LV5

Single Variable Visualisation

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Libraries

```
library(tidyverse)
```

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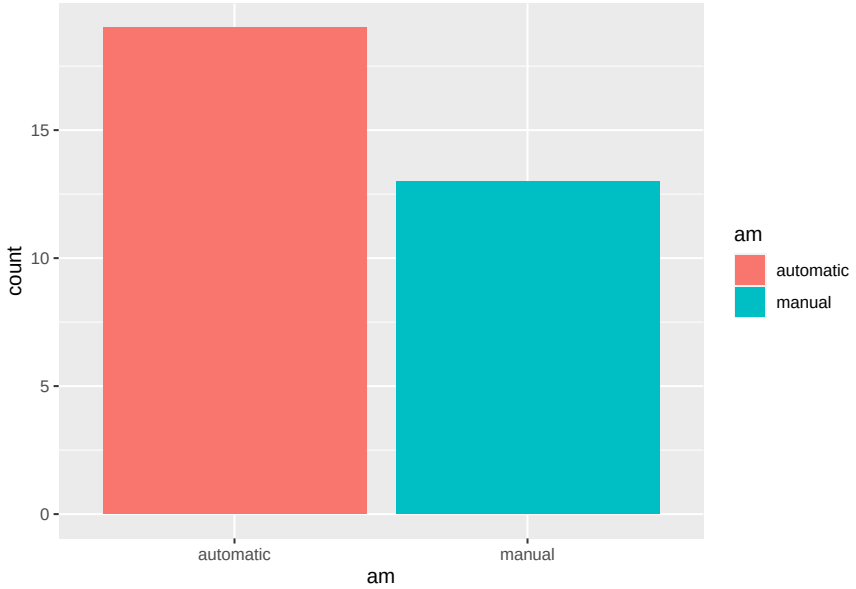
2 Plots fr a single Variable - bar plot

Create Dataset

```
mtcars %>%
  mutate(
    am = ifelse(am == 1, "manual", "automatic"),
    vs = ifelse(vs == 1, "straight", "v-shaped")
  ) -> data
```

2.1 Classic Bar Chart

```
data %>% ggplot(aes(x = am, fill= am)) + geom_bar()
```



Interpretation: - shows the number (count) of cars with automatic and manual shifting - data set contains more cars with automatic shifting than with manual shifting of gears

2.2 Stacked Bar Chart

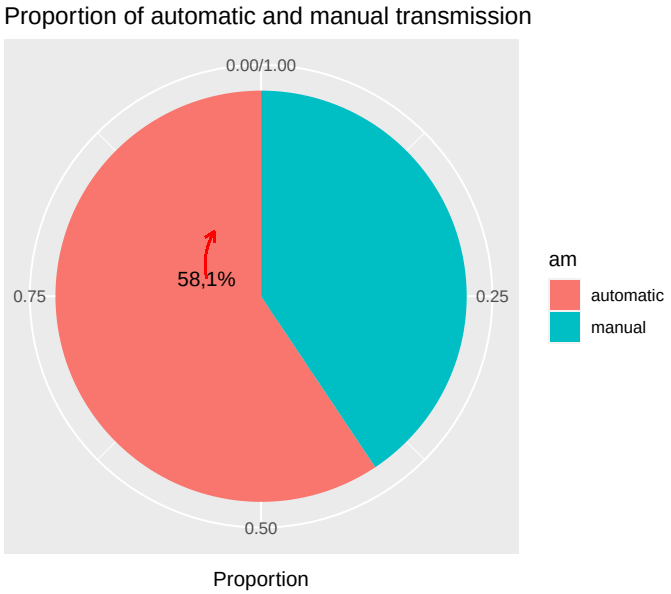
```
data %>% ggplot(aes(x = "", fill = am)) +
  geom_bar(position = "fill", width = 0.5) +
  xlab("") +
  ylab("Proportion") +
  scale_x_discrete(breaks = NULL)
```

Interpretation:

- the graph shows the proportion of automatic to manual gear shifting in the car data set

2.3 Pie Chart

```
ggplot(data, aes(x = 1, fill=am)) +
  geom_bar(position = "fill") +
  coord_polar("y") +
  xlab("") +
  ylab("Proportion") +
  ggtitle("Proportion of automatic and manual transmission") +
  scale_x_continuous(breaks = NULL) +
  #annotate("text", 0.3, 0.3, label="58,1%") +
  geom_segment(aes(x = 0.8, y = 0.8, xend = 0.9, yend = 0.9),
               arrow = arrow(length = unit(0.2, "cm")),
               col = "red") +
  annotate("text", 0.8, 0.8, label="58,1%")
```

