Problem Set 2

Your name here

2023-09-19

- Due date: September 11 at 11:59 PM (PST)
- Submission process: Please submit your assignment directly to Gradescope. You can do this by rendering your file and downloading the PDF to your computer. Then navigate to Gradescope.com or via the link on BCourses to submit your assignment.

Helpful hints:

- Render your file early and often to minimize rendering errors! If you copy and paste code from the slides, you are bound to get an error that is hard to diagnose. Typing out the code is the way to smooth rendering. We recommend rendering your file each time after you write a few sentences/add a new code chunk, so you can detect the source of the rendering error more easily. You can render by clicking the blue "Render" arrow in the top menu bar in R studio. This will save you and the teaching team time!

- To render as PDF, you will need to have LaTeX installed. If you are using the datahub **this should already be there and you don't need to install or update**. If you are not using datahub, there is an R package to handle this! If you don't have LaTeX, you can un-comment and run the following code (note: you only need to do this once, and don't need to load this like other packages).

```
# If you don't have LaTeX installed at all,
# uncomment and run the line below
# install.packages("tinytex")

# If you need to update LaTeX or run into rendering issues,
# uncomment and run the line below
#tinytex::reinstall_tinytex()
```

- Please make sure that your code does not run off the page of the rendered PDF. If it does, we can't see your work. To avoid this, have a look at your rendered PDF and ensure all the code fits in the file. When it doesn't, go back to your .qmd file and add spaces (new lines) using the return or enter key so that the code runs onto the next line.

Question 1

Use the function Sys.Date() to get the current date. Save it in your environment.

```
(current_date <- Sys.Date())
```

```
[1] "2023-09-19"
```

Use the class() function to see what kind of object your date is, and then use the typeof() function to see how it is stored in R.

```
class(current_date)
```

```
[1] "Date"
```

```
typeof(current_date)
```

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

Why is your saved object both a Date and a double? HINT: try using as.numeric() on the object and think about what that number means.

Dates in R are stored as the number of days before or after 1/1/1970, which is just a number (an integer stored as a double). Because the number came from Sys.Date(), R knows it is not just a normal number and instead displays it as a date.

Look up the documentation for the lubridate function `wday` (short for weekday). Load the lubridate library and then pass your date object to `wday()` to get the day of the week *as an abbreviated name* e.g. "Sun" and "Mon". You will need to pass the function a second argument to make this happen. Save the result in your environment.

```
library(lubridate)
```

```
Attaching package: 'lubridate'
```

```
The following objects are masked from 'package:base':

    date, intersect, setdiff, union
```

```
(day <- wday(current_date, label = TRUE))
```

```
[1] Tue
Levels: Sun < Mon < Tue < Wed < Thu < Fri < Sat
```

Run this code chunk to save a vector of the seven days of the week. The levels() function returns a vector containing the names of all the levels of a factor.

```
library(lubridate)
days <- levels(wday(Sys.Date(), label = TRUE))
```

Subset the vector of days to get a vector of *weekdays only* (Mon-Fri). You can pull out values from a vector by using a sequence of positions/indexes inside square brackets (see the lecture "Data Types and Objects in R"). Save the list of weekdays as a new object in your environment.

```
# all 3 options below will give you the same result
weekdays <- days[2:6]
weekdays <- days[seq(2,6)]
weekdays <- days[c(2,3,4,5,6)]
```

