Lecture 3: Continuous variables

Michael Lopez, Skidmore College

Goals: charts for continuous data

1. Univariate: histogram, boxplot, violin, density curve
2. Bivariate: scatter, line
3. Tricks: jittering, grouping, coloring

Data set

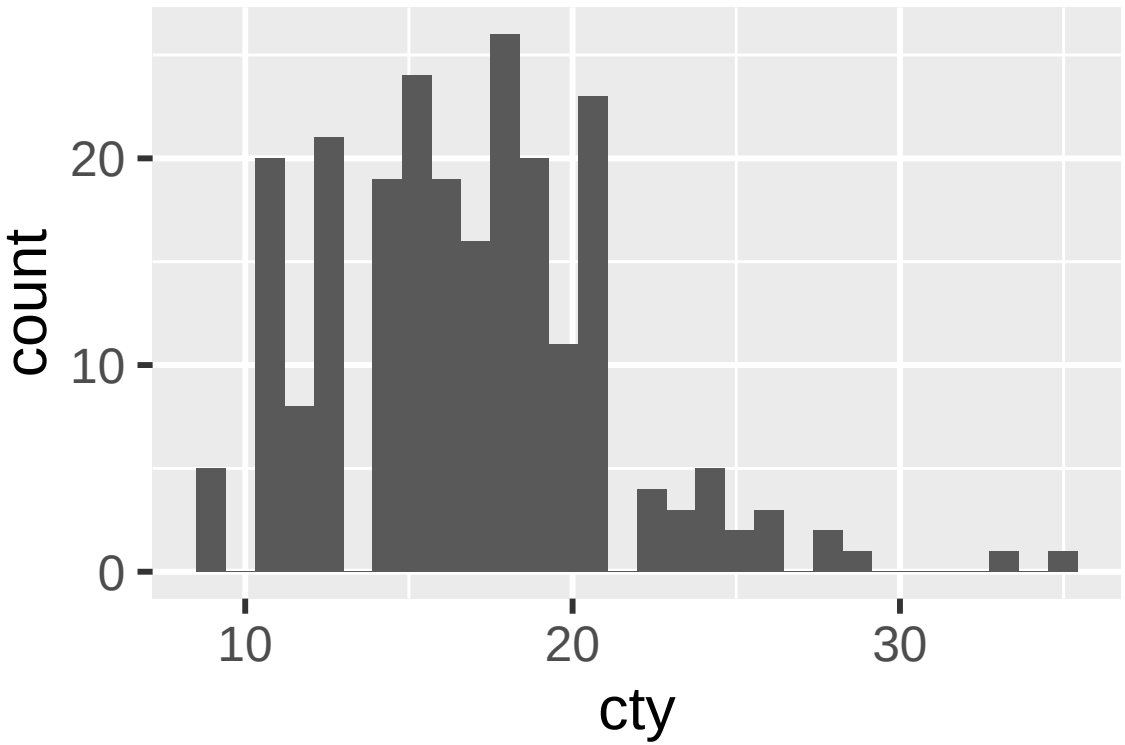
```
library(ggplot2); library(dplyr)
mpg %>% head(4)
```

```
## # A tibble: 4 × 11
##   manufacturer model displ  year   cyl      trans   drv   cty   hwy    fl
##          <chr> <chr> <dbl> <int> <int>      <chr> <chr> <int> <int> <chr>
## 1         audi    a4   1.8  1999     4   auto(l5)     f    18    29     p
## 2         audi    a4   1.8  1999     4 manual(m5)     f    21    29     p
## 3         audi    a4   2.0  2008     4 manual(m6)     f    20    31     p
## 4         audi    a4   2.0  2008     4   auto(av)     f    21    30     p
## # ... with 1 more variables: class <chr>
```

Variable types?

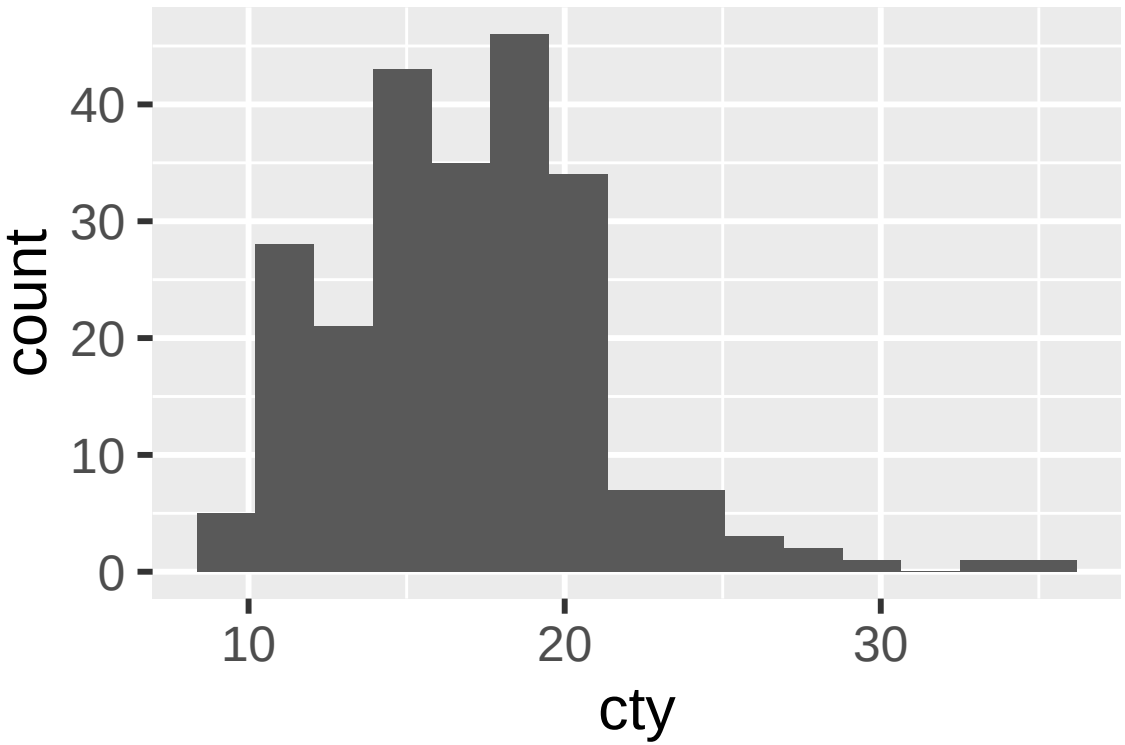
Histogram

```
ggplot(data = mpg, aes(x = cty)) +
  geom_histogram()
```



