STA 444 Practical F24 (MWF)

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Instructions

You may use the book during the exam and may take until the end of the period.

- **Change the header information within the RMD to contain your own name.**
- **Answer all exercise prompts within the RMD. All code must be shown.**
- **Place answers into the blank R chunks given for each required response.**
- **Compile the RMD into a PDF when finished.**
- **Ensure all code is visible within the PDF.**
- **Submit the PDF through our Canvas portal.**
- **The practical is not graded - try your best!**

Exercise 1

Specifically load the packages `ggplot2`, `dplyr`, and `broom`. Be sure the code is displayed. It is okay if warnings or messages are output.

```
library(ggplot2)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(broom)
```

Exercise 2

Load the data set `mtcars` from base R. Display the first 6 rows of this data frame.

```
data(mtcars)
head(mtcars)
```

```
##                   mpg cyl disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
## Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

Exercise 3

Create a new column within `mtcars` called `wt01` that takes on the value `LightWeight` if less than the mean weight (`wt`) of the data set, or takes on the value `HeavyWeight` if greater than or equal to the mean weight. *This question should use dplyr commands to achieve the result.*

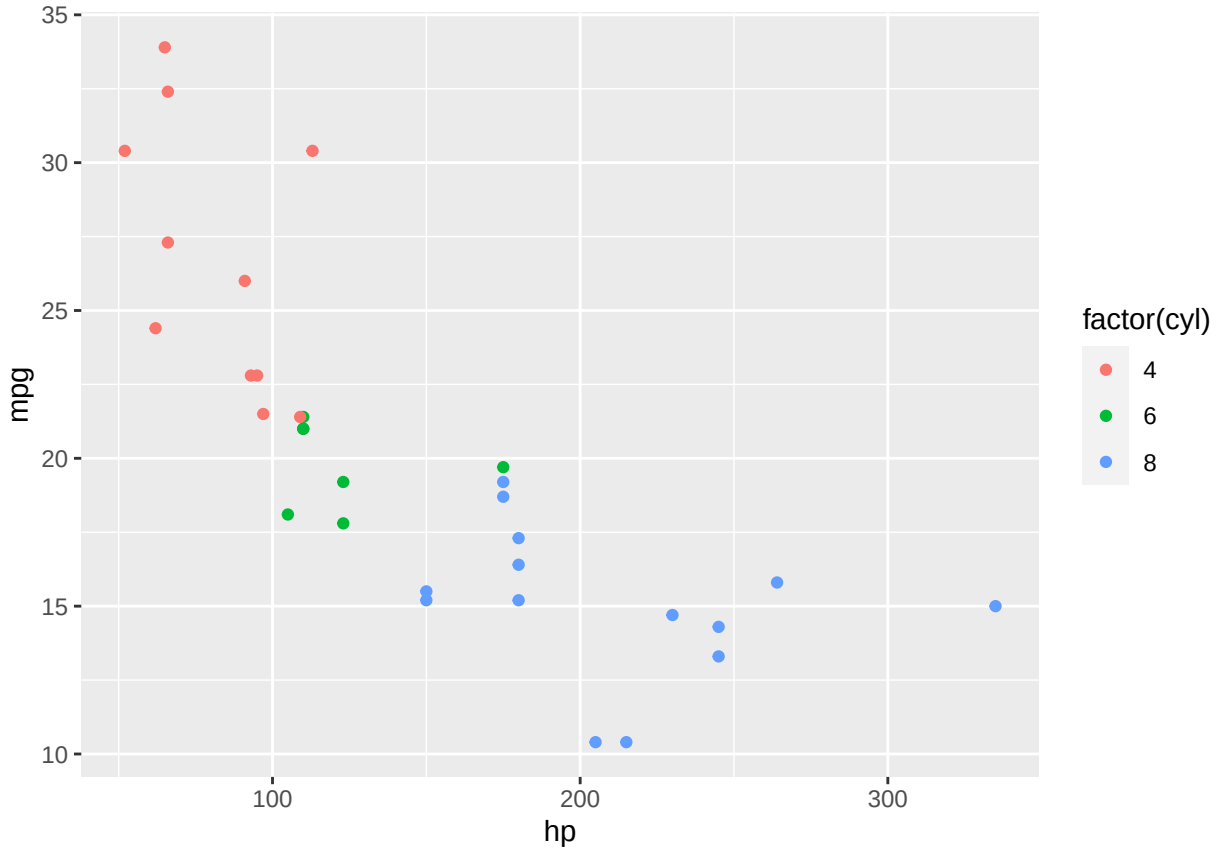
```
mtcars <- mtcars %>%
    mutate(wt01 = ifelse(wt < mean(mtcars$wt), 'LightWeight', 'HeavyWeight'))
head(mtcars)
```