Is the current day you saved in the current_wday chunk above a weekday? Check using the %in% operator. Also check if the current day is in the days vector.

```
day %in% weekdays
```
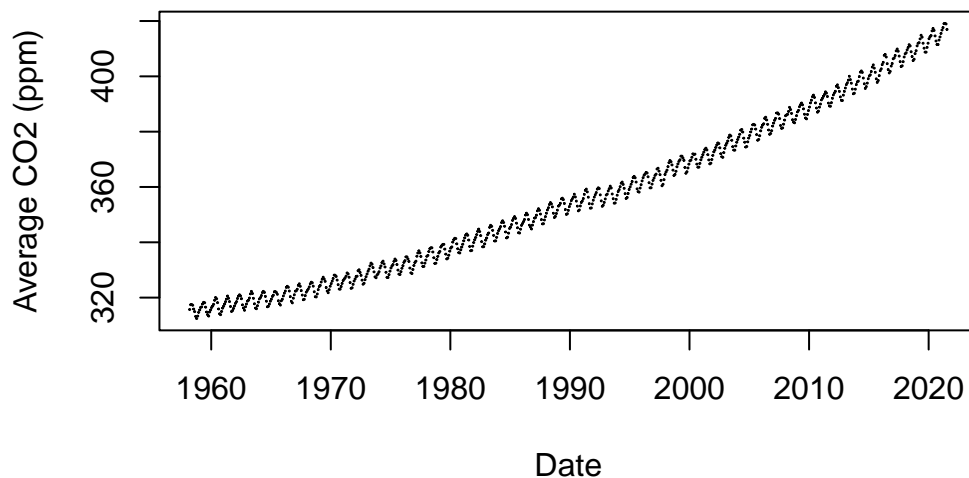
```
[1] TRUE
```

```
day %in% days
```

```
[1] TRUE
```

Question 2

if/else, vector math, logical ops

Run this chunk as-is to load a dataset of Mauna Loa carbon dioxide records and plot CO2
levels over time. Importing and plotting data will be covered in an upcoming lecture–the graph
is just for context.

```r
# read in the csv file and save it as a data frame in the environment
co2 <- read.csv(file = "co2_mm_mlo.csv", skip = 51, header = TRUE, row.names = NULL)
# label the columns
colnames(co2) <- c("year","month","date","average","interpolated","trend","ndays")
# display the data graphically
plot(x = co2$date, y = co2$average, pch = 20, cex = 0.1,
     xlab = "Date", ylab = "Average CO2 (ppm)")
```



```r
# view the last few rows of the data in a table
tail(co2)
```

	year	month	date	average	interpolated	trend	ndays	NA
756	2021	2	2021.125	416.75	415.93	28	1.02	0.37
757	2021	3	2021.208	417.64	416.14	28	0.86	0.31

4

```
758 2021      4 2021.292  419.05        416.23    24  1.12 0.44
759 2021      5 2021.375  419.13        415.71    28  0.90 0.33
760 2021      6 2021.458  418.94        416.58    28  0.65 0.23
761 2021      7 2021.542  416.96        416.58    30  0.72 0.25
```

Before the industrial revolution, the global concentration of carbon dioxide was about 280 parts per million. Let's see if we can express CO2 levels over time as a percentage of pre-industrial levels.

Start by extracting the average temperature column from the data frame. You can run this chunk as-is, since we haven't covered data frames in detail yet.

```
# pull the "average" column out of the data as a vector
avg_co2 <- co2$average
# this is another way to do the exact same thing
avg_co2 <- co2[["average"]]
```