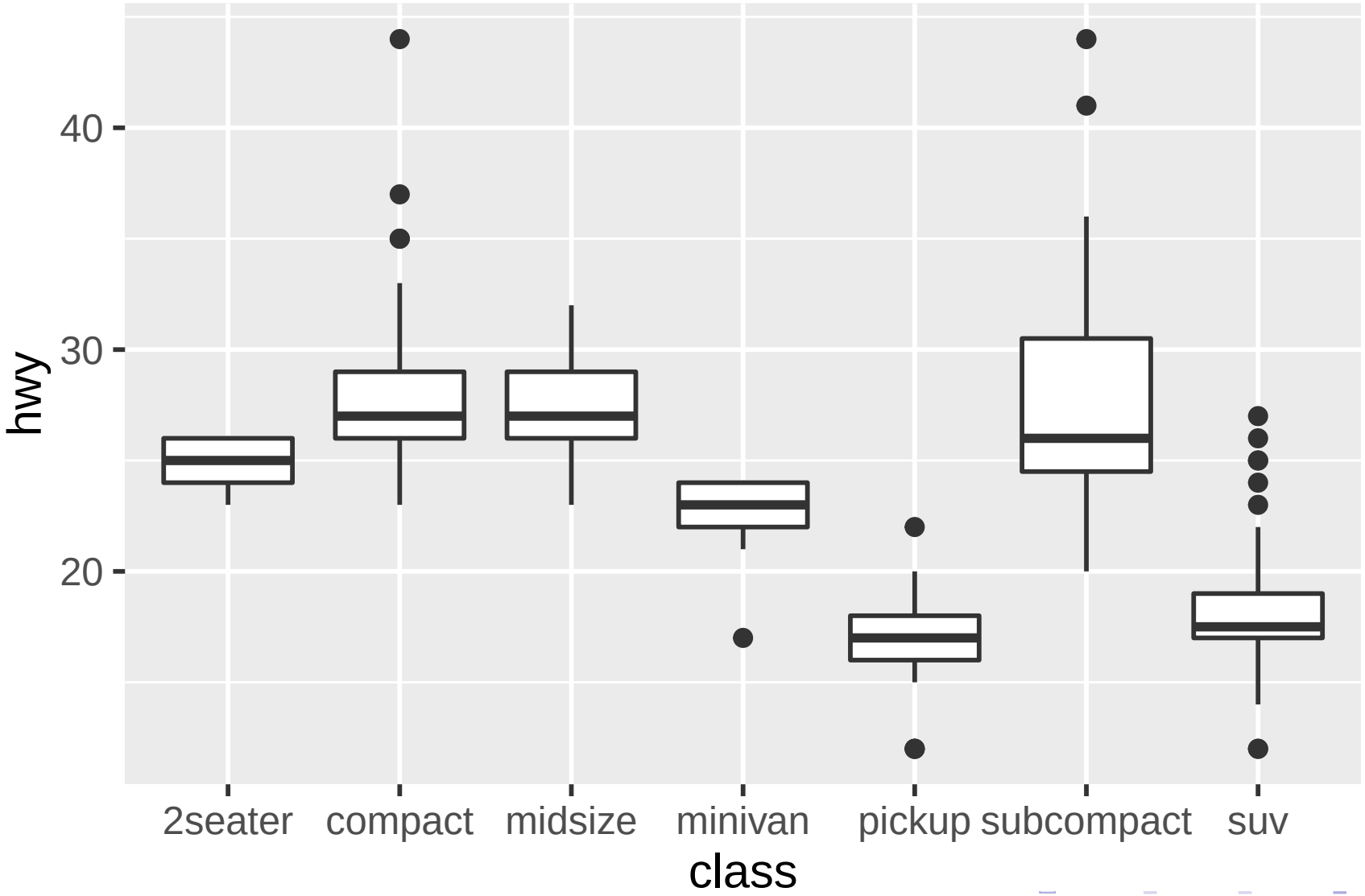
Histogram

```
ggplot(data = mpg, aes(x = cty)) +
  geom_histogram(bins = 15)
```



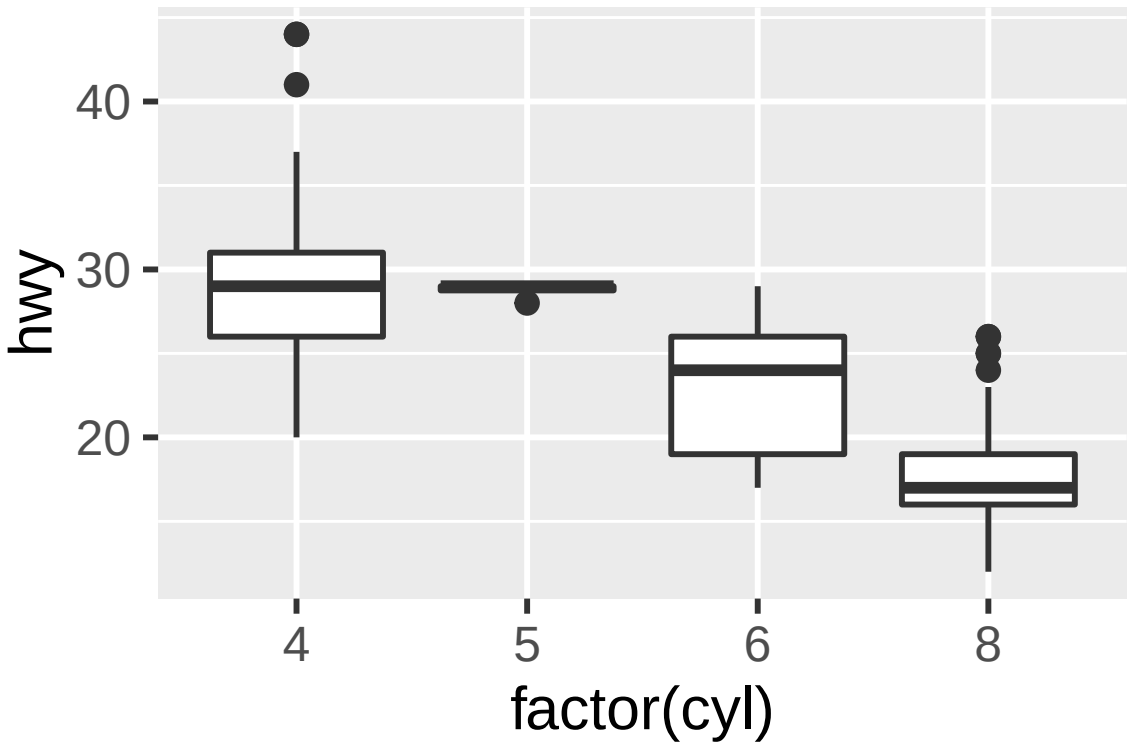
Boxplot

```
ggplot(mpg, aes(x = class, y = hwy)) +
  geom_boxplot()
```



