Week 2 Homework Assignment

```
# IST687    - Writing    functions    and doing    some    initial data    analysis
myCars<-mtcars
myCars
```

```
##                        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
## 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
## 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
## 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
## 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
## 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
## Volvo 142E            21.4   4 121.0 109 4.11 2.780 18.60  1  1    4    2
```

```
# Step  1:  What    is  the hp      (hp stands  for "horse  power")
# What   is  the highest hp?

maxHP <- max(myCars$hp)
maxHP
```

```
## [1] 335
```

```
#Which  car has the highest hp?

CarWithHighHP <- row.names( myCars[which.max(myCars$hp),] )
CarWithHighHP
```

```
## [1] "Maserati Bora"
```

```
# Step  2:  Explore mpg (mpg    stands  for "miles  per gallon")
# What  is  the highest mpg?

maxMPG <- max(myCars$mpg)
maxMPG
```

```
## [1] 33.9
```

```
#Which  car has the highest mpg?
CarWithmaxMPG <- row.names( myCars[which.max(myCars$mpg),] )
CarWithmaxMPG
```

```
## [1] "Toyota Corolla"
```

```
#Create a   sorted  dataframe,  based   on  mpg

myCarsSorted <- myCars[order(myCars$mpg),]
myCarsSorted
```

```
##                       mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## 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
## Camaro Z28           13.3   8 350.0 245 3.73 3.840 15.41  0  0    3    4
## Duster 360           14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
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## Maserati Bora        15.0   8 301.0 335 3.54 3.570 14.60  0  1    5    8
## Merc 450SLC          15.2   8 275.8 180 3.07 3.780 18.00  0  0    3    3
## AMC Javelin          15.2   8 304.0 150 3.15 3.435 17.30  0  0    3    2
## Dodge Challenger     15.5   8 318.0 150 2.76 3.520 16.87  0  0    3    2
## Ford Pantera L       15.8   8 351.0 264 4.22 3.170 14.50  0  1    5    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
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## Ferrari Dino         19.7   6 145.0 175 3.62 2.770 15.50  0  1    5    6
