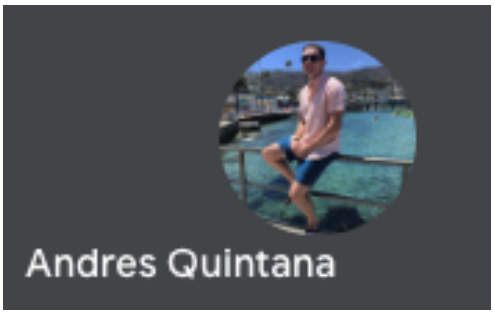
Homework 1

Prepare your answers as a **single PDF file**.
Group work: You may work in groups of 1-3. Include all group member names in the PDF file. Only **one person** in the group should submit to Canvas.
Due: check on Canvas.

1. Please upload a "group picture" of your group. You can be creative - an actual group photo, a screen capture of a zoom meeting, putting your profile pictures/avatars into one, ... Please put your names on the picture too. (You must answer this question even if you work by yourself).



2. Use the in-built dataset, `mtcars`, for this problem. Write code to (**For each question, give (1) the code and (2) the output)**:

a. How many rows are there?
   > nrow(mtcars)
   [1] 32

b. How many columns are there?
   > ncol(mtcars)
   [1] 11

c. What is the unit of the weight column? (Hint: see help)
   > ?mtcars
   From help on format, I saw that [,6] wt Weight (1000lbs)

d. Show first 10 rows

```
> head(mtcars, 10)
                   mpg cyl  disp  hp drat    wt  qsec vs am gear carb
Mazda RX4         21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
Mazda RX4 Wag     21.0   6 160.0 110 3.90 2.875 17.02  0  1    4    4
Datsun 710        22.8   4 108.0  93 3.85 2.320 18.61  1  1    4    1
Hornet 4 Drive    21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
Hornet Sportabout 18.7   8 360.0 175 3.15 3.440 17.02  0  0    3    2
Valiant           18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
Duster 360        14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
Merc 240D         24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
Merc 230          22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
Merc 280          19.2   6 167.6 123 3.92 3.440 18.30  1  0    4    4
```

e. Show every other row (i.e., 1st, 3rd, 5th, …)

```
> mtcars[seq(1, nrow(mtcars), 2), ]
                   mpg cyl  disp  hp drat    wt  qsec vs am gear carb
Mazda RX4         21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
Datsun 710        22.8   4 108.0  93 3.85 2.320 18.61  1  1    4    1
Hornet Sportabout 18.7   8 360.0 175 3.15 3.440 17.02  0  0    3    2
Duster 360        14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
Merc 230          22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
Merc 280C         17.8   6 167.6 123 3.92 3.440 18.90  1  0    4    4
Merc 450SL        17.3   8 275.8 180 3.07 3.730 17.60  0  0    3    3
Cadillac Fleetwood 10.4  8 472.0 205 2.93 5.250 17.98  0  0    3    4
Chrysler Imperial 14.7   8 440.0 230 3.23 5.345 17.42  0  0    3    4
Honda Civic       30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
Toyota Corona     21.5   4 120.1  97 3.70 2.465 20.01  1  0    3    1
AMC Javelin       15.2   8 304.0 150 3.15 3.435 17.30  0  0    3    2
Pontiac Firebird  19.2   8 400.0 175 3.08 3.845 17.05  0  0    3    2
Porsche 914-2     26.0   4 120.3  91 4.43 2.140 16.70  0  1    5    2
Ford Pantera L    15.8   8 351.0 264 4.22 3.170 14.50  0  1    5    4
Maserati Bora     15.0   8 301.0 335 3.54 3.570 14.60  0  1    5    8
```

