Lab 1 - Data visualization

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Load Packages

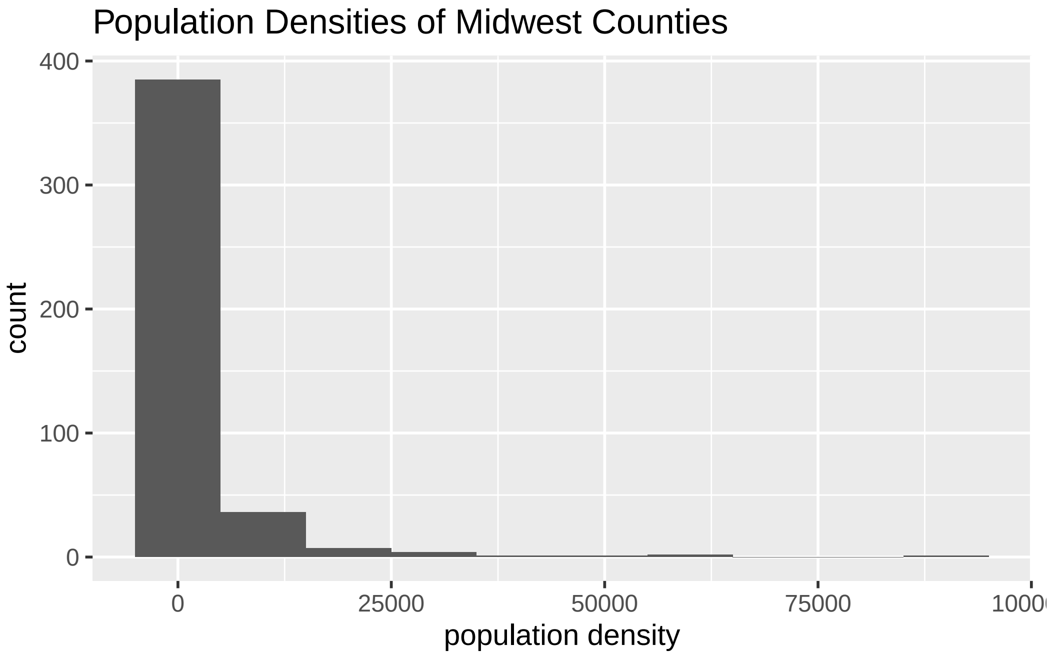
```
library(tidyverse)
```

```
Warning in system("timedatectl", intern = TRUE): running command 'timedatectl'
had status 1
```

```
library(viridis)
```

Exercise 1

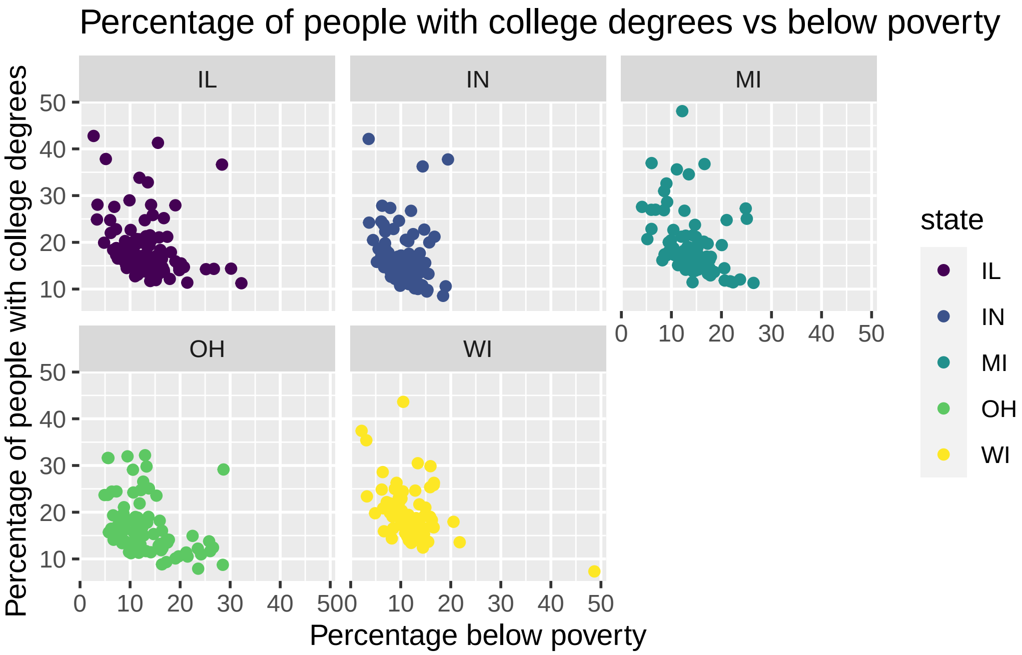
```
ggplot(midwest) +
  aes(x = popdensity) +
  geom_histogram(binwidth = 10000) +
  labs(title = "Population Densities of Midwest Counties", x = "population density", y = "
```



The shape of the distribution is right-scewed. There are some outliers that have a higher population density than the other counties. Most of the counties have a population density between 0 and 25,000 but there a couple of counties in the 60,000 and 80,000 range.