Boxplot with `factor()`

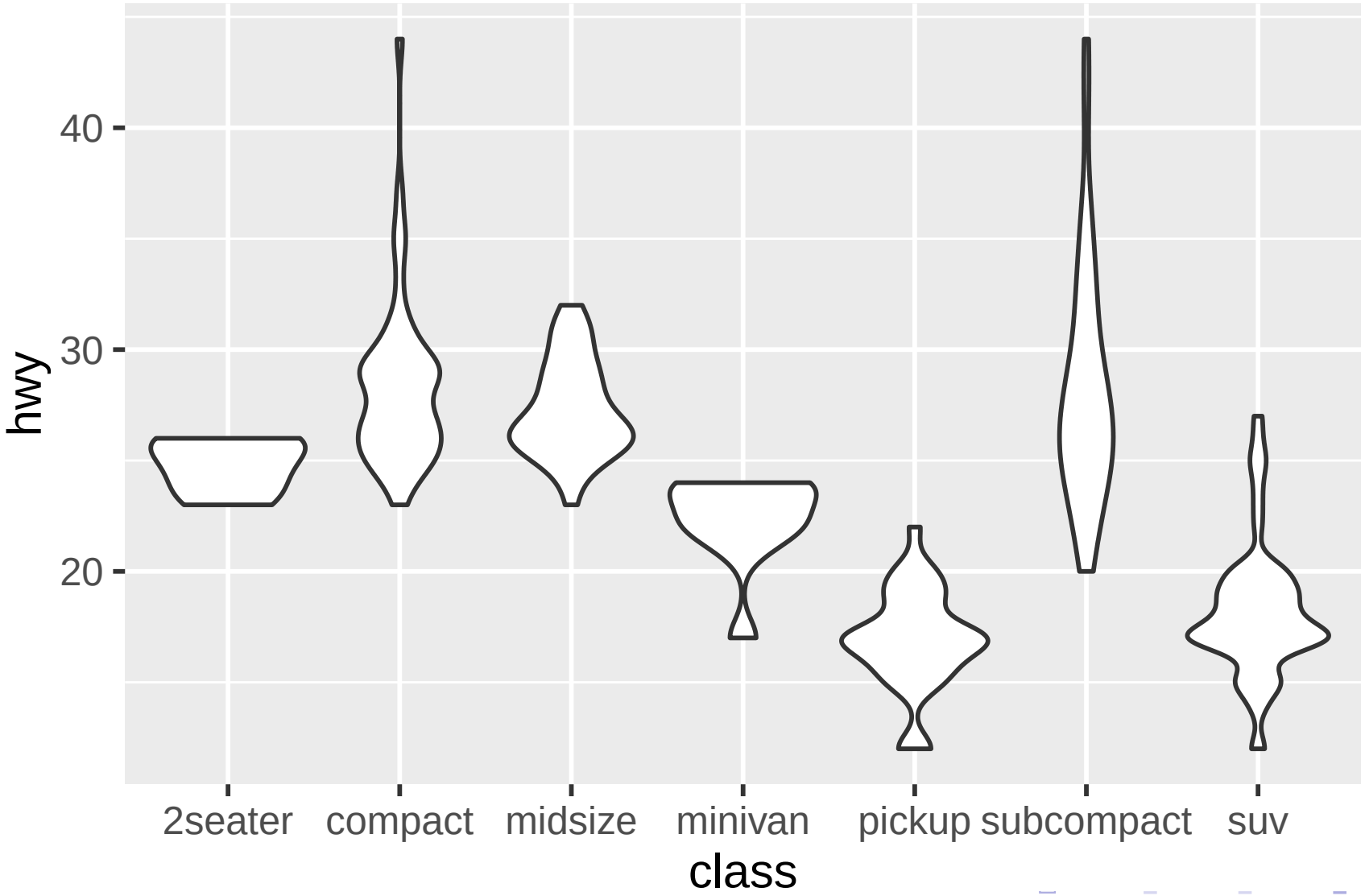
```
ggplot(mpg, aes(x = factor(cyl), y = hwy)) +
  geom_boxplot()
```



Characteristics of a boxplot

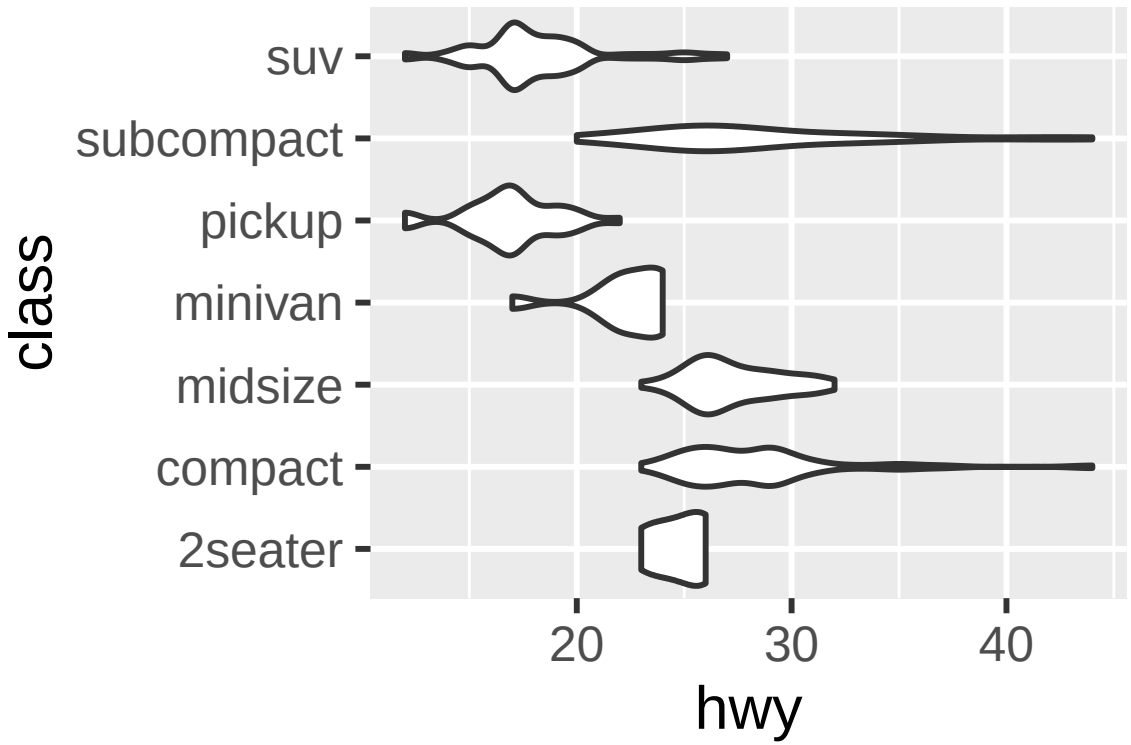
Violin plot

```
ggplot(mpg, aes(x = class, y = hwy)) +
  geom_violin()
```



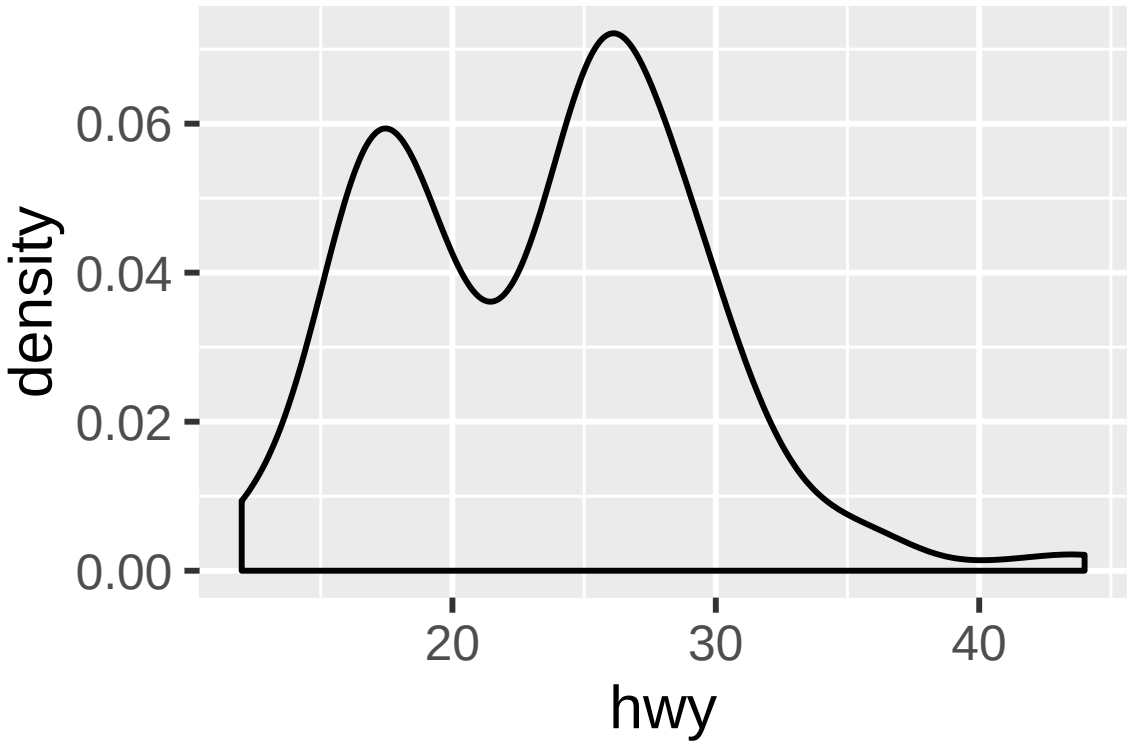
Violin plot

```
ggplot(mpg, aes(x = class, y = hwy)) +
  geom_violin() +
  coord_flip()
```



