Homework 2

Problem 1 (20 points)

1. Generate a vector x`<-1:1000`
2. Write a for loop where the iterator varies from 1 to length of vector x.
3. For each iteration multiply the value of `x[i]` by 2
4. Report the computation time for the loop
5. For the same problem above use vector operation `x <- x*2` and compute the time taken
6. Use the code below to compute run time

```
t1 <- Sys.time()
# Insert your for loop code
t2 <- Sys.time()

t3 <- Sys.time()
# Insert your code for vector operation
t4 <- Sys.time()
# Compare t2-t1 and t4-t3
```

7. Repeated the above steps for x`<-1:100000, x<-1:1000000, x<-1:10000000`
8. Write your observations on the effect of vector length on computing time using "for loop" and vector operation

Problem 2 (10 Points)

Write a custom function that accepts a dataframe from the user and returns a dataframe sample with a random number of records. The fraction of records must be given by the user in the form of an argument. If the user enters a non-numeric argument, notify using an error message that they have to enter a numeric value.

Example: `frac_rows(df, n = 1000)`

Problem 3 (Use dplyr, tidyr, lubridate, stringr packages)

The following link provides COVID-19 data for nursing homes.
https://data.cms.gov/covid-19/covid-19-nursing-home-data/data/september-12-2021

The variable description for the dataset above is provided in the link below

https://data.cms.gov/sites/default/files/2021-07/covid-19-nursing-home-data-dictionary_0.pdf

From the dataset answer the following questions

3.1 Count the number of nursing home facilities by state and order them in descending order(**10 points**)

3.2 Display the top five counties by number of nursing home facilities (**10 points**)

3.3 Display four tables containing the states which experienced more than 20 weeks of shortage of nursing staff (table 1), clinical staff (table 2), aides (table 3), and other staff (table 4) (**20 points**)

3.4 Display counties that faced more than 10 weeks shortage of N95 masks (table 1), surgical masks (table 2), eye protection (table 3), supply of gowns (table 4), supply of gloves (table 5), and supply of hand sanitizer (table 6) (**20 points**)

3.5 Display all the nursing home facilities that experienced a shortage of ventilator supplies for more than 10 weeks (**10 points**)

Submission Format

1. Each group should submit only one homework copy
2. Submit the R markdown file
3. Each question should be in one code block
4. The codes for reading the input data must be included in the code block
5. Make sure the code follows the R coding standards (Link)