Module 1 Problem Set

insert your name here

insert date here

Welcome to Data Management and Manipulation Using R!

In this problem set, you will practice "knitting," creating objects (i.e., atomic vectors and lists), and investigating those objects.

- Note: Change author to your name & date to current date above in the YAML header (we'll learn more about headers later on. . .)
- Save this Rmd file to your "HED696C_RClass/problemsets/module1" folder using the naming convention "lastname_module1_ps.Rmd"
- If you're experiencing errors while working on this assignment (or any assignment), start fresh by closing out R (when prompted to "save your workspace" hit "don't save") and re-open the assignment.

Step 1: Practice "knitting" the problem set Rmd file!

- Open your RStudio via the Rproject (`HED96C_RClass.Rproj`) we created in class
- Once in RStudio, in the top menu bar, click on File > Open File. . .
- Navigate to your HED696C_RClass folder and open your saved `module1_ps.Rmd` file (hint it should be located in: problemsets/module1 folder)
- Open the module1_ps.Rmd file in RStudio
- At the top of the module1_ps.Rmd file, insert your name and the date in the first few lines of this .Rmd file where indicated for you
- Now select the "Knit" tab (icon with blue yarn ball) or use the drop down menu next to the yard ball and select "Knit to PDF"

Step 2: Objects in R

Question 1: What are the two types of vectors in R? How are they different from one another?

- **ANSWER: The two types of vectors are *atomic vectors* and *lists*. Atomic vectors are homogenours (i.e., all elements within the atomic vectors must be of the same type), whereas lists can be heterogenous (i.e., elements within lists can be different**

types).

Question 2: How are the two vectors below similar and different?

- I have already created two vectors in the R chunk below: `x1` and `x2`
- Run diagnostics of these vectors in the R chunk below using the following functions:
  - `length()`
  - `typeof()`
  - `str()`
- ANSWER: **Objects `x1` and `x2` are similar in that they are both atomic vectors with 4 elements. However, `x1` is a logical type and object `x2` is a character type. Unlike object `x1`, object `x2` also has named elements.**

```
#object 1
x1 <- c(TRUE, FALSE, FALSE, TRUE)

length(x1)
```

```
## [1] 4
```

```
typeof(x1)
```

```
## [1] "logical"
```

```
str(x1)
```

```
##  logi [1:4] TRUE FALSE FALSE TRUE
```

```
#object 2
x2 <- c(animal="dog", food="kibble", habitat="home", type="domestic")

length(x2)
```

```
## [1] 4
```

```
typeof(x2)
```

```
## [1] "character"
```

```
str(x2)
```

```
##  Named chr [1:4] "dog" "kibble" "home" "domestic"
##  - attr(*, "names")= chr [1:4] "animal" "food" "habitat" "type"
```

Question 3: How are the two objects below similar and different?**

- I have already created two objects in the R chunk below: `x3` and `x4`
- Run diagnostics of these objects in the R chunk below
- **ANSWER: Objects `x3` and `x4` are similar in that they are both vectors. However, `x3` is a list vectors (i.e., elements are different types) and `x4` is an atomic vector (i.e., all elements are characters). As `x3` is a list, it contains three named atomic vector (one is a double type and the other two are character types) with two elements each.**

```
#object 1
x3 <- list(var1=c(1,2), var2=c("public", "private"), var3=c("AZ", "CA"))
length(x3)
```

```
## [1] 3
```

```
typeof(x3)
```

```
## [1] "list"
```

```
str(x3)
```

```
## List of 3
##  $ var1: num [1:2] 1 2
##  $ var2: chr [1:2] "public" "private"
##  $ var3: chr [1:2] "AZ" "CA"
```

```
length(x3$var1)
```

```
## [1] 2
```

```
typeof(x3$var1)
```

```
## [1] "double"
```

```
length(x3$var2)
```

```
## [1] 2
```

```
typeof(x3$var2)
```

```
## [1] "character"
```

```
length(x3$var3)
```

```
## [1] 2
```

```r
typeof(x3$var3)
```

```
## [1] "character"
```

```r
#object 2
x4 <- c(1,2,"public", "private", "AZ", "CA")
length(x4)
```

```
## [1] 6
```

```r
typeof(x4)
```

```
## [1] "character"
```

```r
str(x4)
```

```
##  chr [1:6] "1" "2" "public" "private" "AZ" "CA"
```

Question 4: Access the "var2" element in the `x3` object below. What's the length and type of the var2 element in `x3`? Does the var2 element have a hierarchical structure?

- I have already re-created the `x3` object in the R chunk below
- Run diagnostics of the "var2" element in the `x3` object in the R chunk below
- ANSWER: **The `var2` element within the object `x3` is an atomic vector with a character type and has a length of 2. Yes, it has a hierarchical structure as the two elements within the vector are named as `var2`**

```r
#object 1
x3 <- list(var1=c(1,2), var2=c("public", "private"), var3=c("AZ", "CA"))
str(x3)
```

```
## List of 3
##  $ var1: num [1:2] 1 2
##  $ var2: chr [1:2] "public" "private"
##  $ var3: chr [1:2] "AZ" "CA"
```

```r
length(x3$var2)
```

```
## [1] 2
```

```r
typeof(x3$var2)
```

```
## [1] "character"
```

```r
str(x3$var2)
```

```
##  chr [1:2] "public" "private"
```

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- Submit both .Rmd and pdf - Use this naming convention “lastname_module1_ps.Rmd”