Density curves

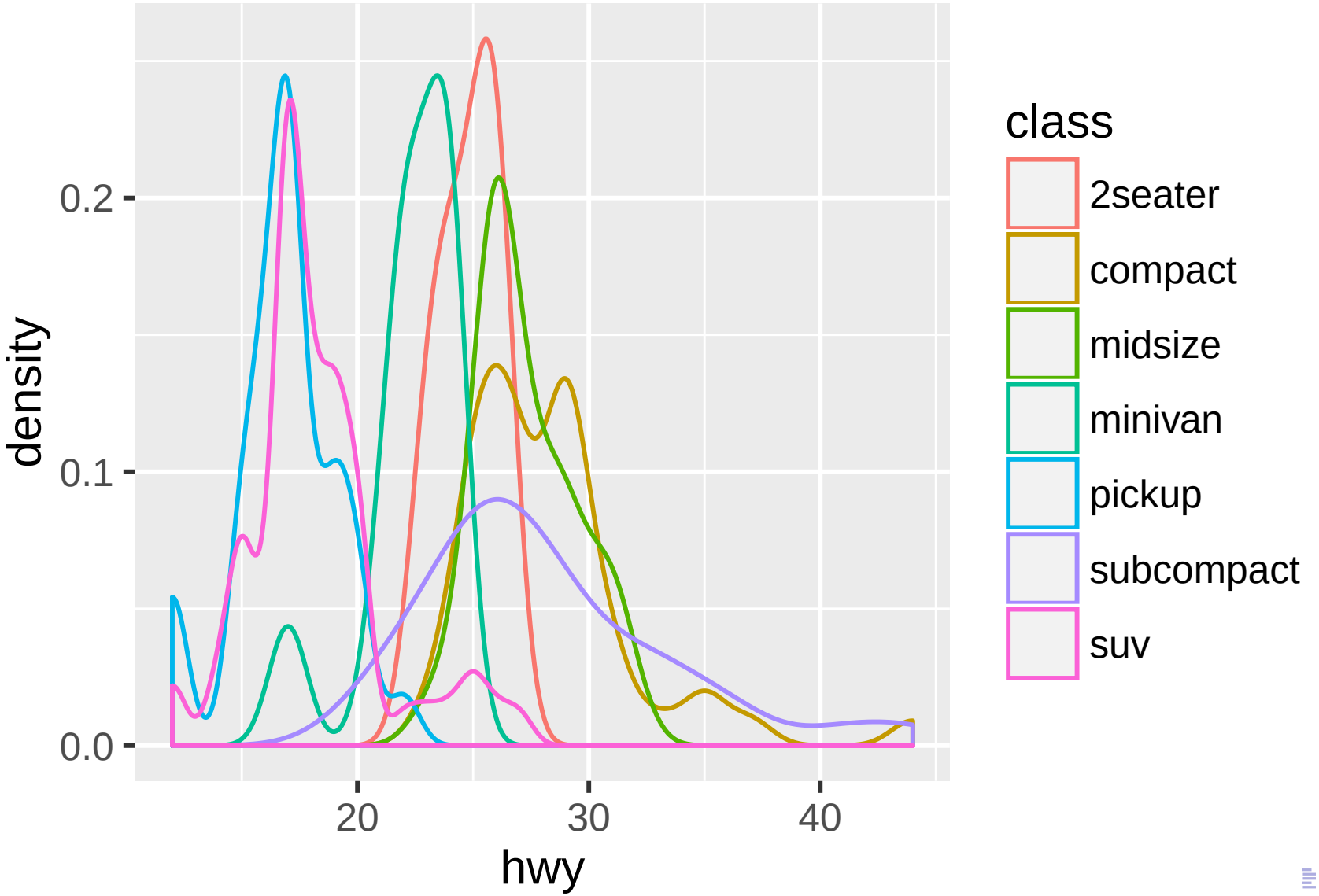
```
ggplot(mpg, aes(x = hwy)) +
  geom_density()
```



Anatomy of a density curve

Density curves within groups

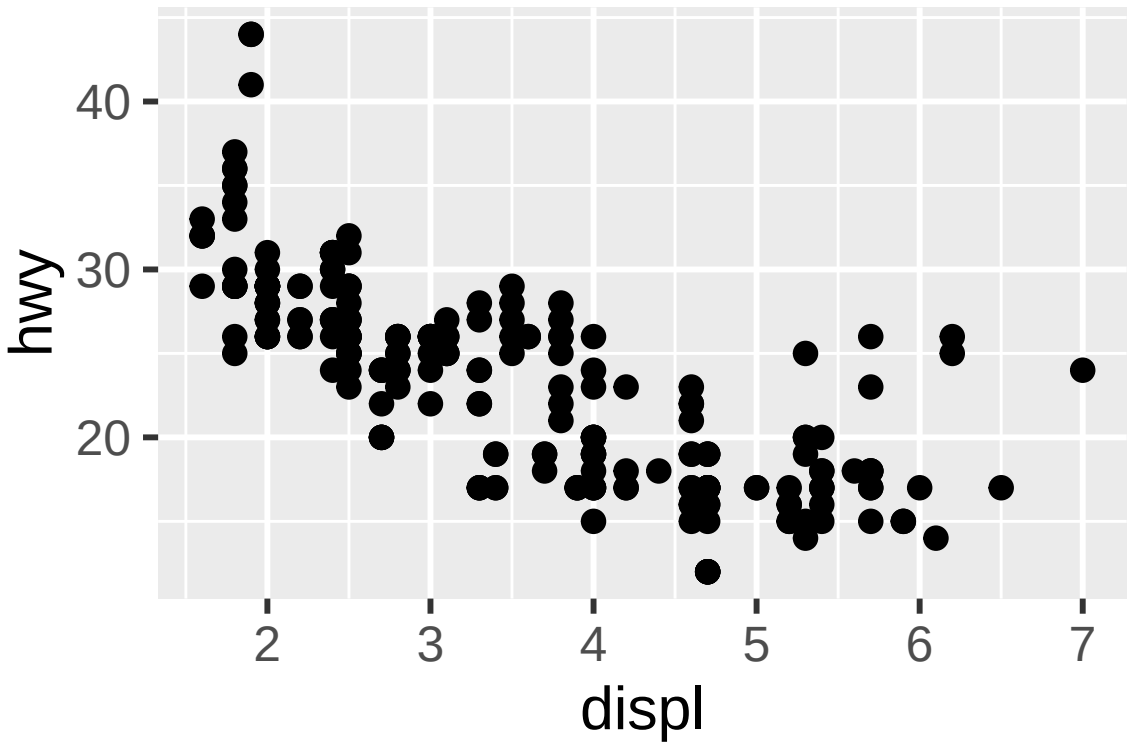
```
ggplot(mpg, aes(x = hwy, colour = class)) +
  geom_density()
```



