**ECO 634 - Lab 1 – R Fundamentals  
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September 14, 2022**

**Expressions and Strings**

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

* The outputs are different because the first line is not in quotes and the second line is in quotes. R interprets the first line as an expression, so the output is a vector containing the 3 numbers. R interprets the second line as a string, so R doesn’t do anything with the information contained in quotes and the output is just the same string of text.

**Variables**

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

* C\_1 is a variable because it is a vector that contains 3 values. It is not a function which does something specific with input data. It also is assigned a value using an = sign.

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

* C\_2 is a variable because it just contains string, or character data. It is not a function which does something specific with input data. It also is assigned a value using an = sign.

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

* They have different values because c\_1 is not in quotes and is recognized as a vector containing numeric data. C\_2 is in quotes and R interprets that as string data which is just a character value.

**Matrices**

**Q5 (1 pt.):** What are the dimensions of the matrix (i.e. how many rows and columns)?

* 3 rows, 2 columns

**Q6 (2 pts.):** Write R code to retrieve the element of mat\_1 that has a value of 3.

* mat\_1[3,1]

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

* mat\_2 = matrix(my\_vec, nrow = 2, ncol = 3)

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

* mat\_3 = matrix(my\_vec, nrow = 3, ncol = 2)

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

* R distributed the values by column. This seems to be the default setting, since I did not add a byrow argument to specify how R should distribute the values. If I had included byrow=TRUE, R would have distributed the values by row.

**Q10 (1 pt.):** Using my\_vec, create a matrix, mat\_4. mat\_4 must have a total number of elements that is not a multiple of 3.

* mat\_4 = matrix(my\_vec, nrow=2, ncol=1). This contains 2 elements.

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

* R created mat\_4 but also gave the following message “Warning: data length differs from size of matrix: [6 != 2 x 1]”. This is letting me know that the matrix does not include all of the values from the vector my\_vec. R just filled in the values until it reached the end of my specified matrix of 2 rows and 1 column of data.

**List Subsetting**

**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.

* my\_list\_1[[1]]
  + value 5.2
  + select element 1 from the list
  + R selected the first element in the list
* my\_list\_1[[as.numeric("1")]]
  + value 5.2
  + used a function to convert a string variable to numeric and then subsetted element 1 from the list
  + R converted “1” from a character value to a numeric value and then selected the first element from the list.
* my\_list\_1[["1"]]
  + NULL
  + R tried to select an element named “1” from the list
  + This didn’t work because there is no element named “1” in the list
* my\_list\_1[["one"]]
  + value “five point two”
  + selected element named “one” from the list (a string value)
  + R looked for an element named one and printed the value of that element
* my\_list\_1$one
  + value “five point two”
  + selected the element named one from the list
  + The symbol $ told R that we were inputting the name of a character variable, so R looked for a character element in the list named one and selected that element.
* my\_list\_1$"one"
  + value “five point two”
  + selected the string element named “one” from the list by looking for the characters
  + The symbol $ told R that we were inputting the name of a character variable, so R looked for a character element in the list named “one” and selected that element.
* my\_list\_1$1
  + Error
  + R was expecting to select a character value after the $, but since we specified a number it gave an error.
  + Error because we entered a numeric constant when R was expecting a character element.
* my\_list\_1$"1"
  + Null
  + R tried to select a character element named “1”, which does not exist
  + R looked for an element named “1”, but that does not exist in the list

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

* my\_list\_1[["one"]]
* my\_list\_1$one
* my\_list\_1$"one"
* These three lines produced the string output “five point two” because it selected the second element of the list named “one” and printed out the value of that element.

**Q14 (1 pt.):** Identify which lines produced NULL output and explain why.

* my\_list\_1[["1"]]
* my\_list\_1$"1"
* These lines produced a NULL output because there is no character element named “1” contained within the list.