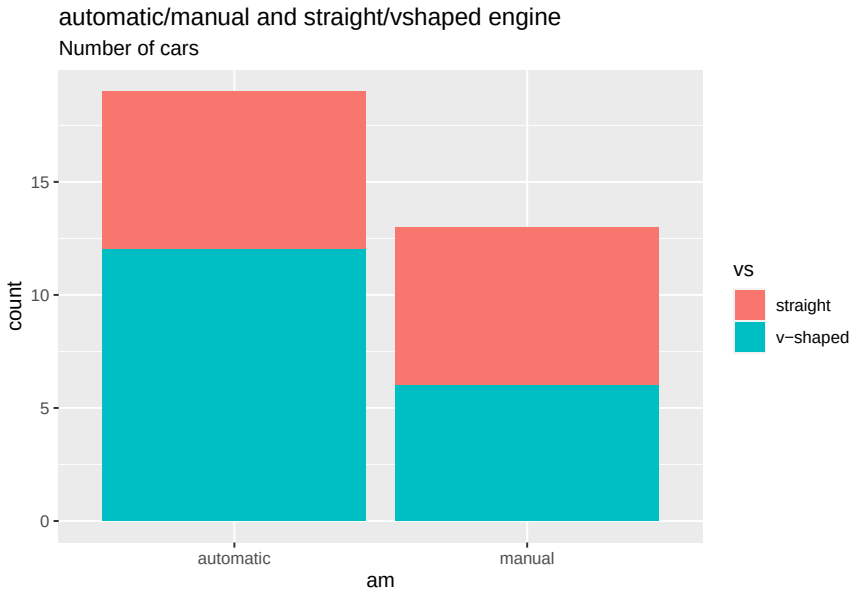


Interpretation:

- Different form of previous plot
- shows that 58.1% of the cars in the dataset are automatic transmission

2.4 Graphs with two categorial variables

```
data %>% ggplot(aes(x = am, fill=vs)) +
  geom_bar() +
  ggtitle("automatic/manual and straight/vshaped engine", subtitle="Number of cars")
```

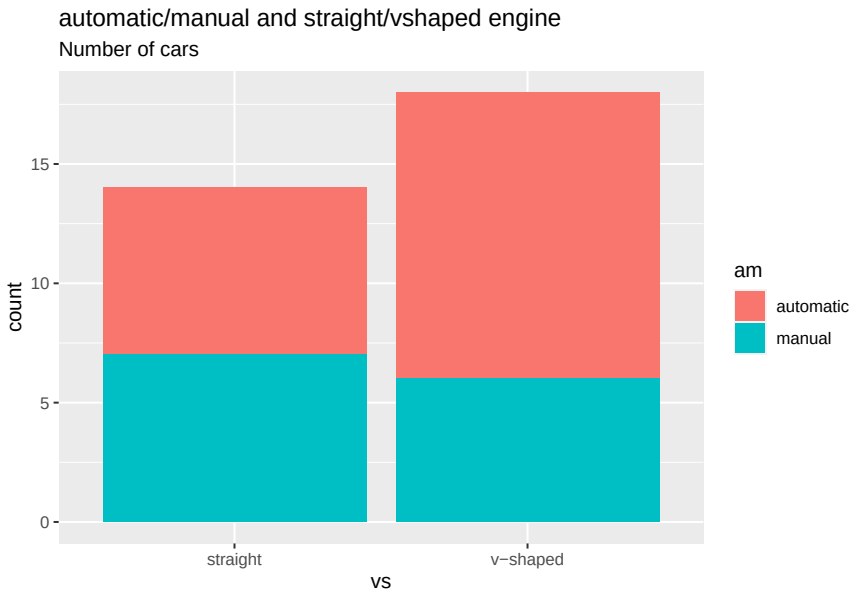


Interpretation:

- Number of cars with automatic gear shifting is higher than cars with manual gear shifting
- For automatic cars the v-shaped engines dominate (around 2/3)
- Manual transmission has approximately equal straight and vshaped engines

2.4.1 Alternativ Switch variables

```
data %>% ggplot(aes(x = vs, fill=am)) +
  geom_bar() +
  ggtitle("automatic/manual and straight/vshaped engine", subtitle="Number of cars")
```

