

# Lab 2 - Data wrangling

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```
library(tidyverse)
```

## Questions

### Part 1

```
?midwest
```

## Question 1

```
midwest |>
  count(state, sort = TRUE)
```

```
# A tibble: 5 x 2
  state     n
  <chr> <int>
1 IL        102
2 IN         92
3 OH         88
4 MI         83
5 WI         72
```

Comment: Illinois has the most amount of counties with 102, and Wisconsin has the least with 72.

## Question 2

```
midwest |>
  count(county,state) |>
  count(county, name = "n_states") |>
  filter(n_states == n_distinct(midwest$state))
```

```
# A tibble: 3 x 2
  county   n_states
  <chr>     <int>
1 CRAWFORD      5
2 JACKSON       5
3 MONROE        5
```

### Question 3

```
midwest |>
  filter(popdensity > 25000) |>
  select(county,state,popdensity,poptotal,area) |>
  arrange(desc(popdensity))
```

```
# A tibble: 9 x 5
  county state popdensity poptotal area
  <chr>   <chr>     <dbl>     <int>  <dbl>
1 COOK    IL        88018.  5105067 0.058
2 MILWAUKEE WI       63952.  959275  0.015
3 WAYNE    MI       60334.  2111687 0.035
4 CUYAHOGA OH       54313.  1412140 0.026
5 DU PAGE  IL       39083.  781666  0.02
6 MARION   IN       34659.  797159  0.023
7 HAMILTON OH       34649.  866228  0.025
8 FRANKLIN OH       28278.  961437  0.034
9 MACOMB   MI       25621.  717400  0.028
```

```
midwest |>
  filter(popdensity == max(popdensity)) |>
  select(county,state,popdensity,poptotal,area)
```

```
# A tibble: 1 x 5
  county state popdensity poptotal area
  <chr>   <chr>     <dbl>     <int>  <dbl>
1 COOK    IL        88018.  5105067 0.058
```

#### Question 4

```
midwest |>
  summarize(
    median(popdensity),
    q1 = quantile(popdensity, 0.25),
    q3 = quantile(popdensity, 0.75)
  )
```

```
# A tibble: 1 x 3
`median(popdensity)`    q1     q3
<dbl> <dbl> <dbl>
1      1156.   622.  2330
```

Comment:

The distribution of population density of counties is unimodal and extremely right-skewed. A typical Midwestern county has population density of 1156.208 people per unit area. The middle 50% of the counties have population densities between 622.4074 to 2330 people per unit area.

## Question 5

```
midwest |>
  count(state,inmetro)|>
  group_by(state) |>
  mutate(prop=n/sum(n))
```

```
# A tibble: 10 x 4
# Groups:   state [5]
  state inmetro     n   prop
  <chr>    <int> <int> <dbl>
1 IL          0     74  0.725
2 IL          1     28  0.275
3 IN          0     55  0.598
4 IN          1     37  0.402
5 MI          0     58  0.699
6 MI          1     25  0.301
7 OH          0     48  0.545
8 OH          1     40  0.455
9 WI          0     52  0.722
10 WI         1     20  0.278
```

**Question 6**

**Question 7**

**Question 8**

## **Part 2**

### **Question 9**