

Homework 1
Data Science, PCS – Uconn, 2022
Due Date: July 12, 2022 (by 8pm, via HuskyCT)

1. What is wrong with the following R program?

```
d <- 3
y <- D*3
cat(mean(y), "\n")
```

2. Create a variable called `Sevens` which contains the first 100 integers which are divisible by 7 without remainder.
3. Use the examples shown in class to generate 10000 values from a `binomial(N,p)` distribution, and plot a histogram and a boxplot. Do it for $N=100$ and $p=0.1, 0.2, \dots, 0.9$. What happens when you change N to be 10?
4. We also saw an example of the syntax of a “for” loop. Write a for loop which runs for 100 iterations, and in each one a random sample of size $n=30$ is drawn from a standard normal distribution (using the `rnorm(n)` function). In each iteration print to the screen the mean of the sample, the median, the difference between the mean and the median, and the standard deviation of the sample (with the `sd()` function). Also, use the examples shown in class to collect all the means from all the iterations and store these 100 values in a variable called `allMeans`. What is the mean of the vector `allMeans`? What is its standard deviation?
5. Run the following program which generates the first 15 elements famous Fibonacci sequence:

```
# Fibonacci
n <- 15
fib <- rep(0,n)
fib[1] <- 1
fib[2] <- 1
for (i in 3:n) {
  fib[i] <- fib[i-1] + fib[i-2]
}
cat(fib, "\n")
```

Add R code which will keep the ratio between pairs of consecutive elements in a vector called `FibRatio`. Note that this vector will have 14 elements. Print the values of `FibRatio` using the `cat()` function, and show them as a graph, using the `plot()` function. What do you observe about the sequence of ratios?