# Week 3 Lab Assignment 1

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## Assignments

Use the mtcars data set to answer the following questions. (You can use the ?mtcars command to learn about this dataset).

- a. Create an R object containing cars with manual transmission.
- b. Create an R object containing cars with weight greater than 1000 lbs.
- c. Create an R object containing cars with automatic transmission and 3 forward gears.
- d. Create an R object containing cars with automatic transmission and miles per gallon(mpg) less than 20.
- e. Let's assume you are a car manufacturer. After analyzing the data, you want to improve the miles per galon (mpg) of those cars with automatic transmission and mpg less than 20. Now for these subset of cars, create a new data column with your choice of ideal miles per gallon and assign this value to this column.

### Assignment A

a. Create an R object containing cars with manual transmission.

```
manual_trans <- mtcars[mtcars$am == 1,]
manual_trans</pre>
```

```
##
                                                   qsec vs am
                   mpg cyl disp hp drat
                                                              gear carb
                                               wt
                          6 160.0 110 3.90 2.620 16.46
## Mazda RX4
                  21.0
                                                         0
                                                                       4
                                                                       4
## Mazda RX4 Wag
                  21.0
                          6 160.0 110 3.90 2.875 17.02
                                                          0
## Datsun 710
                  22.8
                          4 108.0
                                   93 3.85 2.320 18.61
                                                          1
                                                                       1
## Fiat 128
                   32.4
                          4
                             78.7
                                   66 4.08 2.200 19.47
                                                          1
                                                                       1
                                                                       2
## Honda Civic
                   30.4
                             75.7
                                   52 4.93 1.615 18.52
## Toyota Corolla 33.9
                             71.1
                                   65 4.22 1.835 19.90
                                                                       1
## Fiat X1-9
                   27.3
                             79.0
                                   66 4.08 1.935 18.90
                                                                       1
## Porsche 914-2
                  26.0
                          4 120.3
                                   91 4.43 2.140 16.70
                                                          0
                                                                  5
                                                                       2
## Lotus Europa
                                                                       2
                   30.4
                          4 95.1 113 3.77 1.513 16.90
## Ford Pantera L 15.8
                          8 351.0 264 4.22 3.170 14.50
                                                                       4
                                                          0
                                                                  5
## Ferrari Dino
                   19.7
                          6 145.0 175 3.62 2.770 15.50
                                                          0
                                                                  5
                                                                       6
                                                                       8
## Maserati Bora
                  15.0
                          8 301.0 335 3.54 3.570 14.60
                                                         0
                                                             1
## Volvo 142E
                   21.4
                          4 121.0 109 4.11 2.780 18.60
```

#### Assignment B

b. Create an R object containing cars with weight greater than 1000 lbs.

```
weight_1000 <- mtcars[mtcars$wt > 1, ]
weight_1000
```

```
##
                        mpg cyl
                                 disp hp drat
                                                        qsec vs am gear carb
## Mazda RX4
                        21.0
                               6 160.0 110 3.90 2.620 16.46
                                                              0
                                                                            4
## Mazda RX4 Wag
                        21.0
                               6 160.0 110 3.90 2.875 17.02
                                                              0
                                                                       4
                                                                            4
                               4 108.0 93 3.85 2.320 18.61
                                                                       4
                                                                            1
## Datsun 710
                        22.8
## Hornet 4 Drive
                        21.4
                               6 258.0 110 3.08 3.215 19.44
                                                                            1
## Hornet Sportabout
                        18.7
                               8 360.0 175 3.15 3.440 17.02
                                                              0
                                                                       3
                                                                            2
                                                                 0
## Valiant
                        18.1
                               6 225.0 105 2.76 3.460 20.22
```

```
## Duster 360
                        14.3
                               8 360.0 245 3.21 3.570 15.84
## Merc 240D
                                        62 3.69 3.190 20.00
                                                                       4
                                                                            2
                        24.4
                               4 146.7
## Merc 230
                        22.8
                                        95 3.92 3.150 22.90
                                                                            2
## Merc 280
                        19.2
                               6 167.6 123 3.92 3.440 18.30
                                                                            4
## Merc 280C
                        17.8
                               6 167.6 123 3.92 3.440 18.90
                                                                            4
                                                                       3
                                                                            3
## Merc 450SE
                        16.4
                               8 275.8 180 3.07 4.070 17.40
                                                                  0
## Merc 450SL
                        17.3
                               8 275.8 180 3.07 3.730 17.60
## 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
                                                                       3
## Chrysler Imperial
                        14.7
                               8 440.0 230 3.23 5.345 17.42
                                                                            4
## Fiat 128
                                  78.7
                                        66 4.08 2.200 19.47
                                                                       4
                        32.4
                                                               1
                                                                            1
## Honda Civic
                        30.4
                               4
                                  75.7
                                        52 4.93 1.615 18.52
                                                                       4
                                                                            2
                                                               1
                                                                  1
## Toyota Corolla
                                        65 4.22 1.835 19.90
                        33.9
                               4 71.1
## Toyota Corona
                                        97 3.70 2.465 20.01
                                                                       3
                        21.5
                               4 120.1
                                                                            1
## Dodge Challenger
                        15.5
                               8 318.0 150 2.76 3.520 16.87
                                                                       3
                                                                       3
                                                                            2
## AMC Javelin
                        15.2
                               8 304.0 150 3.15 3.435 17.30
                                                               0
                                                                  0
## Camaro Z28
                        13.3
                               8 350.0 245 3.73 3.840 15.41
## Pontiac Firebird
                                                                       3
                        19.2
                               8 400.0 175 3.08 3.845 17.05
                                                               0
                                                                            2
                                                                  0
## Fiat X1-9
                        27.3
                               4 79.0
                                        66 4.08 1.935 18.90
                                                                       4
                                                                            1
## Porsche 914-2
                        26.0
                               4 120.3 91 4.43 2.140 16.70
                                                              0
                                                                       5
                                                                            2
## Lotus Europa
                               4 95.1 113 3.77 1.513 16.90
                        30.4
                               8 351.0 264 4.22 3.170 14.50
## Ford Pantera L
                        15.8
                                                               0
                                                                       5
                                                                            4
                                                                  1
                               6 145.0 175 3.62 2.770 15.50
                                                                       5
                                                                            6
## Ferrari Dino
                        19.7
## Maserati Bora
                        15.0
                               8 301.0 335 3.54 3.570 14.60
                                                                       5
                                                                            8
## Volvo 142E
                        21.4
                               4 121.0 109 4.11 2.780 18.60
                                                                            2
```