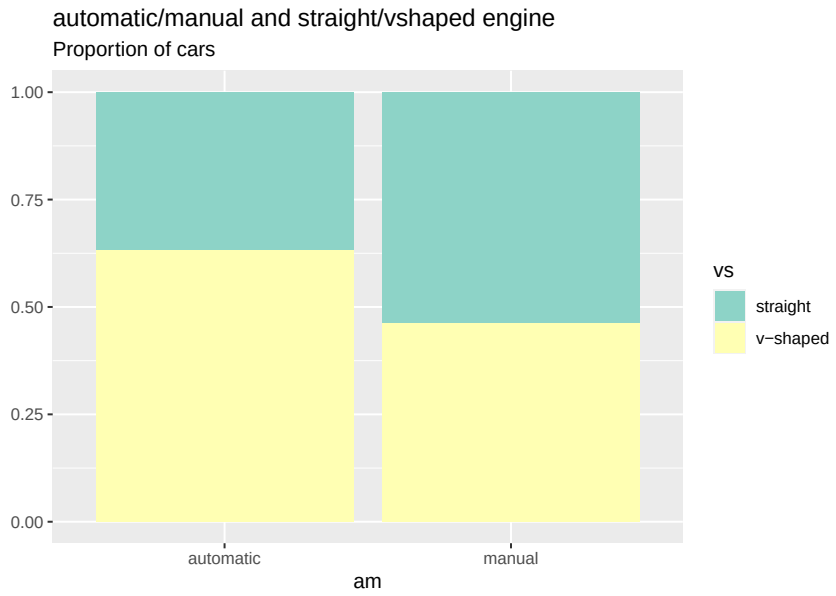


Interpretation:

- Doesnt change much for interpretation

2.5 Stacked pie Charts - two categorial variables

```
data %>% ggplot(aes(x = am, fill=vs)) +
  geom_bar(position = "fill") +
  ggtitle("automatic/manual and straight/vshaped engine", subtitle="Proportion of cars") +
  ylab("") +
  scale_fill_brewer(type = "qual", palette = 8)
```

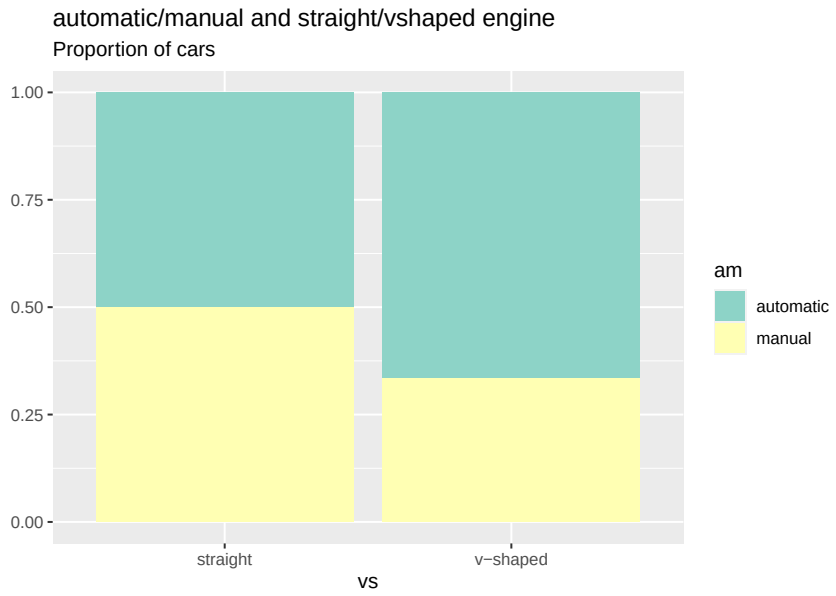


Interpretation:

- Share of straight engines is lower with automatic gearbox than with manual gear boxes
- That more cars are automatic is no longer visible in the graph

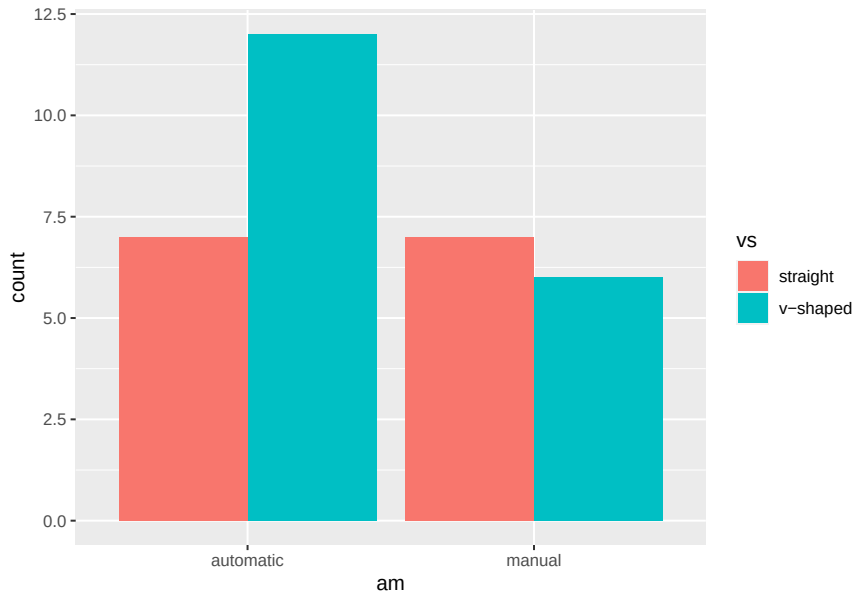
2.5.1 Alternative - switch variables

```
data %>% ggplot(aes(x = vs, fill=am)) +
  geom_bar(position = "fill") +
  ggtitle("automatic/manual and straight/vshaped engine", subtitle="Proportion of cars") +
  ylab("") +
  scale_fill_brewer(type = "qual", palette = 8)
```