Print out the vector avg_co2

```
avg_co2
```

```
  [1] 315.70 317.45 317.51 317.24 315.86 314.93 313.20 312.43 313.33 314.67
 [11] 315.58 316.48 316.65 317.72 318.29 318.15 316.54 314.80 313.84 313.33
 [21] 314.81 315.58 316.43 316.98 317.58 319.03 320.04 319.59 318.18 315.90
 [31] 314.17 313.83 315.00 316.19 316.89 317.70 318.54 319.48 320.58 319.77
 [41] 318.57 316.79 314.99 315.31 316.10 317.01 317.94 318.55 319.68 320.57
 [51] 321.02 320.62 319.61 317.40 316.25 315.42 316.69 317.70 318.74 319.07
 [61] 319.86 321.38 322.25 321.48 319.74 317.77 316.21 315.99 317.07 318.35
 [71] 319.57 320.01 320.74 321.84 322.26 321.89 320.44 318.69 316.70 316.87
 [81] 317.68 318.71 319.44 320.44 320.89 322.14 322.17 321.87 321.21 318.87
 [91] 317.81 317.30 318.87 319.42 320.62 321.60 322.39 323.70 324.08 323.75
[101] 322.38 320.36 318.64 318.10 319.78 321.03 322.33 322.50 323.04 324.42
[111] 325.00 324.09 322.54 320.92 319.25 319.39 320.73 321.96 322.57 323.15
[121] 323.89 325.02 325.57 325.36 324.14 322.11 320.33 320.25 321.32 322.89
[131] 324.00 324.42 325.63 326.66 327.38 326.71 325.88 323.66 322.38 321.78
[141] 322.86 324.12 325.06 325.98 326.93 328.13 328.08 327.67 326.34 324.69
[151] 323.10 323.06 324.01 325.13 326.17 326.68 327.17 327.79 328.93 328.57
[161] 327.36 325.43 323.36 323.56 324.80 326.01 326.77 327.63 327.75 329.72
[171] 330.07 329.09 328.04 326.32 324.84 325.20 326.50 327.55 328.55 329.56
[181] 330.30 331.50 332.48 332.07 330.87 329.31 327.51 327.18 328.16 328.64
[191] 329.35 330.71 331.48 332.65 333.19 332.20 331.07 329.15 327.33 327.28
[201] 328.31 329.58 330.73 331.46 331.94 333.11 333.95 333.42 331.97 329.95
```

```
[211] 328.50 328.36 329.38 330.62 331.56 332.74 333.36 334.74 334.72 333.98
[221] 333.08 330.68 328.96 328.72 330.16 331.62 332.68 333.17 334.96 336.14
[231] 336.93 336.17 334.88 332.56 331.29 331.28 332.46 333.60 334.94 335.26
[241] 336.66 337.69 338.02 338.01 336.50 334.42 332.36 332.45 333.76 334.91
[251] 336.14 336.69 338.27 338.82 339.24 339.26 337.54 335.72 333.98 334.24
[261] 335.32 336.81 337.90 338.34 340.07 340.93 341.45 341.36 339.45 337.67
[271] 336.25 336.14 337.30 338.29 339.29 340.55 341.63 342.60 343.04 342.54
[281] 340.82 338.48 336.95 337.05 338.58 339.91 340.93 341.76 342.78 343.96
[291] 344.77 343.88 342.42 340.24 338.38 338.41 339.44 340.78 341.57 342.78
[301] 343.37 345.40 346.14 345.76 344.32 342.50 340.46 340.53 341.79 343.20
[311] 344.21 344.92 345.68 347.14 347.78 347.16 345.79 343.74 341.59 341.86
[321] 343.31 345.00 345.48 346.41 347.91 348.66 349.28 348.65 346.90 345.26
[331] 343.47 343.35 344.73 346.12 346.78 347.48 348.25 349.86 350.52 349.98
[341] 348.25 346.17 345.48 344.82 346.22 347.48 348.73 348.92 349.81 351.40
[351] 352.15 351.59 350.21 348.20 346.66 346.72 348.08 349.28 350.51 351.70
[361] 352.50 353.67 354.35 353.88 352.80 350.49 348.97 349.37 350.42 351.62
[371] 353.07 353.43 354.08 355.72 355.95 355.44 354.05 351.84 350.09 350.33