Summary, univariate approaches

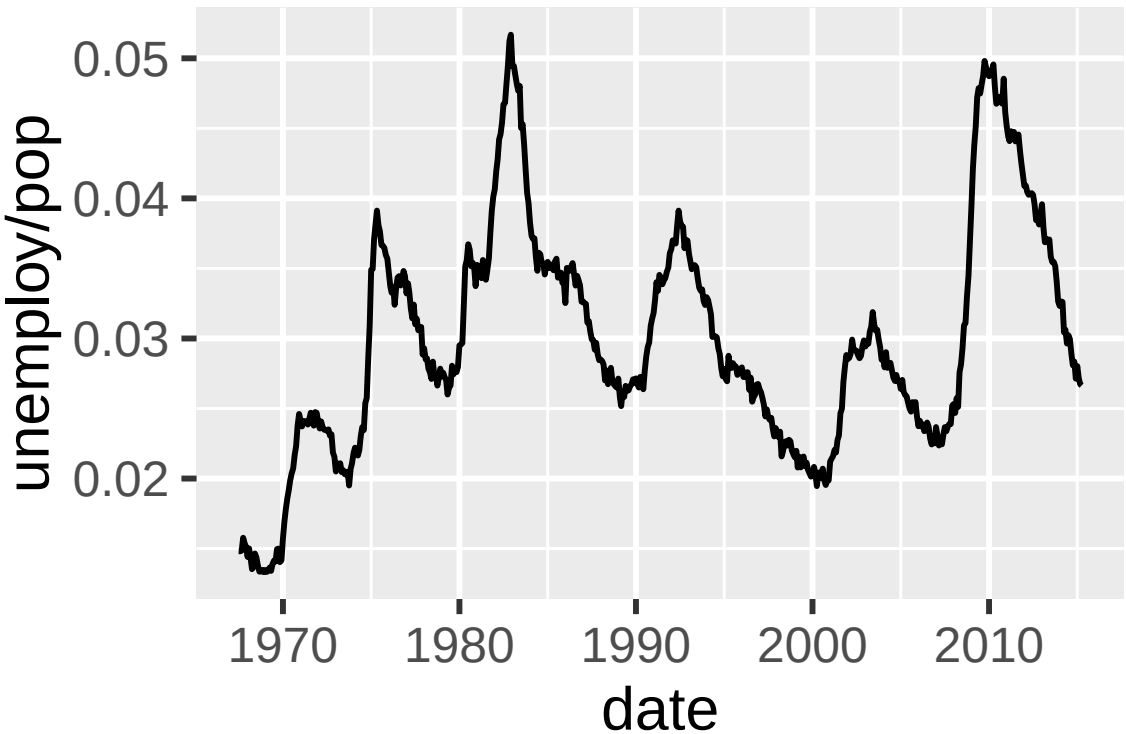
Bivariate approaches

```
ggplot(mpg, aes(x = displ, y = hwy)) +
  geom_point()
```



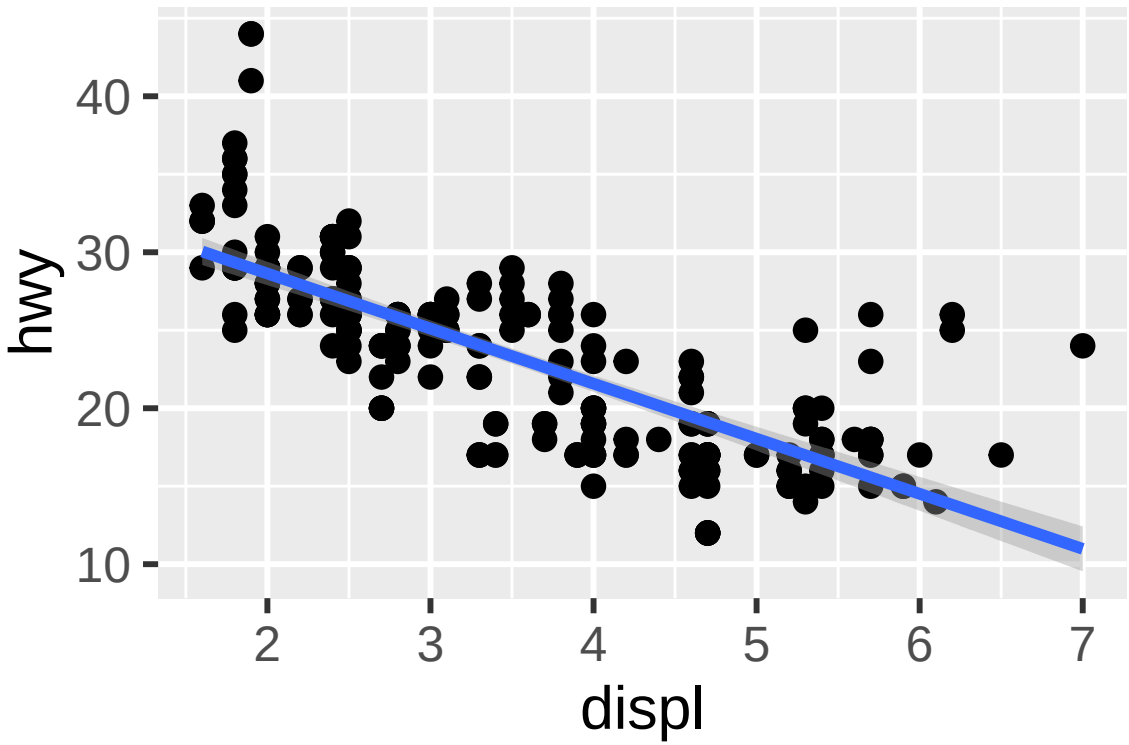
Connections over time

```
ggplot(economics, aes(date, unemploy / pop)) +
     geom_line()
```



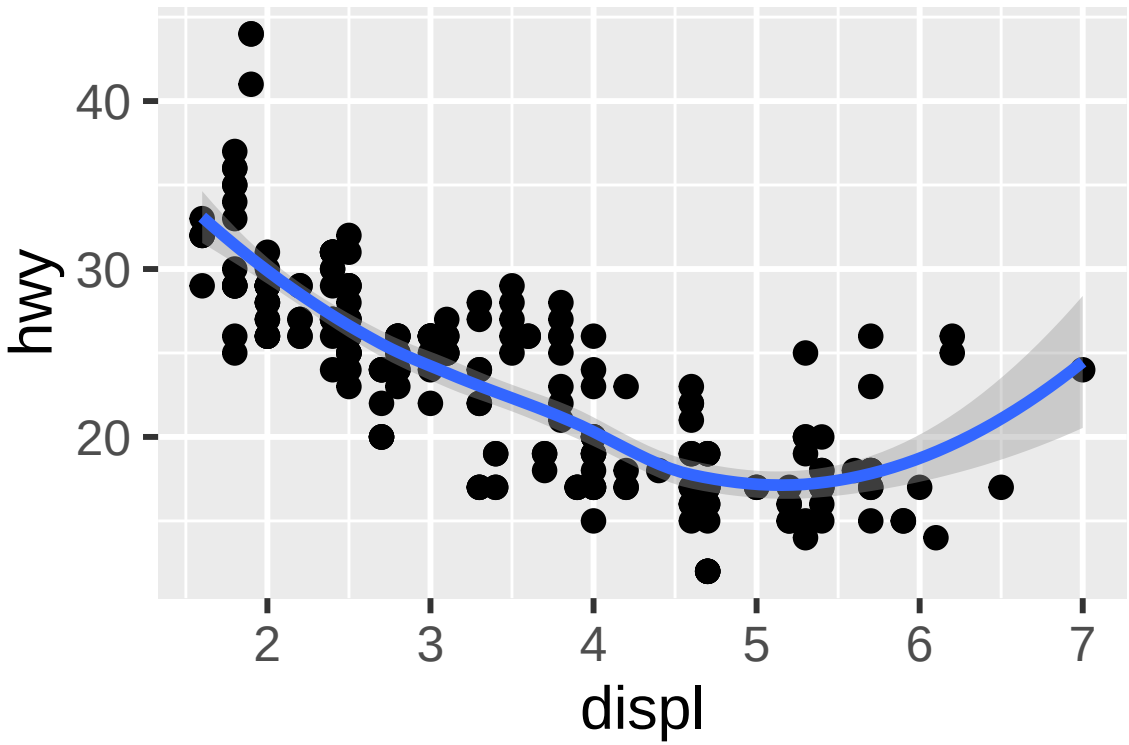
Smoothed lines of best fit

```
ggplot(mpg, aes(x = displ, y = hwy)) +
  geom_point() +
  geom_smooth(method = "lm")
```