#### Assignment C

c. Create an R object containing cars with automatic transmission and 3 forward gears.

```
automatic_threegears <- mtcars[mtcars$am == 0 & mtcars$gear ==3,]
automatic_threegears</pre>
```

```
##
                                 disp hp drat
                         mpg cyl
                                                    wt
                                                        qsec vs am gear carb
                               6 258.0 110 3.08 3.215 19.44
## Hornet 4 Drive
                        21.4
                               8 360.0 175 3.15 3.440 17.02
                                                                            2
## Hornet Sportabout
                        18.7
                                                               0
                                                                  0
## Valiant
                        18.1
                               6 225.0 105 2.76 3.460 20.22
                                                                  0
                                                                            1
## Duster 360
                        14.3
                               8 360.0 245 3.21 3.570 15.84
                                                                            4
                               8 275.8 180 3.07 4.070 17.40
                                                                       3
## Merc 450SE
                        16.4
                                                               0
                                                                  0
                                                                            3
## Merc 450SL
                        17.3
                               8 275.8 180 3.07 3.730 17.60
                                                               0
                                                                  0
                                                                       3
                                                                            3
                                                                       3
                                                                            3
## Merc 450SLC
                        15.2
                               8 275.8 180 3.07 3.780 18.00
## Cadillac Fleetwood 10.4
                               8 472.0 205 2.93 5.250 17.98
                                                                       3
                                                                            4
## Lincoln Continental 10.4
                               8 460.0 215 3.00 5.424 17.82
                                                                       3
                                                                            4
## Chrysler Imperial
                        14.7
                               8 440.0 230 3.23 5.345 17.42
                                                              0
                                                                  0
                                                                       3
                                                                            4
                                                                       3
## Toyota Corona
                        21.5
                               4 120.1 97 3.70 2.465 20.01
                                                                       3
                                                                            2
## Dodge Challenger
                        15.5
                               8 318.0 150 2.76 3.520 16.87
                                                               0
                                                                  0
## AMC Javelin
                        15.2
                               8 304.0 150 3.15 3.435 17.30
                                                               0
                                                                       3
                                                                            2
## Camaro Z28
                        13.3
                               8 350.0 245 3.73 3.840 15.41
                                                               0
                                                                       3
                                                                            4
## Pontiac Firebird
                        19.2
                               8 400.0 175 3.08 3.845 17.05
```