[381] 351.55 352.91 353.86 355.10 355.75 356.38 357.38 356.39 354.89 353.07
[391] 351.38 351.69 353.14 354.41 354.93 355.82 357.33 358.77 359.23 358.23
[401] 356.30 353.97 352.34 352.43 353.89 355.21 356.34 357.21 357.97 359.22
[411] 359.71 359.43 357.15 354.98 353.01 353.41 354.42 355.68 357.10 357.42
[421] 358.59 359.39 360.30 359.64 357.46 355.76 354.14 354.23 355.53 357.03
[431] 358.36 359.04 360.11 361.36 361.78 360.94 359.51 357.59 355.86 356.21
[441] 357.65 359.10 360.04 361.00 361.98 363.44 363.83 363.33 361.78 359.33
[451] 358.32 358.14 359.61 360.82 362.20 363.36 364.28 364.69 365.25 365.06
[461] 363.69 361.55 359.69 359.72 361.04 362.39 363.24 364.21 364.65 366.49
[471] 366.77 365.73 364.46 362.40 360.44 360.98 362.65 364.51 365.39 366.10
[481] 367.36 368.79 369.56 369.13 367.98 366.10 364.16 364.54 365.67 367.30
[491] 368.35 369.28 369.84 371.15 371.12 370.46 369.61 367.06 364.95 365.52
[501] 366.88 368.26 369.45 369.71 370.75 371.98 371.75 371.87 370.02 368.27
[511] 367.15 367.18 368.53 369.83 370.76 371.69 372.63 373.55 374.03 373.40
[521] 371.68 369.78 368.34 368.61 369.94 371.42 372.70 373.37 374.30 375.19
[531] 375.93 375.69 374.16 372.03 370.93 370.73 372.43 373.98 375.07 375.82
[541] 376.64 377.92 378.78 378.46 376.88 374.57 373.34 373.31 374.84 376.17
[551] 377.17 378.05 379.06 380.54 380.80 379.87 377.65 376.17 374.43 374.63
[561] 376.33 377.68 378.63 379.91 380.95 382.48 382.64 382.40 380.93 378.93
[571] 376.89 377.19 378.54 380.31 381.58 382.40 382.86 384.80 385.22 384.24
[581] 382.65 380.60 379.04 379.33 380.35 382.02 383.10 384.12 384.81 386.73
[591] 386.78 386.33 384.73 382.24 381.20 381.37 382.70 384.19 385.78 386.06
[601] 386.28 387.33 388.78 387.99 386.61 384.32 383.41 383.21 384.41 385.79
[611] 387.17 387.70 389.04 389.76 390.36 389.70 388.25 386.29 384.95 384.64
[621] 386.23 387.63 388.91 390.41 391.37 392.67 393.21 392.38 390.41 388.54
[631] 387.03 387.43 388.87 389.99 391.50 392.05 392.80 393.44 394.41 393.95
```

```
[641] 392.72 390.33 389.28 389.19 390.48 392.06 393.31 394.04 394.59 396.38
[651] 396.93 395.91 394.56 392.59 391.32 391.27 393.20 394.57 395.78 397.03
[661] 397.66 398.64 400.02 398.81 397.51 395.39 393.72 393.90 395.36 397.03
[671] 398.04 398.27 399.91 401.51 401.96 401.43 399.38 397.32 395.64 396.29
[681] 397.55 399.15 400.18 400.55 401.74 403.35 404.15 402.97 401.46 399.11
[691] 397.82 398.49 400.27 402.06 402.73 404.25 405.06 407.60 407.90 406.99
[701] 404.59 402.45 401.23 401.79 403.72 404.64 406.36 406.66 407.53 409.22
[711] 409.89 409.08 407.33 405.32 403.57 403.82 405.31 407.00 408.15 408.52
[721] 409.59 410.45 411.44 410.99 408.90 407.16 405.71 406.19 408.21 409.27
[731] 411.03 411.96 412.18 413.54 414.86 414.16 411.97 410.18 408.76 408.75
[741] 410.48 411.98 413.61 414.34 414.74 416.45 417.31 416.60 414.62 412.78
[751] 411.52 411.51 413.12 414.26 415.52 416.75 417.64 419.05 419.13 418.94
[761] 416.96
```