```
##                   mpg cyl disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
## Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
##                          wt01
## Mazda RX4         LightWeight
## Mazda RX4 Wag     LightWeight
## Datsun 710        LightWeight
## Hornet 4 Drive    LightWeight
## Hornet Sportabout HeavyWeight
## Valiant           HeavyWeight
```

Exercise 4

Using the `mtcars` data, create a scatter graph with `hp` on the x-axis and `mpg` on the y-axis. Color the graph using the `cyl`. To get unique groups add the command `factor(cyl)` rather than just the variable `cyl` when coloring your graph.

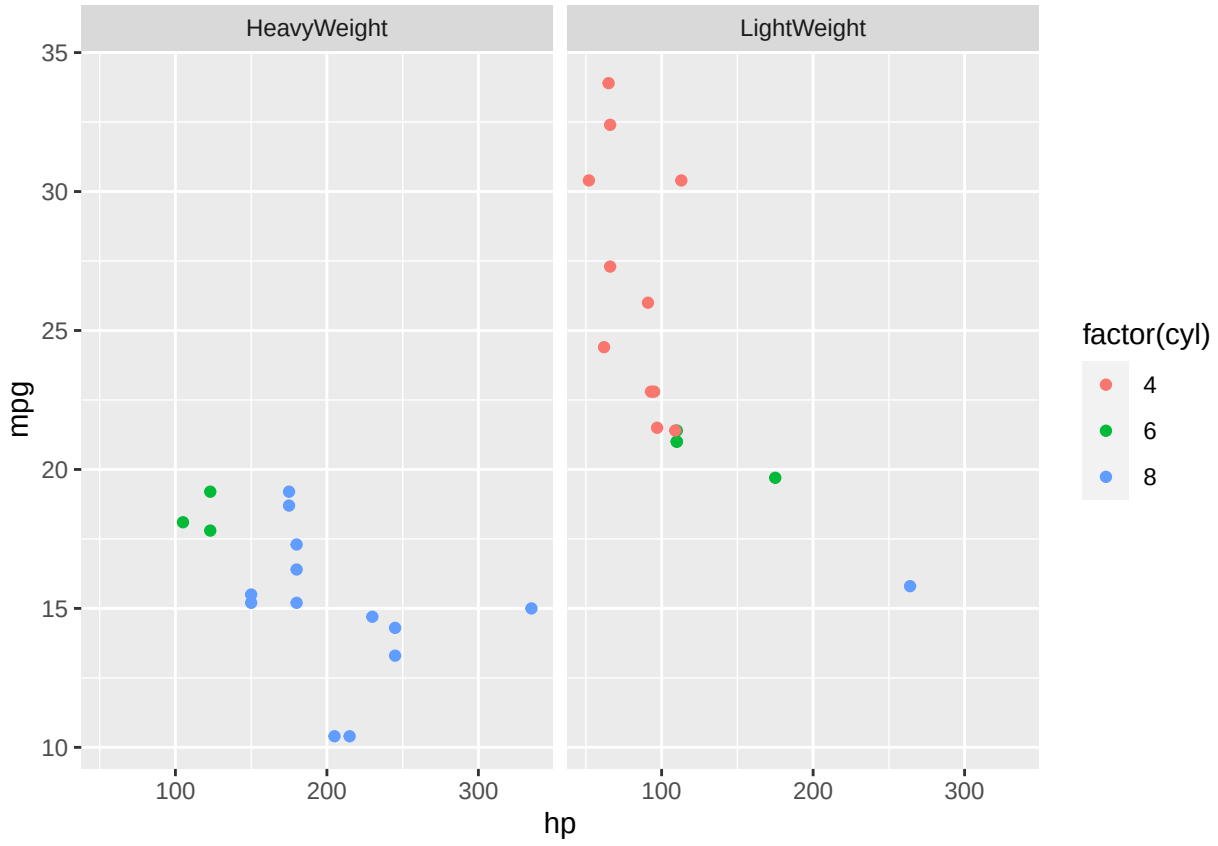
```
ggplot(data=mtcars,
       mapping=aes(x=hp, y=mpg, color=factor(cyl)))+
  geom_point()
```



Exercise 5

Split your graph above into a two paneled graph by adding a facet for `wt01`.

```
ggplot(data=mtcars,
       mapping=aes(x=hp, y=mpg, color=factor(cyl)))+
  geom_point()+
  facet_grid(cols=vars(wt01))
```



Exercise 6

Using the `mtcars` data, calculate the mean and standard deviation of `mpg` for each `cyl` and `wt01` combination. *Hint: group_by().*

```
mtcars %>% group_by(cyl, wt01) %>% summarise( mean(mpg), sd(mpg))
```

```
## `summarise()` has grouped output by 'cyl'. You can override using the `.groups`
## argument.
```

```
## # A tibble: 5 x 4
## # Groups:   cyl [3]
##     cyl wt01        `mean(mpg)` `sd(mpg)`
##   <dbl> <chr>             <dbl>     <dbl>
## 1     4 LightWeight        26.7     4.51
## 2     6 HeavyWeight        18.4     0.737
## 3     6 LightWeight        20.8     0.741
## 4     8 HeavyWeight        15.0     2.66
## 5     8 LightWeight        15.8    NA
```

Exercise 7

Estimate the model below using the `mtcars` data.

```
model.mtcars <- lm(data = mtcars, mpg ~ hp*wt01)
```

Display the resulting coefficient estimates using the `broom` package. Be sure to include the confidence intervals for each parameter.

```
broom::tidy(model.mtcars, conf.int=TRUE)
```

```
## # A tibble: 4 x 7
##   term                estimate std.error statistic     p.value conf.low conf.high
##   <chr>                  <dbl>     <dbl>     <dbl>       <dbl>    <dbl>     <dbl>
## 1 (Intercept)          20.3       2.77        7.36     5.21e-8  14.7     26.0
## 2 hp                   -0.0248    0.0141     -1.76     8.91e-2  -0.0536   0.00404
## 3 wt01LightWeight      11.5       3.31        3.47     1.71e-3   4.70    18.3
## 4 hp:wt01LightWeight   -0.0449    0.0210     -2.13     4.18e-2  -0.0880  -0.00179
```