 – Value, used an operation to retrieve element from the component with the name “one”, same as above, just used the \$ to specify.

Line 6 – Value, same as above, but put the name of the component in quotes and after a \$

Line 7 – Error, Using the \$ to attempt to retrieve the first element, but returned an error

Line 8 – NULL, Using the \$ and quotations to retrieve elements from the first component as string values, returned NULL because none exist in the first component.

13) Q13 (2 pts): Identify which lines produced output "five point two" and explain why.

“five point two” was produced by lines 4, 5, & 6. They produced this output because all three lines used operations to retrieve the second element in the list, which was “five point two”

14) Q14 (2 pts): Identify which lines produced NULL output and explain why.

NULL was produced by lines 3 and 8. Both of these lines requested the retrieval of values in the first element that were string values. Since no values in the first element are string values, it returned a NULL.