That's a lot of numbers! You wouldn't want to print all that in a report. Use the `summary()` function to get a more useful overview of the range of numbers in that vector.

```r
summary(avg_co2)
```

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 312.4   329.4   353.4   356.4   380.5   419.1
```

Create a vector that expresses the Mauna Loa CO2 levels as a percentage of pre-industrial levels (280 ppm). Save it as a new vector in your environment and print out a summary.

```r
avg_co2_pct <- avg_co2/280*100
summary(avg_co2_pct)
```

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 111.6   117.6   126.2   127.3   135.9   149.7
```

Let's say you're publishing a report about climate change and you want to have two versions of it for two different audiences. In one version, you want to report carbon dioxide concentration in parts per million. In the other, you want those numbers as a percentage of pre-industrial levels.

Use if/else blocks to print a summary of Mauna Loa CO2 levels, where the format (ppm or percentage) depends on the logical indicator included in the code chunk below. Make sure you get the expected output when percentage is TRUE, and when percentage is FALSE.

```
percentage <- TRUE


if(percentage == TRUE){
    summary(avg_co2_pct)
}else{
    summary(avg_co2)}
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  111.6   117.6   126.2   127.3   135.9   149.7
```

Look at the date columns in the co2 data frame (you can view the whole table by clicking on "co2" in your environment pane). The "date" column in a decimal date format. Search the web for a function within the lubridate package that can convert a decimal date into the standard date format. Use that function on the vector of decimal dates and print the result. Make sure you set the correct time zone for Hawaii (search the web for the 3-letter abbreviation of that time zone and use that string as the argument)!

```
co2$date
```

```
  [1] 1958.203 1958.288 1958.370 1958.455 1958.537 1958.622 1958.707 1958.789
  [9] 1958.874 1958.956 1959.041 1959.126 1959.203 1959.288 1959.370 1959.455
 [17] 1959.537 1959.622 1959.707 1959.789 1959.874 1959.956 1960.041 1960.126
 [25] 1960.205 1960.290 1960.372 1960.456 1960.538 1960.623 1960.708 1960.790
 [33] 1960.874 1960.956 1961.041 1961.126 1961.203 1961.288 1961.370 1961.455
 [41] 1961.537 1961.622 1961.707 1961.789 1961.874 1961.956 1962.041 1962.126
 [49] 1962.203 1962.288 1962.370 1962.455 1962.537 1962.622 1962.707 1962.789
 [57] 1962.874 1962.956 1963.041 1963.126 1963.203 1963.288 1963.370 1963.455
 [65] 1963.537 1963.622 1963.707 1963.789 1963.874 1963.956 1964.041 1964.126
 [73] 1964.205 1964.290 1964.372 1964.456 1964.538 1964.623 1964.708 1964.790
 [81] 1964.874 1964.956 1965.041 1965.126 1965.203 1965.288 1965.370 1965.455
 [89] 1965.537 1965.622 1965.707 1965.789 1965.874 1965.956 1966.041 1966.126
 [97] 1966.203 1966.288 1966.370 1966.455 1966.537 1966.622 1966.707 1966.789
[105] 1966.874 1966.956 1967.041 1967.126 1967.203 1967.288 1967.370 1967.455
[113] 1967.537 1967.622 1967.707 1967.789 1967.874 1967.956 1968.041 1968.126
[121] 1968.205 1968.290 1968.372 1968.456 1968.538 1968.623 1968.708 1968.790
[129] 1968.874 1968.956 1969.041 1969.126 1969.203 1969.288 1969.370 1969.455
[137] 1969.537 1969.622 1969.707 1969.789 1969.874 1969.956 1970.041 1970.126
[145] 1970.203 1970.288 1970.370 1970.455 1970.537 1970.622 1970.707 1970.789
[153] 1970.874 1970.956 1971.041 1971.126 1971.203 1971.288 1971.370 1971.455
