car_viz

call built-in data mtcars.

```
data(mtcars)
```

Select only car models where mpg<20

```
mtcars_mpg2 <- mtcars[mtcars$mpg < 20,]
#use of $ to select the desired column
```

Reduce the variables to mpg, cyl, disp, hp, gears

```
mtcars_mpg2 <- mtcars_mpg2[, c(1,2,3,4,10)]
#columns are vectors so we are calling the columns we want by the number vector they are in the data fr
```

read the R file hand_functions.R so that it can be used

notice that with echo = TRUE

```
source(file = "hand_functions.R", echo = TRUE)
```

```
##
## > sum_special <- function(df_x) {
## +     try(if (!is.data.frame(df_x))
## +         stop("Input data must be a data frame."))
## +     sp_means <- apply(df_ .... [TRUNCATED]
```

Now use the function from hand_functions.R

```
sp_out <- sum_special(mtcars_mpg2)

sum_special <- function(df_x){

  ## sum_special calculates data summary statistics
  ## the input param df_x is the data frame of input values

  #  browser()  # browser() will start the debugger
               # if the line is uncommented


  ## test the input data to assure that it is a data frame.
  try(if(!is.data.frame(df_x)) stop("Input data must be a data frame."))


  sp_means <- apply(df_x, MARGIN = 2, FUN = mean)
  sp_var <- apply(df_x, MARGIN = 2, FUN = var)
  sp_cov <- cov(df_x)
  sp_cor <- cor(df_x)

  ## Note that defining a list with the
  ## syntax list(list_name = list_content) produces
  ## named list items
  sp_outputs <- list(sp_means=sp_means,
                     sp_var = sp_var,
                     sp_cov = sp_cov,
                     sp_cor = sp_cor)

  return(sp_outputs)
}
```

```
#call the sp_out list

sp_out
```

```
## $sp_means
##        mpg        cyl       disp         hp       gear
##  15.900000   7.555556 313.811111 191.944444   3.444444
##
## $sp_var
##          mpg          cyl         disp           hp         gear
##    7.5258824    0.7320261 9438.7645752 3253.5849673    0.6143791
##
## $sp_cov
##                mpg        cyl       disp         hp        gear
## mpg     7.5258824 -1.3176471 -188.79529  -75.81176   0.6352941
## cyl    -1.3176471  0.7320261   64.71111   28.44444  -0.2614379
## disp -188.7952941 64.7111111 9438.76458 2679.60065 -34.1934641
## hp    -75.8117647 28.4444444 2679.60065 3253.58497  15.2026144
## gear    0.6352941 -0.2614379  -34.19346   15.20261   0.6143791
##
## $sp_cor
##             mpg        cyl       disp         hp       gear
## mpg   1.0000000 -0.5613802 -0.7083614 -0.4844811  0.2954459
## cyl  -0.5613802  1.0000000  0.7784989  0.5828450 -0.3898406
## disp -0.7083614  0.7784989  1.0000000  0.4835389 -0.4490217
## hp   -0.4844811  0.5828450  0.4835389  1.0000000  0.3400314
## gear  0.2954459 -0.3898406 -0.4490217  0.3400314  1.0000000
```

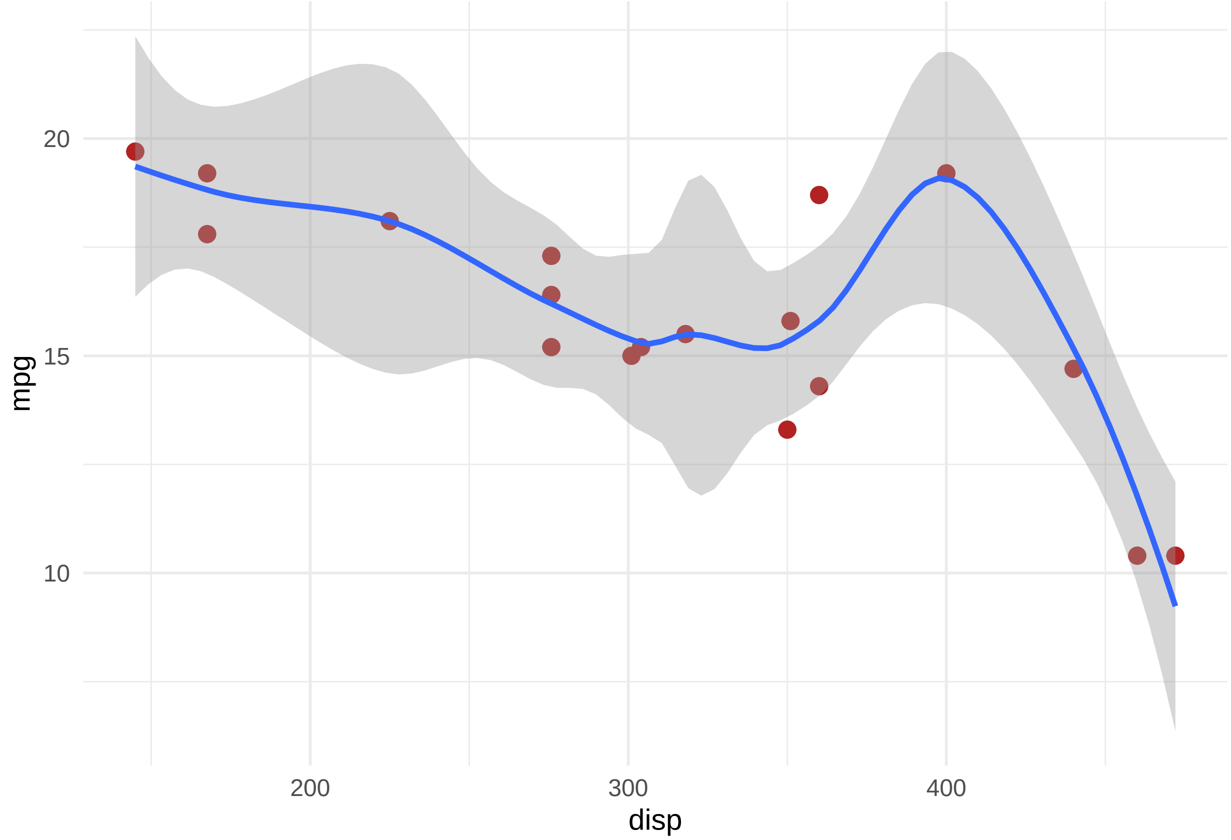
```
#This shows you the mean, variance, covariance, and correlation between the variables mpg, cyl, disp, h
```

```
# library(esquisse)
#
# esquisser(data = mtcars_mpg2, viewer = "browser")

#Using esquisser allows us to easily manipulate the plot without having to worry about the code. Once w
```

```r
ggplot(mtcars_mpg2) +
  aes(x = disp, y = mpg) +
  geom_point(shape = "bullet", size = 4L, colour = "#B22222") +
  geom_smooth(span = 0.5) +
  theme_minimal()
```