2.6 Grouped bar charts

```
data %>% ggplot(aes(x = am , fill= vs)) +
  geom_bar(position = "dodge")
```



Interpretation:

- Two groups are compares (automatic vs manual)
- In the group automatic the number of straight engines is lower the the number of v-shaped engines. In the group if manual shifting gear cars the opposite is the case.
- The number of straight engines appears to be equal in the group of automatic and manual cars

###Check number of cars via data manipulation

```
data %>% group_by(am, vs) %>%  summarise(n=n())
```

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

```
## # A tibble: 4 x 3
## # Groups:   am [2]
##   am        vs           n
##   <chr>     <chr>    <int>
## 1 automatic straight     7
## 2 automatic v-shaped    12
## 3 manual    straight     7
## 4 manual    v-shaped     6
```

Interpretation:

- Indeed the number of cars with straight engines is equal in the group of automatic and manual cars.

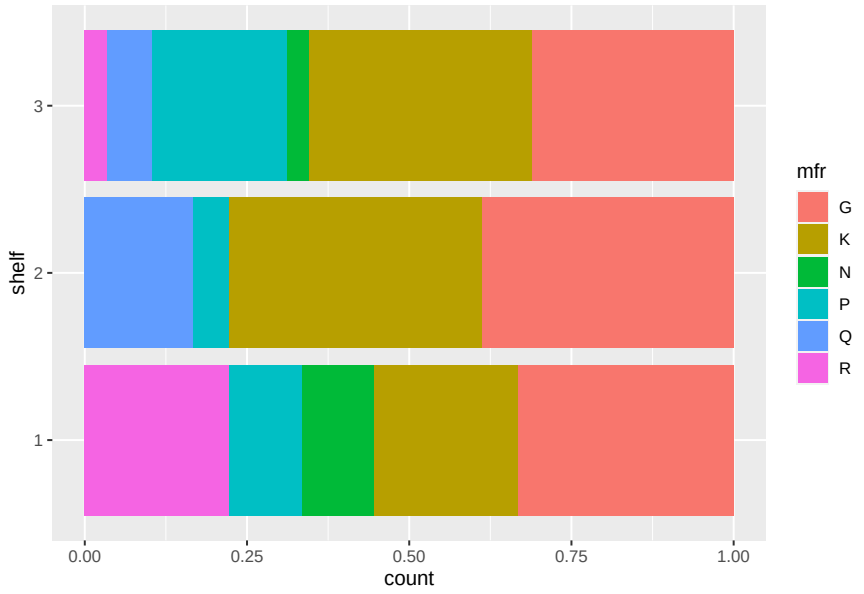
3 Exercise

Visualize the proportion of manufacturers among the shelves

```
data(UScereal, package = "MASS")
head(UScereal)
```

```
##                            mfr calories   protein      fat   sodium     fibre
## 100% Bran                    N 212.1212 12.121212 3.030303 393.9394 30.303030
## All-Bran                     K 212.1212 12.121212 3.030303 787.8788 27.272727
## All-Bran with Extra Fiber    K 100.0000  8.000000 0.000000 280.0000 28.000000
## Apple Cinnamon Cheerios      G 146.6667  2.666667 2.666667 240.0000  2.000000
## Apple Jacks                  K 110.0000  2.000000 0.000000 125.0000  1.000000
## Basic 4                      G 173.3333  4.000000 2.666667 280.0000  2.666667
##                              carbo   sugars shelf potassium vitamins
## 100% Bran                 15.15152 18.18182     3 848.48485 enriched
## All-Bran                  21.21212 15.15151     3 969.69697 enriched
## All-Bran with Extra Fiber 16.00000  0.00000     3 660.00000 enriched
## Apple Cinnamon Cheerios   14.00000 13.33333     1  93.33333 enriched
## Apple Jacks               11.00000 14.00000     2  30.00000 enriched
## Basic 4                   24.00000 10.66667     3 133.33333 enriched
```

```
UScereal %>% mutate(shelf = as.factor(shelf)) %>% ggplot(aes(x = shelf, fill=mfr)) + geom_bar(position =
```