[161] 1971.537 1971.622 1971.707 1971.789 1971.874 1971.956 1972.041 1972.126
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```
[169] 1972.205 1972.290 1972.372 1972.456 1972.538 1972.623 1972.708 1972.790
[177] 1972.874 1972.956 1973.041 1973.126 1973.203 1973.288 1973.370 1973.455
[185] 1973.537 1973.622 1973.707 1973.789 1973.874 1973.956 1974.041 1974.126
[193] 1974.203 1974.288 1974.375 1974.458 1974.542 1974.625 1974.708 1974.792
[201] 1974.875 1974.958 1975.042 1975.125 1975.208 1975.292 1975.375 1975.458
[209] 1975.542 1975.625 1975.708 1975.792 1975.875 1975.958 1976.042 1976.125
[217] 1976.208 1976.292 1976.375 1976.458 1976.542 1976.625 1976.708 1976.792
[225] 1976.875 1976.958 1977.042 1977.125 1977.208 1977.292 1977.375 1977.458
[233] 1977.542 1977.625 1977.708 1977.792 1977.875 1977.958 1978.042 1978.125
[241] 1978.208 1978.292 1978.375 1978.458 1978.542 1978.625 1978.708 1978.792
[249] 1978.875 1978.958 1979.042 1979.125 1979.208 1979.292 1979.375 1979.458
[257] 1979.542 1979.625 1979.708 1979.792 1979.875 1979.958 1980.042 1980.125
[265] 1980.208 1980.292 1980.375 1980.458 1980.542 1980.625 1980.708 1980.792
[273] 1980.875 1980.958 1981.042 1981.125 1981.208 1981.292 1981.375 1981.458
[281] 1981.542 1981.625 1981.708 1981.792 1981.875 1981.958 1982.042 1982.125
[289] 1982.208 1982.292 1982.375 1982.458 1982.542 1982.625 1982.708 1982.792
[297] 1982.875 1982.958 1983.042 1983.125 1983.208 1983.292 1983.375 1983.458
[305] 1983.542 1983.625 1983.708 1983.792 1983.875 1983.958 1984.042 1984.125
[313] 1984.208 1984.292 1984.375 1984.458 1984.542 1984.625 1984.708 1984.792
[321] 1984.875 1984.958 1985.042 1985.125 1985.208 1985.292 1985.375 1985.458
[329] 1985.542 1985.625 1985.708 1985.792 1985.875 1985.958 1986.042 1986.125
[337] 1986.208 1986.292 1986.375 1986.458 1986.542 1986.625 1986.708 1986.792
[345] 1986.875 1986.958 1987.042 1987.125 1987.208 1987.292 1987.375 1987.458
[353] 1987.542 1987.625 1987.708 1987.792 1987.875 1987.958 1988.042 1988.125
[361] 1988.208 1988.292 1988.375 1988.458 1988.542 1988.625 1988.708 1988.792
[369] 1988.875 1988.958 1989.042 1989.125 1989.208 1989.292 1989.375 1989.458
[377] 1989.542 1989.625 1989.708 1989.792 1989.875 1989.958 1990.042 1990.125
[385] 1990.208 1990.292 1990.375 1990.458 1990.542 1990.625 1990.708 1990.792
[393] 1990.875 1990.958 1991.042 1991.125 1991.208 1991.292 1991.375 1991.458
[401] 1991.542 1991.625 1991.708 1991.792 1991.875 1991.958 1992.042 1992.125
[409] 1992.208 1992.292 1992.375 1992.458 1992.542 1992.625 1992.708 1992.792
[417] 1992.875 1992.958 1993.042 1993.125 1993.208 1993.292 1993.375 1993.458
[425] 1993.542 1993.625 1993.708 1993.792 1993.875 1993.958 1994.042 1994.125
[433] 1994.208 1994.292 1994.375 1994.458 1994.542 1994.625 1994.708 1994.792
[441] 1994.875 1994.958 1995.042 1995.125 1995.208 1995.292 1995.375 1995.458
[449] 1995.542 1995.625 1995.708 1995.792 1995.875 1995.958 1996.042 1996.125
[457] 1996.208 1996.292 1996.375 1996.458 1996.542 1996.625 1996.708 1996.792
[465] 1996.875 1996.958 1997.042 1997.125 1997.208 1997.292 1997.375 1997.458
[473] 1997.542 1997.625 1997.708 1997.792 1997.875 1997.958 1998.042 1998.125
[481] 1998.208 1998.292 1998.375 1998.458 1998.542 1998.625 1998.708 1998.792
[489] 1998.875 1998.958 1999.042 1999.125 1999.208 1999.292 1999.375 1999.458
[497] 1999.542 1999.625 1999.708 1999.792 1999.875 1999.958 2000.042 2000.125
[505] 2000.208 2000.292 2000.375 2000.458 2000.542 2000.625 2000.708 2000.792
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[513] 2000.875 2000.958 2001.042 2001.125 2001.208 2001.292 2001.375 2001.458