Exercise 2

```
ggplot(midwest, aes(x = percbelowpoverty, y = percollege, color = state)) +
  scale_color_viridis_d() +
  geom_point() +
  facet_wrap(~state) +
  labs(title = "Percentage of people with college degrees vs below poverty",
       x = "Percentage below poverty",
       y = "Percentage of people with college degrees")
```



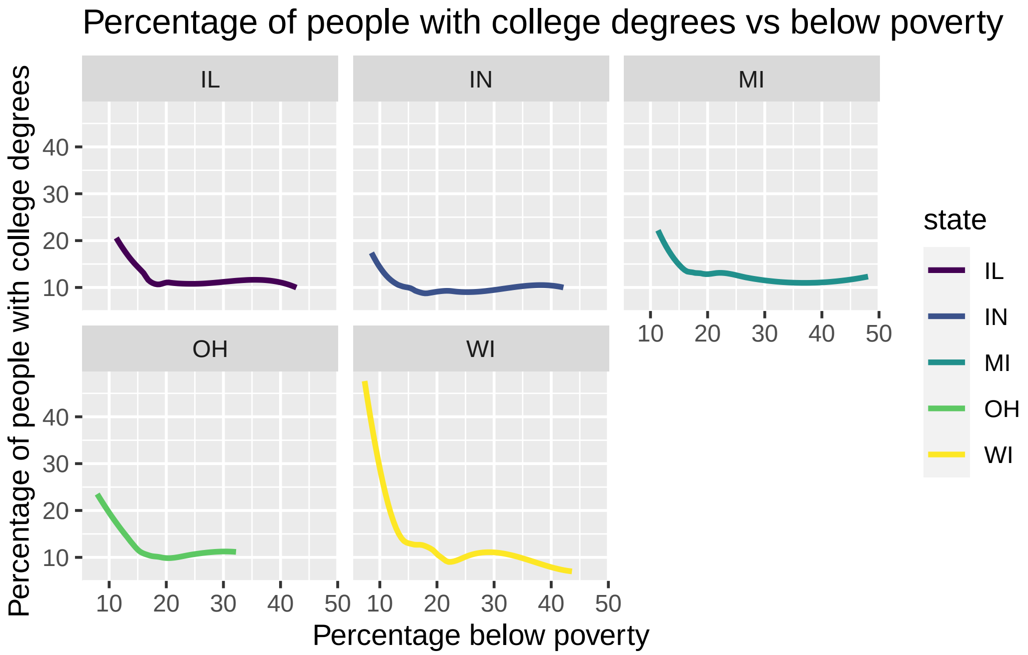
Exercise 3

There seems to be no correlation between the percentage of people with college degrees and the percentage of people below poverty. However, the plots of the different states are nearly identical. Across all states, the percentage of people below poverty in most counties is 5%-20% and the percentage of people with college degrees is 10%-30%. One difference is that Michigan, Illinois and Ohio have some counties with the percentage of poverty being between 20%-25% as well. There are also different outliers for the different states.

Exercise 4

```r
ggplot(midwest) +
  aes(x = percollege, y = percbelowpoverty, color = state) +
    scale_color_viridis_d() +
    geom_smooth(se = FALSE) +
    facet_wrap(~state) +
  labs(title = "Percentage of people with college degrees vs below poverty",
       x = "Percentage below poverty",
       y = "Percentage of people with college degrees")
```