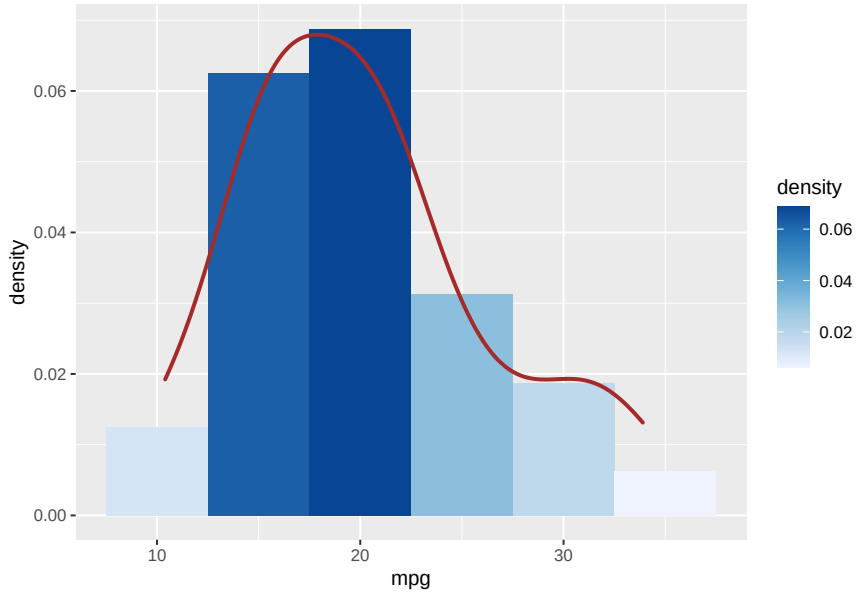



```
#UScereal %>% mutate(shelf = as.factor(shelf)) %>% ggplot(aes(x = mfr, fill=shelf)) + geom_bar(position
```

4 Once continous variable

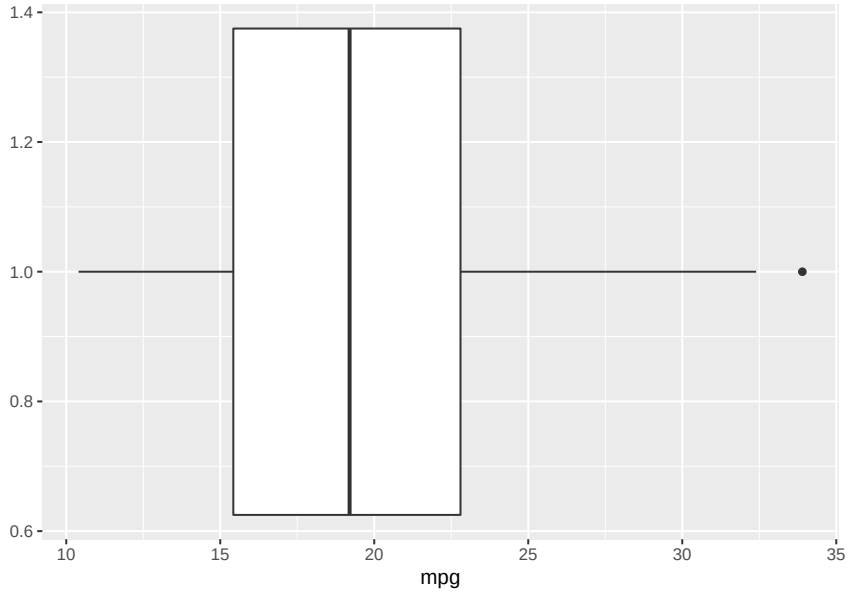
4.1 Histogram

```
data %>% ggplot(aes(x = mpg, y = stat(density))) + geom_histogram(aes(fill = stat(density)), binwidth =
  scale_fill_distiller(type = "seq", direction = 1) +
  geom_density(col = "brown", size = 1)
```