Smoothed curves of best fit

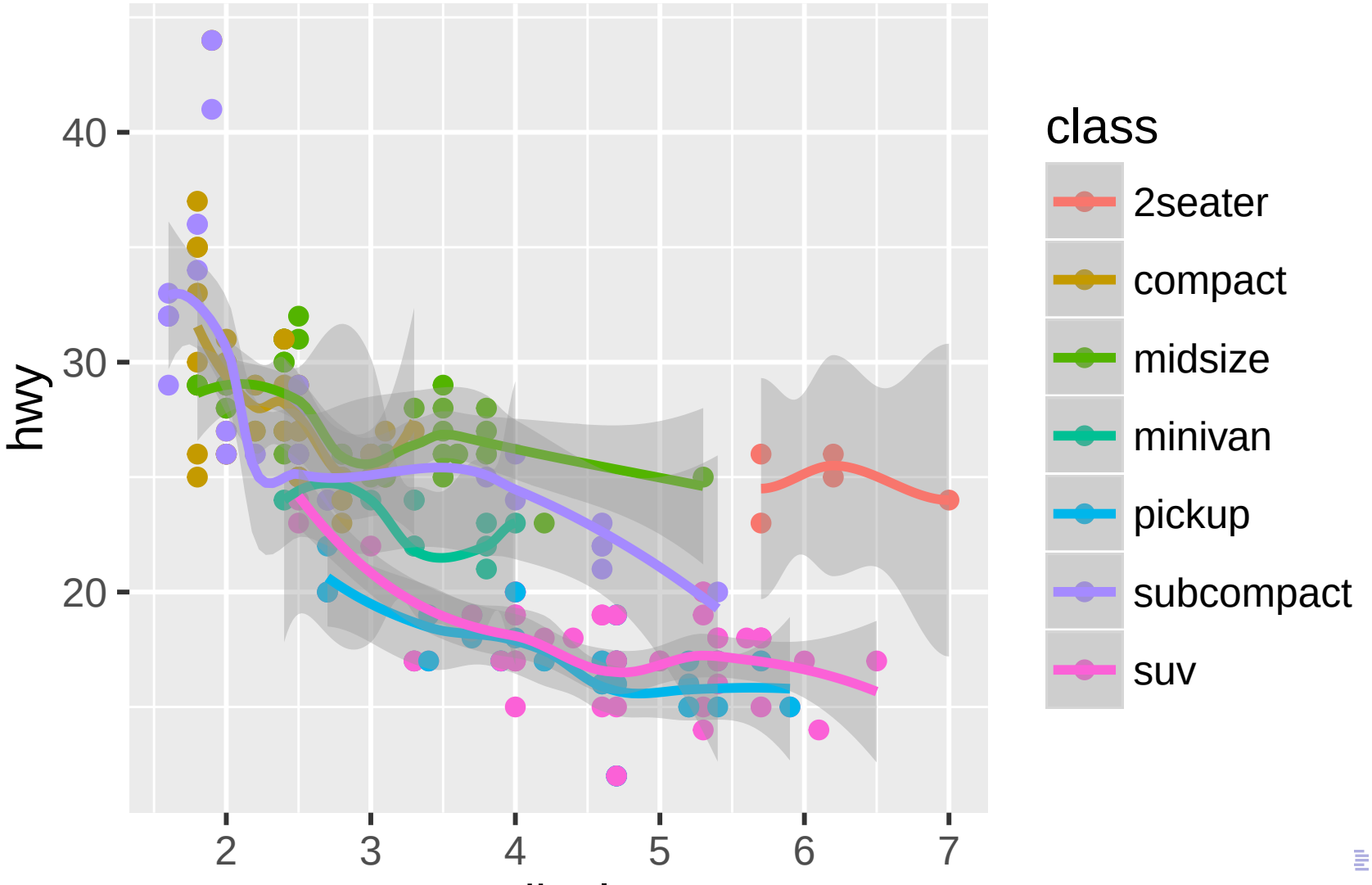
```
ggplot(mpg, aes(x = displ, y = hwy)) +
  geom_point() +
  geom_smooth(method = "loess")
```



Curves versus lines of best fit

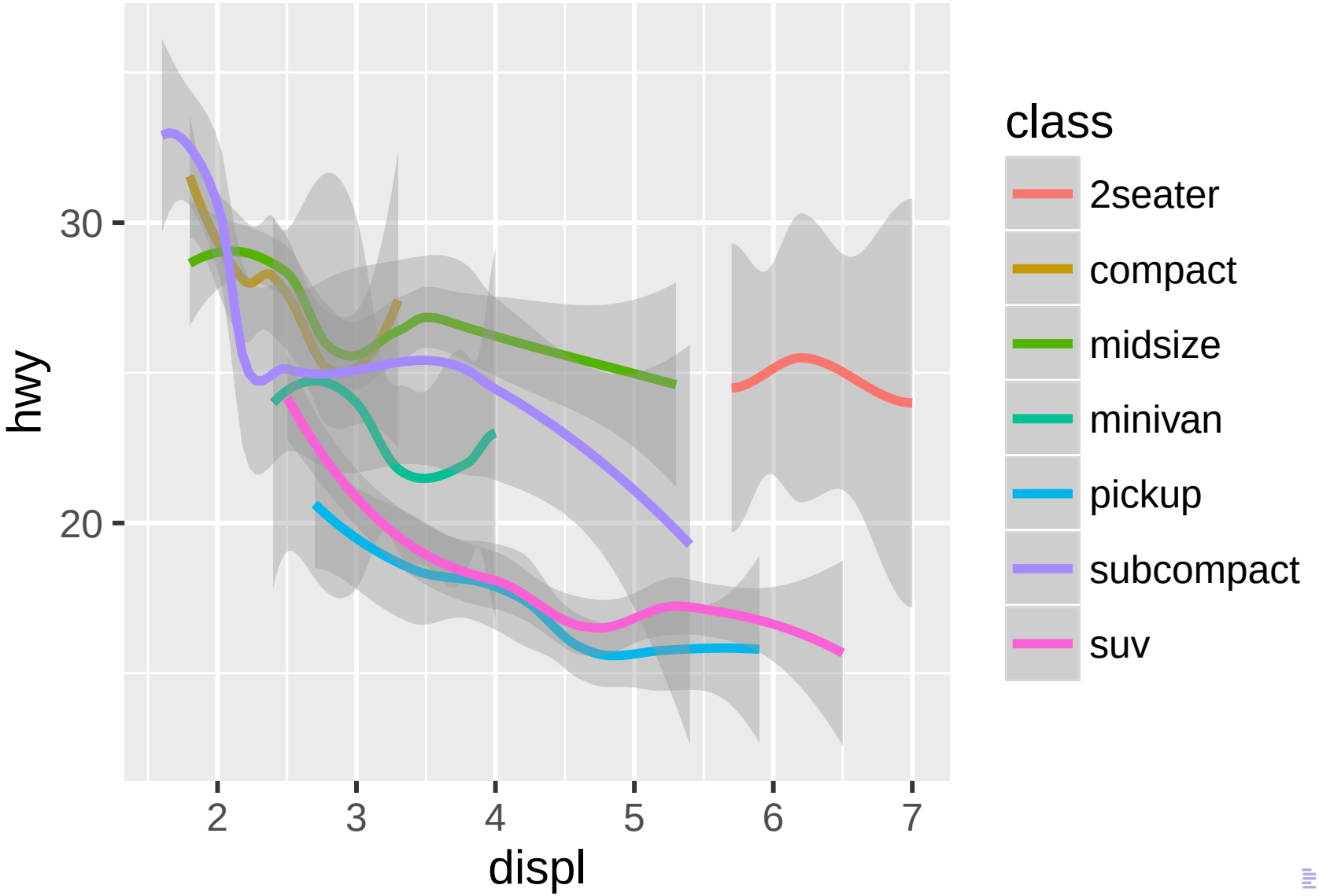
Grouped curves of best fit

```
ggplot(mpg, aes(x = displ, y = hwy, colour = class)) +
  geom_point() +
  geom_smooth(method = "loess")
```