[521] 2001.542 2001.625 2001.708 2001.792 2001.875 2001.958 2002.042 2002.125
[529] 2002.208 2002.292 2002.375 2002.458 2002.542 2002.625 2002.708 2002.792
[537] 2002.875 2002.958 2003.042 2003.125 2003.208 2003.292 2003.375 2003.458
[545] 2003.542 2003.625 2003.708 2003.792 2003.875 2003.958 2004.042 2004.125
[553] 2004.208 2004.292 2004.375 2004.458 2004.542 2004.625 2004.708 2004.792
[561] 2004.875 2004.958 2005.042 2005.125 2005.208 2005.292 2005.375 2005.458
[569] 2005.542 2005.625 2005.708 2005.792 2005.875 2005.958 2006.042 2006.125
[577] 2006.208 2006.292 2006.375 2006.458 2006.542 2006.625 2006.708 2006.792
[585] 2006.875 2006.958 2007.042 2007.125 2007.208 2007.292 2007.375 2007.458
[593] 2007.542 2007.625 2007.708 2007.792 2007.875 2007.958 2008.042 2008.125
[601] 2008.208 2008.292 2008.375 2008.458 2008.542 2008.625 2008.708 2008.792
[609] 2008.875 2008.958 2009.042 2009.125 2009.208 2009.292 2009.375 2009.458
[617] 2009.542 2009.625 2009.708 2009.792 2009.875 2009.958 2010.042 2010.125
[625] 2010.208 2010.292 2010.375 2010.458 2010.542 2010.625 2010.708 2010.792
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[697] 2016.208 2016.292 2016.375 2016.458 2016.542 2016.625 2016.708 2016.792
[705] 2016.875 2016.958 2017.042 2017.125 2017.208 2017.292 2017.375 2017.458
[713] 2017.542 2017.625 2017.708 2017.792 2017.875 2017.958 2018.042 2018.125
[721] 2018.208 2018.292 2018.375 2018.458 2018.542 2018.625 2018.708 2018.792
[729] 2018.875 2018.958 2019.042 2019.125 2019.208 2019.292 2019.375 2019.458
[737] 2019.542 2019.625 2019.708 2019.792 2019.875 2019.958 2020.042 2020.125
[745] 2020.208 2020.292 2020.375 2020.458 2020.542 2020.625 2020.708 2020.792
[753] 2020.875 2020.958 2021.042 2021.125 2021.208 2021.292 2021.375 2021.458
[761] 2021.542
```

```r
# https://lubridate.tidyverse.org/reference/date_decimal.html
date_decimal(co2$date, tz = "HST")
```

```
 [1] "1958-03-15 23:39:08 HST" "1958-04-16 00:15:08 HST"
 [3] "1958-05-16 00:19:27 HST" "1958-06-16 00:02:53 HST"
 [5] "1958-07-16 00:07:13 HST" "1958-08-15 23:50:39 HST"
 [7] "1958-09-15 23:34:05 HST" "1958-10-15 23:38:24 HST"
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```

Question 3

Use a for loop to print out the result of multiplying the numbers 1-10 by 3.

```
for(x in 1:10){
    print(x*3)
}
```

```
[1] 3
```

```
[1]  6
[1]  9
[1]  12
[1]  15
[1]  18
[1]  21
[1]  24
[1]  27
[1]  30
```

Question 4

Use a while loop to do the same thing. It's easy to accidentally create infinite loops; if your chunk takes more than a couple seconds to run, press the red square in the top right corner of the chunk to abort the loop.

```r
i <- 1

while(i <= 10){
    print(i*3)
    i <- i + 1
}
```

```
[1] 3
[1] 6
[1] 9
[1] 12
[1] 15
[1] 18
[1] 21
[1] 24
[1] 27
[1] 30
```

Question 5

If you haven't created a GitHub account yet, do it now. Paste a link to your GitHub profile below:

(Link to github profile should be provided here)

Question 6

You're working on a group coding project with your classmates that's due soon. After a weekend away from your computer, you open R Studio to start working. What is the first git command you should run?

git pull

Question 7

You write some new code, save your Qmd file, commit your changes to your local repository, and then go eat dinner. While you're eating, your teammate sends you a message asking where your new code is. What did you forget to do?

git push

You're done! Please render to pdf and upload to Gradescope.