4.2 Boxplot

```
ggplot(data, aes(1,mpg)) +
  geom_boxplot() +
  coord_flip() +
  xlab("")
```

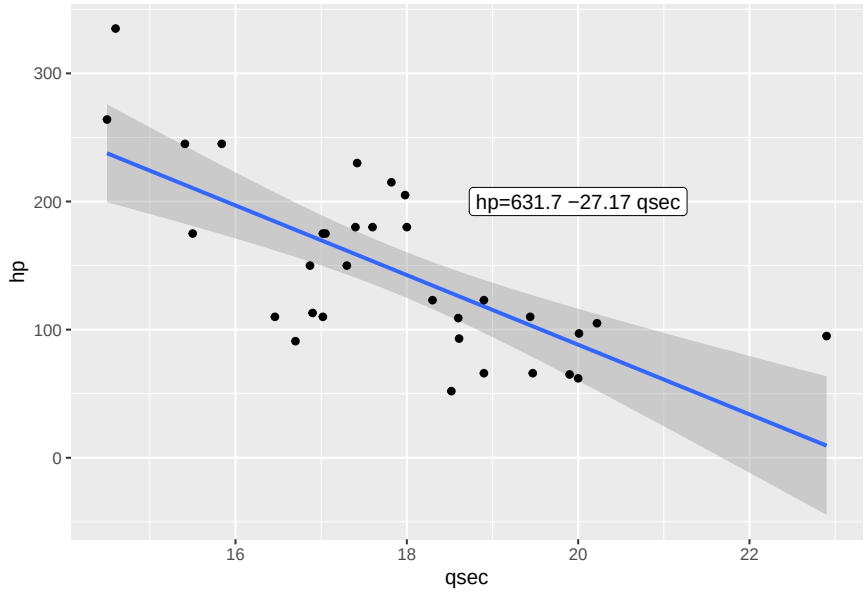



```
lm(hp ~ qsec, data = data)
```

```
##
## Call:
## lm(formula = hp ~ qsec, data = data)
##
## Coefficients:
## (Intercept)         qsec
##      631.70       -27.17
```

```
ggplot(data, aes(x = qsec, y = hp)) +
  geom_smooth(method = "lm") +
  geom_point() +
  annotate("label", 20, 200, label="hp=631.7 -27.17 qsec")
```

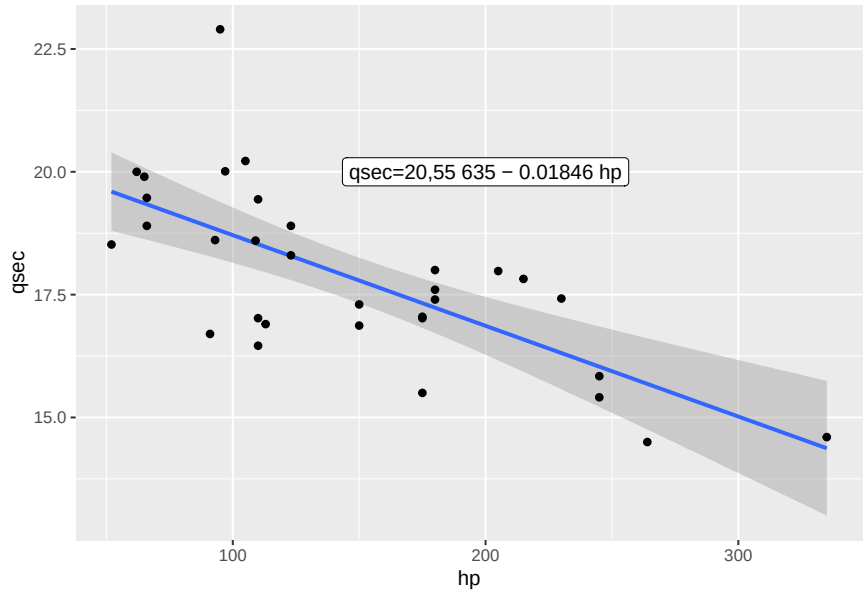
```
## `geom_smooth()` using formula 'y ~ x'
```



4.3 Erklärende Variable sollten eig PS sein

```
ggplot(data, aes(x = hp, y = qsec)) +
  geom_smooth(method = "lm") +
  geom_point() +
  annotate("label", 200, 20, label="qsec=20,55 635 - 0.01846 hp")
```

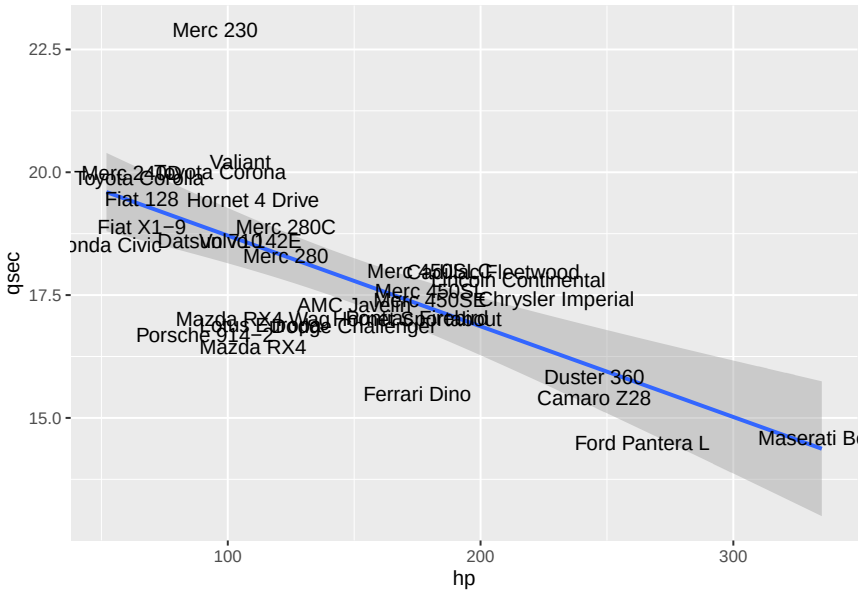
```
## `geom_smooth()` using formula 'y ~ x'
```