f. Show all rows where the number of cylinders is 4 or 6

```
> mtcars[mtcars$cyl == 4 | mtcars$cyl == 6, ]
                mpg cyl  disp  hp drat    wt  qsec vs am gear carb
Mazda RX4      21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
Mazda RX4 Wag  21.0   6 160.0 110 3.90 2.875 17.02  0  1    4    4
Datsun 710     22.8   4 108.0  93 3.85 2.320 18.61  1  1    4    1
Hornet 4 Drive 21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
Valiant        18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
Merc 240D      24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
Merc 230       22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
Merc 280       19.2   6 167.6 123 3.92 3.440 18.30  1  0    4    4
Merc 280C      17.8   6 167.6 123 3.92 3.440 18.90  1  0    4    4
Fiat 128       32.4   4  78.7  66 4.08 2.200 19.47  1  1    4    1
Honda Civic    30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
Toyota Corolla 33.9   4  71.1  65 4.22 1.835 19.90  1  1    4    1
Toyota Corona  21.5   4 120.1  97 3.70 2.465 20.01  1  0    3    1
Fiat X1-9      27.3   4  79.0  66 4.08 1.935 18.90  1  1    4    1
Porsche 914-2  26.0   4 120.3  91 4.43 2.140 16.70  0  1    5    2
Lotus Europa   30.4   4  95.1 113 3.77 1.513 16.90  1  1    5    2
Ferrari Dino   19.7   6 145.0 175 3.62 2.770 15.50  0  1    5    6
Volvo 142E     21.4   4 121.0 109 4.11 2.780 18.60  1  1    4    2
```

g. Are there any NAs in the mpg column?

```
> is.na(mtcars$mpg)
 [1] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[16] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[31] FALSE FALSE
```

h. What is the mean mpg value

> mean(mtcars$mpg)
[1] 20.09062

i. Show all rows where mpg is lower than the mean mpg value

```
> mtcars[mtcars$mpg < mean(mtcars$mpg), ]
                   mpg cyl  disp  hp drat    wt  qsec vs am gear carb
Hornet Sportabout 18.7   8 360.0 175 3.15 3.440 17.02  0  0    3    2
Valiant           18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
Duster 360        14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
Merc 280          19.2   6 167.6 123 3.92 3.440 18.30  1  0    4    4
Merc 280C         17.8   6 167.6 123 3.92 3.440 18.90  1  0    4    4
Merc 450SE        16.4   8 275.8 180 3.07 4.070 17.40  0  0    3    3
Merc 450SL        17.3   8 275.8 180 3.07 3.730 17.60  0  0    3    3
Merc 450SLC       15.2   8 275.8 180 3.07 3.780 18.00  0  0    3    3
Cadillac Fleetwood  10.4   8 472.0 205 2.93 5.250 17.98  0  0    3    4
Lincoln Continental 10.4   8 460.0 215 3.00 5.424 17.82  0  0    3    4
Chrysler Imperial   14.7   8 440.0 230 3.23 5.345 17.42  0  0    3    4
Dodge Challenger    15.5   8 318.0 150 2.76 3.520 16.87  0  0    3    2
AMC Javelin         15.2   8 304.0 150 3.15 3.435 17.30  0  0    3    2
Camaro Z28          13.3   8 350.0 245 3.73 3.840 15.41  0  0    3    4
Pontiac Firebird    19.2   8 400.0 175 3.08 3.845 17.05  0  0    3    2
Ford Pantera L      15.8   8 351.0 264 4.22 3.170 14.50  0  1    5    4
Ferrari Dino        19.7   6 145.0 175 3.62 2.770 15.50  0  1    5    6
Maserati Bora       15.0   8 301.0 335 3.54 3.570 14.60  0  1    5    8
```

j. What is the horsepower of the car with the highest mpg (code should should only the horsepower value)?
> max_mpg_car <- mtcars[which.max(mtcars$mpg),]
> max_mpg_car$hp
[1] 65

3. Consider the answer posted to Quora.com to "Why is R great for Data Science?. Answer one of the following questions.

The author lists 5 parts of the R ecosystem, the 5th being "community". Write 4-5 sentences about any one online community where members discuss R. (Include the URL, how active is the community, what types of people post here, how "friendly" it is to newcomers, etc.)

OR (if you know Python)
The author says "Note that in python, data frame manipulation will require numpy and pandas external packages (and the syntax is more cumbersome)". Do you agree with this statement? Justify your answer in 4-5 sentences.

Stack Overflow - R Tag (https://stackoverflow.com/questions/tagged/r)

Stack Overflow's R tag is one of the most active and widely-used online communities for discussing R programming. It is highly active, with thousands of questions and answers posted

daily. The diverse community consists of R enthusiasts, data scientists, analysts, programmers, and students.
Stack Overflow is generally friendly to newcomers, but the reception can vary depending on the questions' quality. Well-formulated questions that show effort and research tend to receive positive responses. Users are encouraged to provide concise, clear answers, often with code examples.