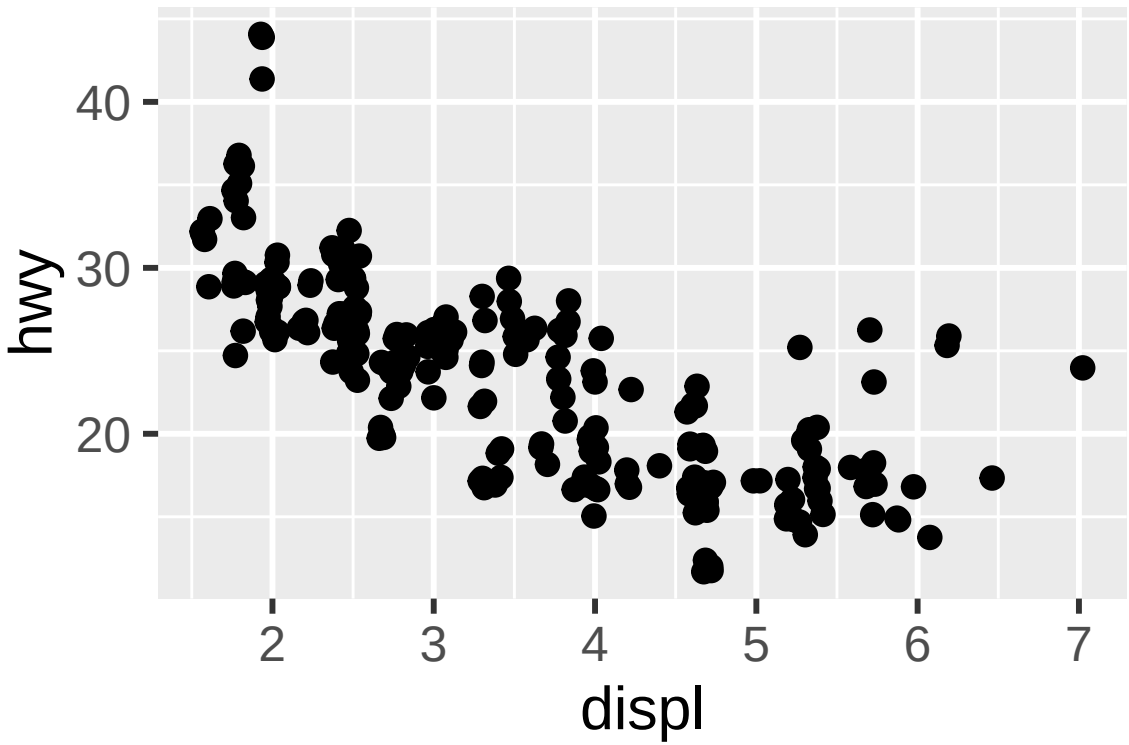
Grouped curves of best fit

```
ggplot(mpg, aes(x = displ, y = hwy, colour = class)) +
  geom_smooth(method = "loess")
```