#### Assignment D

d. Create an R object containing cars with automatic transmission and miles per gallon(mpg) less than 20.

```
automatic_badmpg <- mtcars[mtcars$am == 0 & mtcars$mpg < 20,]
automatic_badmpg</pre>
```

```
##
                         mpg cyl
                                  disp hp drat
                                                         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
                                6 167.6 123 3.92 3.440 18.30
                                                                        4
                                                                              4
## Merc 280
                        19.2
## Merc 280C
                        17.8
                                6 167.6 123 3.92 3.440 18.90
                                                                        4
                                                                              4
                                                                   0
                                                                        3
## Merc 450SE
                        16.4
                                8 275.8 180 3.07 4.070 17.40
                                                                              3
## Merc 450SL
                        17.3
                                8 275.8 180 3.07 3.730 17.60
                                                                0
                                                                   \cap
                                                                        3
                                                                              3
## Merc 450SLC
                        15.2
                                8 275.8 180 3.07 3.780 18.00
                                                                        3
                                                                              3
## Cadillac Fleetwood 10.4
                                8 472.0 205 2.93 5.250 17.98
                                                                0
                                                                        3
                                                                   \cap
                                                                              4
## Lincoln Continental 10.4
                                8 460.0 215 3.00 5.424 17.82
                                                                0
                                                                        3
                                                                              4
                                                                        3
                                                                              4
## Chrysler Imperial
                        14.7
                                8 440.0 230 3.23 5.345 17.42
                                                                0
## Dodge Challenger
                        15.5
                                8 318.0 150 2.76 3.520 16.87
                                                                        3
                                                                              2
## AMC Javelin
                        15.2
                                8 304.0 150 3.15 3.435 17.30
                                                                0
                                                                   Λ
                                                                        3
                                                                              2
## Camaro Z28
                        13.3
                                8 350.0 245 3.73 3.840 15.41
                                                                        3
                                                                              4
                                                                0
                                8 400.0 175 3.08 3.845 17.05
                                                                        3
                                                                              2
## Pontiac Firebird
                        19.2
```

#### Assignment E

e. Let's assume you are a car manufacturer. After analyzing the data, you want to improve the miles per galon (mpg) of those cars with automatic transmission and mpg less than 20. Now for these subset of cars, create a new data column with your choice of ideal miles per gallon and assign this value to this column.

```
automatic_badmpg$ideal_mgp <- 55
automatic_badmpg</pre>
```

```
##
                         mpg cyl
                                 disp hp drat
                                                     wt
                                                         qsec vs am gear carb
                                                                             2
## Hornet Sportabout
                        18.7
                               8 360.0 175 3.15 3.440 17.02
                                                                        3
## Valiant
                        18.1
                               6 225.0 105 2.76 3.460 20.22
                                                                        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
                                                                        4
                        17.8
                               6 167.6 123 3.92 3.440 18.90
                                                                   \cap
                                                                             4
## Merc 450SE
                        16.4
                               8 275.8 180 3.07 4.070 17.40
                                                                0
                                                                        3
                                                                             3
## Merc 450SL
                        17.3
                               8 275.8 180 3.07 3.730 17.60
                                                                        3
                                                                0
                                                                   0
                                                                             3
## Merc 450SLC
                        15.2
                               8 275.8 180 3.07 3.780 18.00
                                                                0
                                                                        3
                                                                             3
## Cadillac Fleetwood
                        10.4
                               8 472.0 205 2.93 5.250 17.98
                                                                        3
                                                                             4
## Lincoln Continental 10.4
                               8 460.0 215 3.00 5.424 17.82
                                                                        3
                                                                             4
                                                               0
                                                                   0
## Chrysler Imperial
                        14.7
                               8 440.0 230 3.23 5.345 17.42
                                                                0
                                                                        3
                                                                             4
## Dodge Challenger
                                                                        3
                                                                             2
                        15.5
                               8 318.0 150 2.76 3.520 16.87
                                                               Ω
                                                                   Λ
## AMC Javelin
                        15.2
                               8 304.0 150 3.15 3.435 17.30
                                                               0
                                                                        3
                                                                             2
## Camaro Z28
                        13.3
                               8 350.0 245 3.73 3.840 15.41
                                                                        3
                                                                0
                                                                   0
                                                                             4
## Pontiac Firebird
                        19.2
                               8 400.0 175 3.08 3.845 17.05
                                                                             2
##
                        ideal_mgp
## Hornet Sportabout
                               55
                               55
## Valiant
## Duster 360
                               55
## Merc 280
                               55
## Merc 280C
                               55
## Merc 450SE
                               55
## Merc 450SL
                               55
## Merc 450SLC
                               55
```

##	Cadillac Fleetwood	55
##	Lincoln Continental	55
##	Chrysler Imperial	55
##	Dodge Challenger	55
##	AMC Javelin	55
##	Camaro Z28	55
##	Pontiac Firebird	55