4.4 Scatter plot using labels

```
data %>% rownames_to_column(var="name") %>%
ggplot(aes(hp, qsec)) +
  geom_smooth(method = "lm") +
  geom_text(aes(label = name))
```

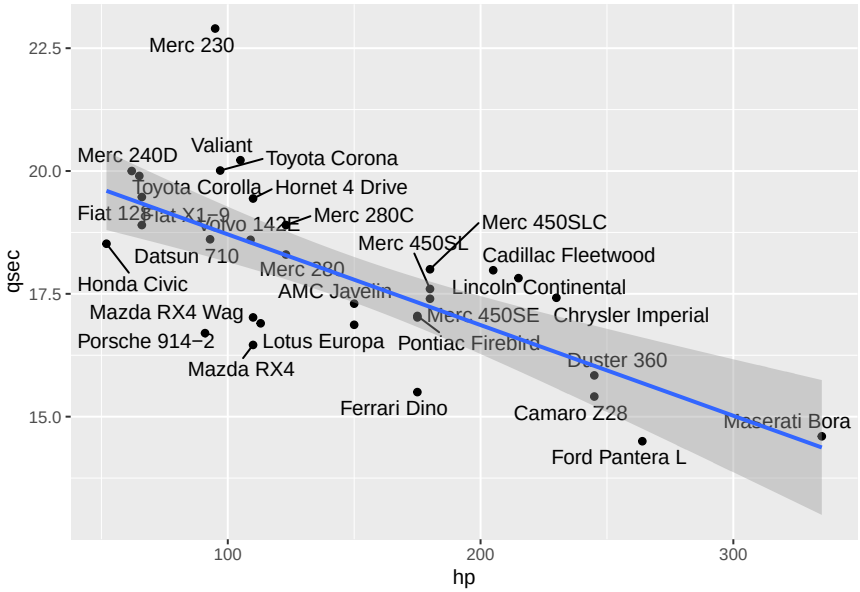
```
## `geom_smooth()` using formula 'y ~ x'
```



5 Using ggrepel package

```
library(ggrepel)
data %>% rownames_to_column(var="name") %>% ggplot(aes(hp, qsec)) +
  geom_point() +
  geom_text_repel(aes(label = name)) +
  geom_smooth(method = "lm")
```

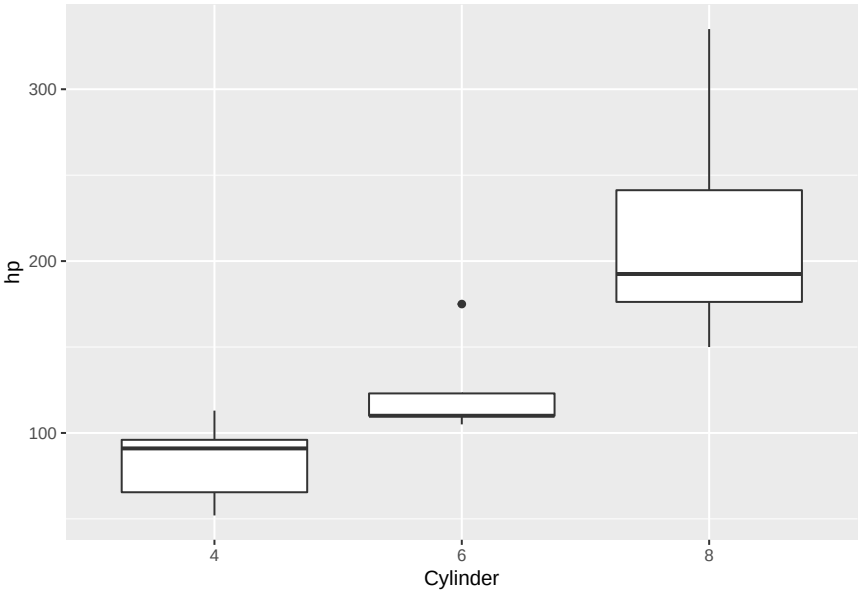
```
## `geom_smooth()` using formula 'y ~ x'

## Warning: ggrepel: 2 unlabeled data points (too many overlaps). Consider
## increasing max.overlaps
```