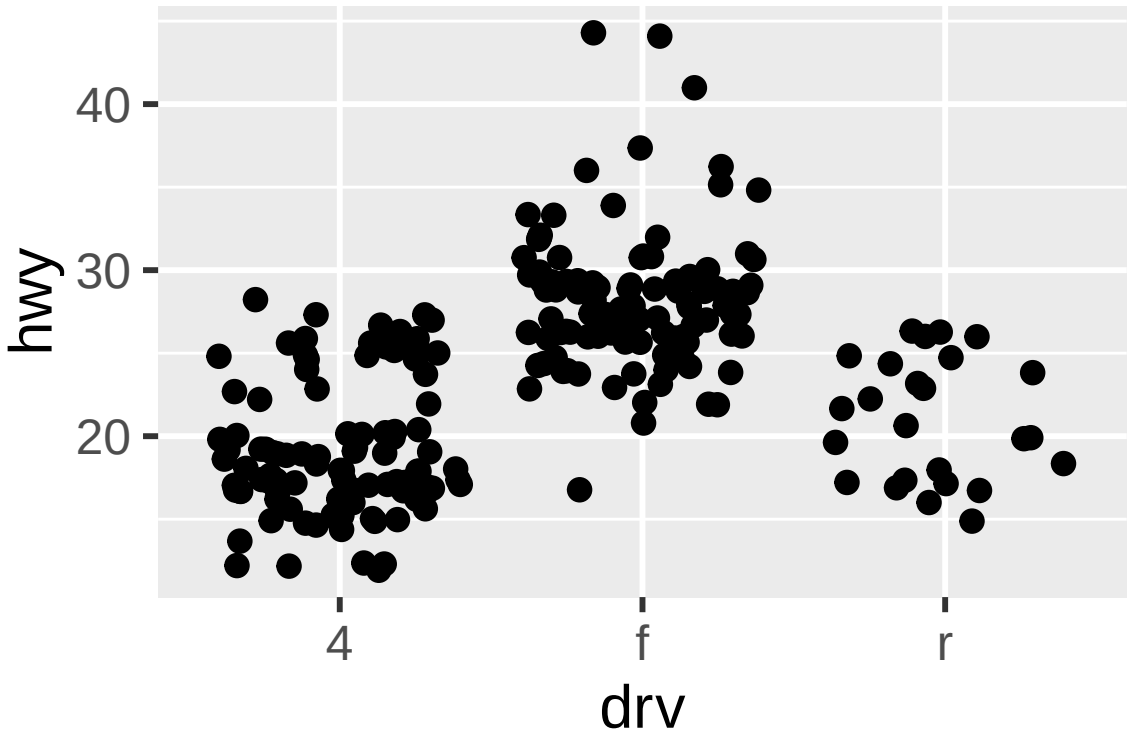


Plotting tricks: the jitter

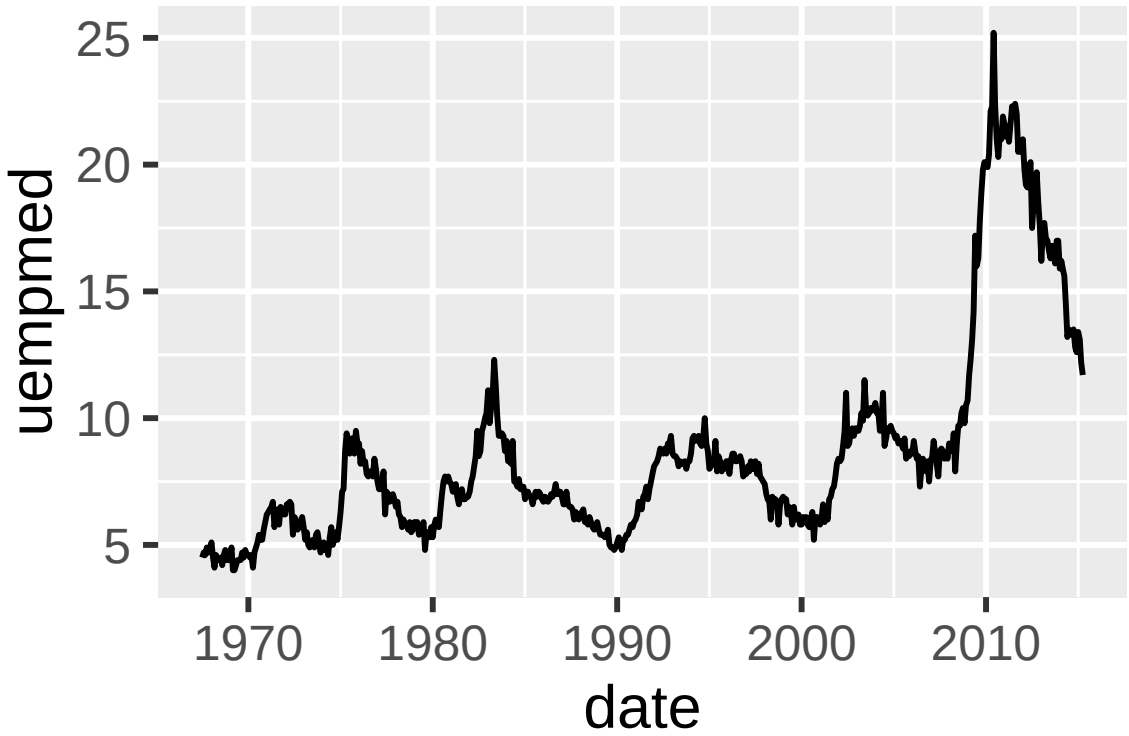
```
ggplot(mpg, aes(x = displ, y = hwy)) +
  geom_jitter()
```



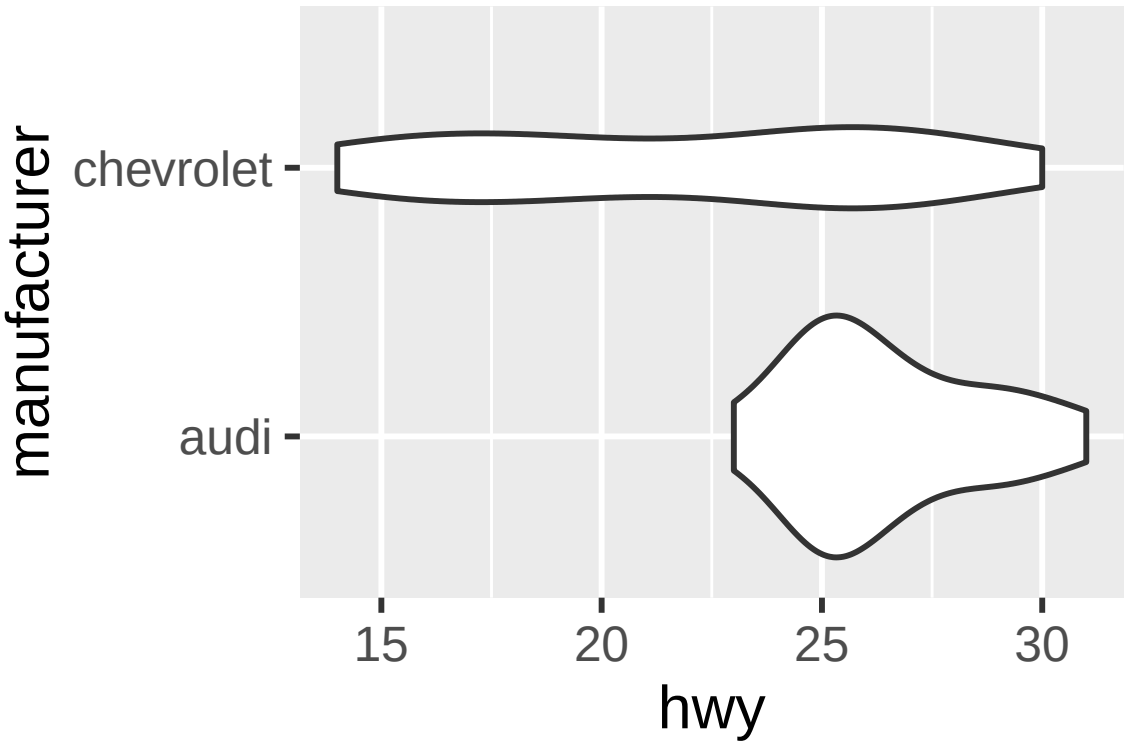
Code this plot & identify weaknesses



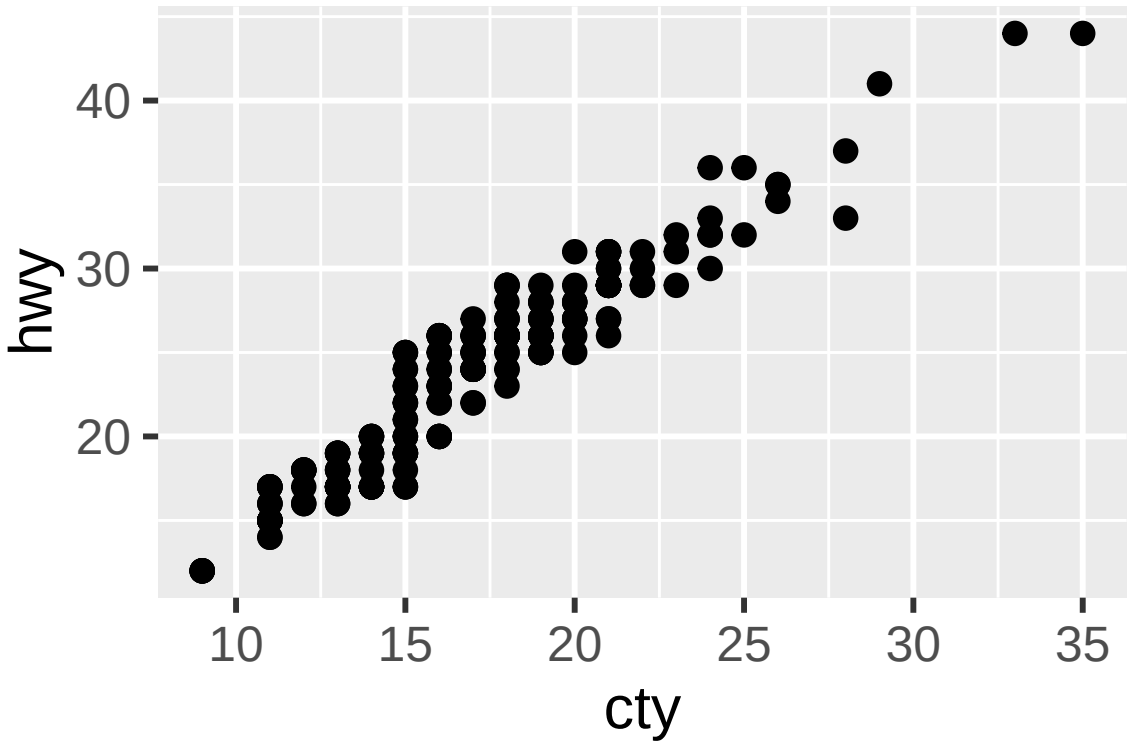
Code this plot & identify weaknesses



Code this plot & identify weaknesses



Code this plot & identify weaknesses



Examples in the news

http://fivethirtyeight.com/features/the-most-conservative-and-most-liberal-elite-law-schools/
http://fivethirtyeight.com/features/the-10-types-of-nfl-quarterbacks/
http://fivethirtyeight.com/features/what-our-nba-projections-got-right-and-wrong-last-season/
http://minimaxir.com/2015/02/ggplot-tutorial/
http://www.nytimes.com/2016/07/20/upshot/hillary-clinton-has-a-76-percent-chance-to-win-the-presidency.html?_r=0
http://fivethirtyeight.com/features/our-47-weirdest-charts-from-2015/
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