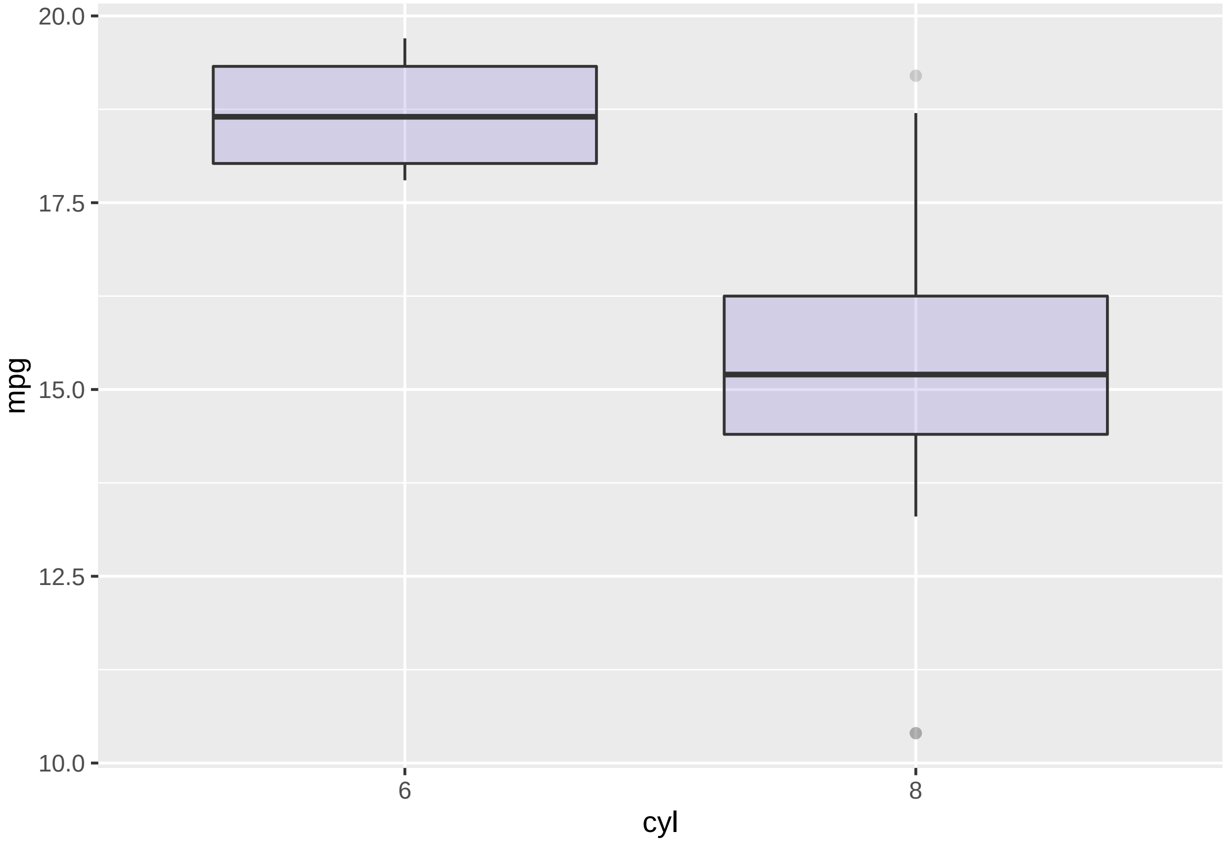
```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```



note that this boxplot cannot be made with esquisse() unless the data is adjusted. What adjustment is needed?

We need to use cylinders as the x input rather than disp, and used the data set mtcars_mpg2 which is a subset of mtcars that only includes car models where mpg<20.

```r
ggplot(mtcars_mpg2, aes(x=as.factor(cyl), y=mpg)) +
  geom_boxplot(fill="slateblue", alpha=0.2) +
  xlab("cyl")
```


20.0
17.5
15.0
12.5
10.0
mpg
6
8
cyl