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## Toyota Corolla       33.9   4  71.1  65 4.22 1.835 19.90  1  1    4    1
```

```
#Step   3:  Which   car has the "best"  combination of  mpg and hp?
# Logic I used: calculate mpg per horsepower for each cars and the car with max miles per galon
 per orse power has got the best combination of hp and mpg

mpg_per_hp <- (myCars$mpg)/(myCars$hp)
mpg_per_hp
```

```
##  [1] 0.19090909 0.19090909 0.24516129 0.19454545 0.10685714 0.17238095
##  [7] 0.05836735 0.39354839 0.24000000 0.15609756 0.14471545 0.09111111
## [13] 0.09611111 0.08444444 0.05073171 0.04837209 0.06391304 0.49090909
## [19] 0.58461538 0.52153846 0.22164948 0.10333333 0.10133333 0.05428571
## [25] 0.10971429 0.41363636 0.28571429 0.26902655 0.05984848 0.11257143
## [31] 0.04477612 0.19633028
```

```
bestCar_hp_mpg <- row.names(myCars[which.max((myCars$mpg)/(myCars$hp)),])
bestCar_hp_mpg
```

```
## [1] "Honda Civic"
```

```
# Step  4:   Which  car has "best"  car combination of  mpg and hp, where   mpg and hp  must
 be  given   equal   weight

# we need to check the behavior of mpg and hp with repect to each other and to check that lets p
lot the data in a chart. I am using ggplot to see how their behaviour

# Refernces from https://rpubs.com/BillB/217355
library(ggplot2)
library(ggrepel)

ggplot(myCars,aes(myCars$hp,myCars$mpg,label=row.names(myCars)))+ geom_point() +
  geom_smooth(method = "lm", se = FALSE)    +
  geom_label_repel(aes(label = row.names(myCars)),
                   box.padding   = 0.35,
                   point.padding = 0.5,
                   segment.color = 'grey50') +
  theme_classic()
```
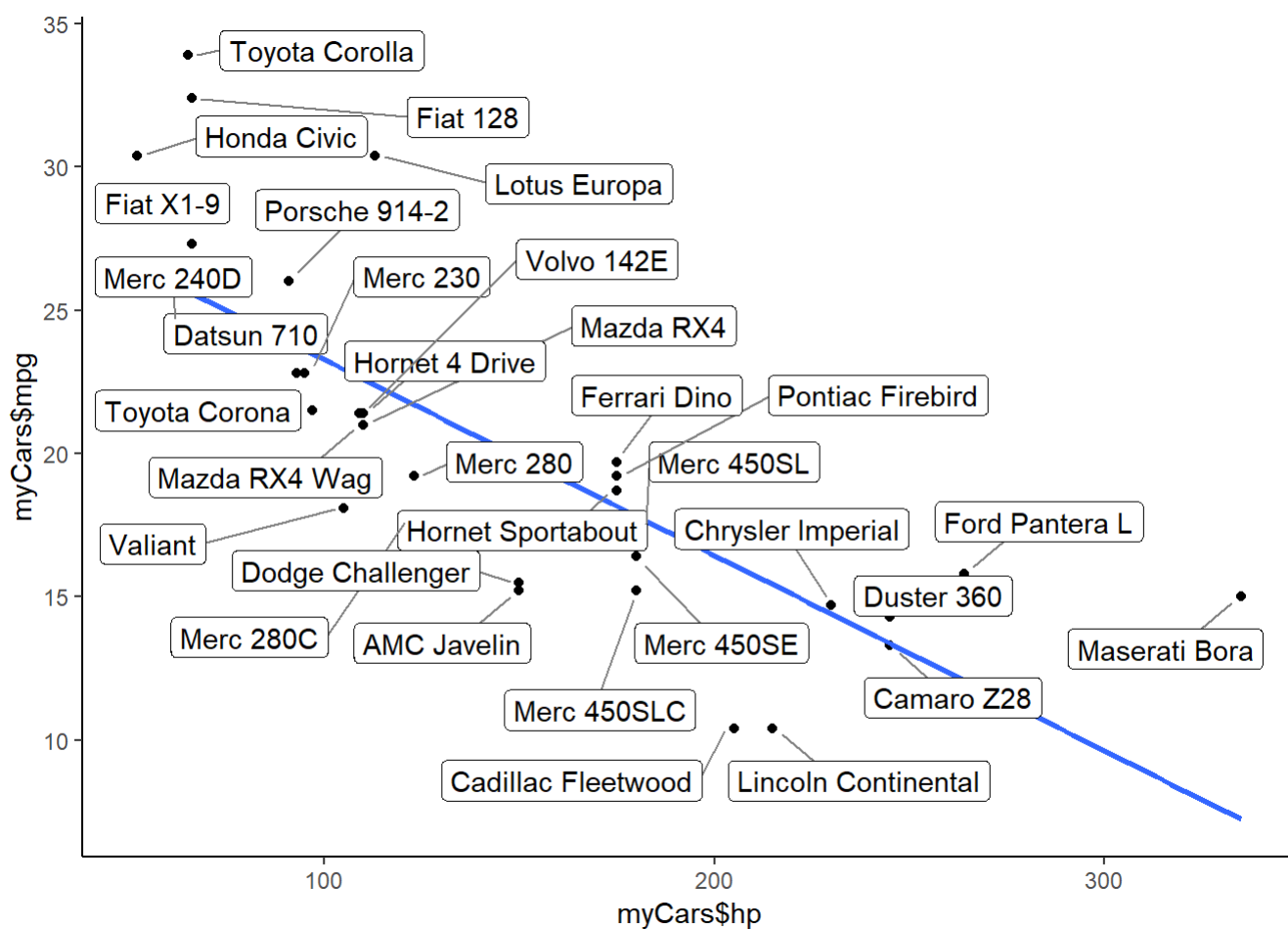


```
# The plot shows that with increase in horsepower the mpg value drops. To select car with best c
ombination of mpg and hp with equal weightage we need to get to the midpoint of this linear mode
l and the cars that fall in the mid ranges are Ferrari Dino and Merc 450SL
```