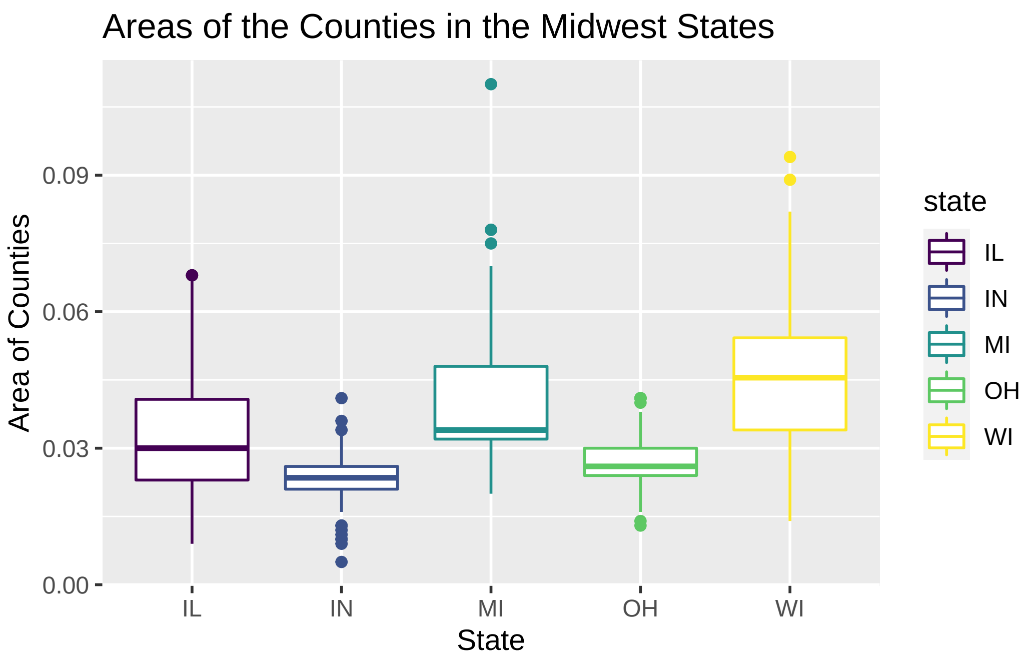
```
`geom_smooth()` using method = 'loess' and formula 'y ~ x'
```



I prefer the plot in Ex. 2 because this plot does not take into account how common certain population densities are in the different midwest states and also does not consider any outliers in the data.

Exercise 5

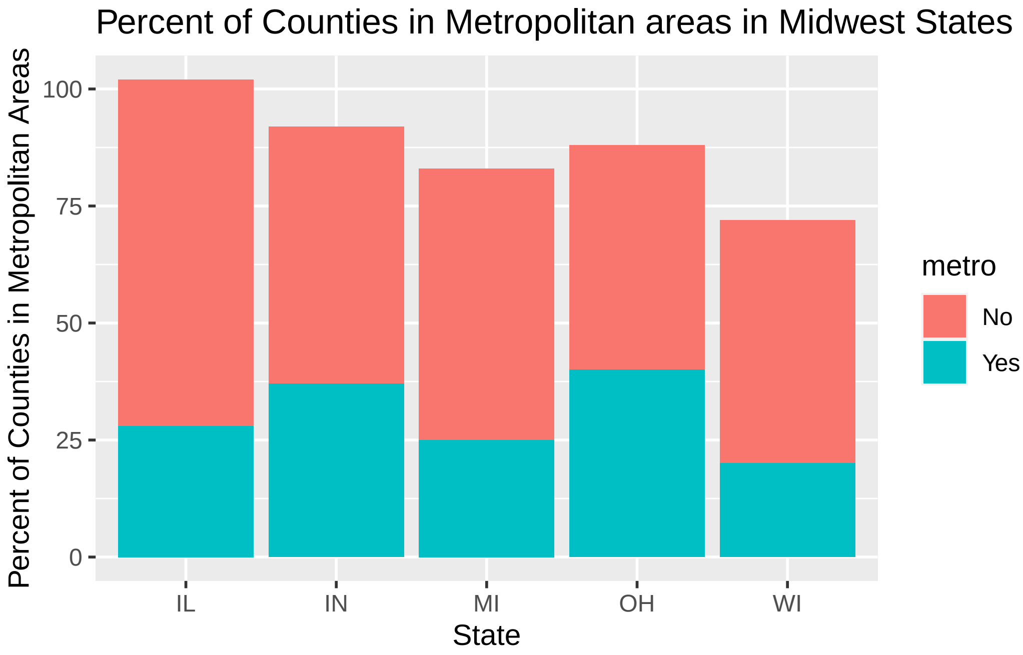
```
ggplot(midwest) +
  aes(x = state, y = area, color = state) +
  scale_color_viridis_d() +
  geom_boxplot() +
  labs(title = "Areas of the Counties in the Midwest States",
         x = "State",
         y = "Area of Counties")
```



From the plot, you can see the average county sizes of the different states and the distribution of the areas of counties in these states. The average areas of the counties in IL, IN, MI, OH and WI are roughly 0.03, 0.02, 0.04, 0.02 and 0.05 respectively. The state with the largest county is MI because it has the point that is farthest up on the plot.

Exercise 6

```
midwest <- midwest |>
   mutate(metro = if_else(inmetro == 1, "Yes", "No"))
 ggplot(data = midwest) +
 aes(x = state, fill = metro) +
 scale_color_viridis_d() +
 geom_bar() +
 labs(title = "Percent of Counties in Metropolitan areas in Midwest States",
        x = "State",
        y = "Percent of Counties in Metropolitan Areas")
```



One thing that can be noticed is that the majority of the counties in each of the states are not in metropolitan areas. However, some states have higher percentages of counties in metropolitan areas with OH having the highest percentage and WI having the lowest percentage.

Exercise 7