Assignment Ten
BSDS Spring 2021
(due 4/2, 11:59pm PST)

Note: You must submit this assignment as BOTH a Jupyter Notebook file (.ipynb) and an (.html) file on Canvas. All of the following must be satisfied.

- The filenames must be of the form

  `[last_name]_HW10.ipynb` and `[last_name]_HW10.html`

- You must include your name and the assignment number in a Markdown cell at the beginning of the notebook

- You must separate questions using Markdown cells

- If a question requires a short answer rather than code, use a markdown cell.

1. Use the **T-pipe** to first filter the `diamonds` dataset by diamonds with price greater than $500, then print the tibble, and finally create a scatter plot of price versus carat.

2. Complete exercise 19.2.1.4 in the Textbook.

3. Complete exercise 19.4.4.3 in the Textbook. (This is a classic programming question you may see referenced in various places) Hint: don't forget about remainder functions %% and %\%!

4. Write a function, **each using a for loop**, to perform each of the following. (Hint: you can create a vector of zeros in your function as a target for the for-loop as it runs over the input)

(a) Input a tibble and output a vector with the number of unique values in each column.

(b) Input a numeric vector and output a logical vector which determines whether each value is greater than the mean of the vector.

5. Use `map_dbl()` to perform the same tasks as in 4a, replacing the for-loop.

6. Consider the following function:

```
specialFunction <- function(x, y, opt=FALSE) {
   if (opt) {x+y}
   x+y+z
}
```

(a) In an empty Jupyter Notebook where the above code is the first block, does running `specialFunction(1, 2)` on the next code block return an error? Why or why not?

(b) Would `specialFunction(1,2,opt=TRUE)` return an error? Why or why not?

(c) Rewrite `specialFunction` so that it adds x and y when opt is True and subtracts x from y when opt is not True, with the default behavior being subtraction.