6 One categorial and one numeric variable

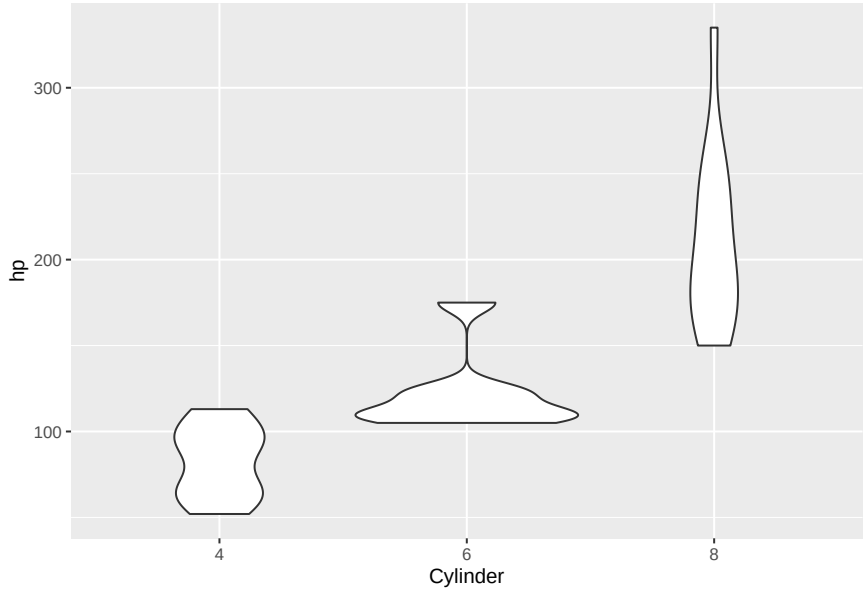
6.1 Boxplot

```
ggplot(data, aes(factor(cyl), hp)) +
  geom_boxplot() +
  xlab("Cylinder")
```



6.2 Violin plot

```
ggplot(data, aes(factor(cyl), hp)) +
  xlab("Cylinder") +
  geom_violin()
```

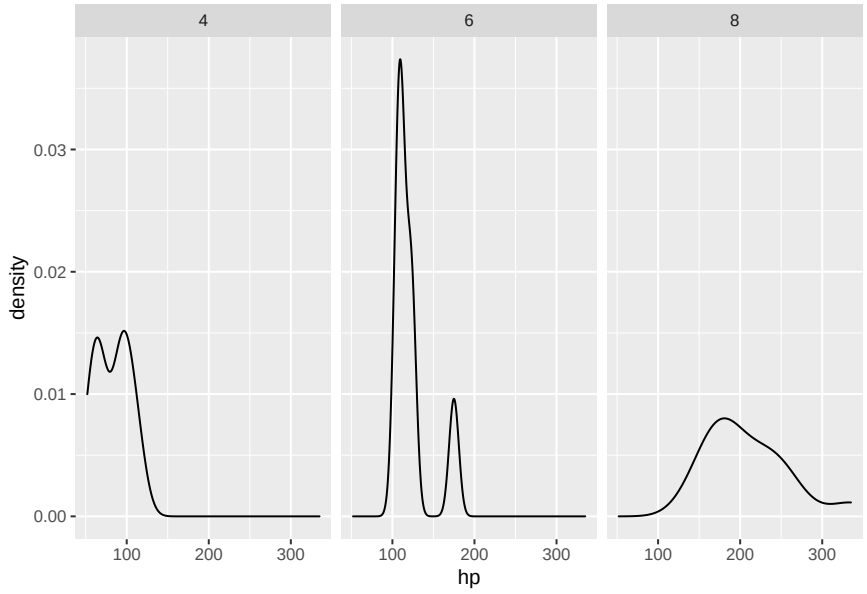


Interpretation:

- hp increases with number of cylinders
- very high horse power cars have all 8 cylinders

6.3 Facetted Plot

```
ggplot(data, aes(x = hp)) +
  geom_density() +
  facet_wrap(~cyl)
```



6.4 Exercise 2

Visualize calories, given manufacturer

```
head(UScereal, 1)
```

```
##           mfr calories  protein      fat   sodium    fibre    carbo   sugars
## 100% Bran   N 212.1212 12.12121 3.030303 393.9394 30.30303 15.15152 18.18182
##           shelf potassium vitamins
## 100% Bran     3  848.4849 enriched
```

```
UScereal %>% ggplot(aes(x = calories, fill=mfr)) + geom_boxplot()
```