Lab 04

due [date] 11:59 PM

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```
library(tidyverse)
library(sf)
```

```
states <- st_read("cb_2020_us_state_20m.shp", quiet = TRUE)
census <- read_csv("census_2020_lower48.csv")
head(states)
```

```
## Simple feature collection with 6 features and 9 fields
## Geometry type: MULTIPOLYGON
## Dimension:     XY
## Bounding box:  xmin: -124.4096 ymin: 32.53416 xmax: -86.80587 ymax: 49.38436
## Geodetic CRS:  NAD83
##   STATEFP  STATENS    AFFGEOID GEOID STUSPS       NAME LSAD        ALAND
## 1      06 01779778 0400000US06    06     CA California   00 403671196038
## 2      55 01779806 0400000US55    55     WI  Wisconsin   00 140292246684
## 3      16 01779783 0400000US16    16     ID      Idaho   00 214049923496
## 4      27 00662849 0400000US27    27     MN  Minnesota   00 206232157570
## 5      19 01779785 0400000US19    19     IA       Iowa   00 144659688848
## 6      29 01779791 0400000US29    29     MO   Missouri   00 178052563675
##        AWATER                       geometry
## 1 20294133830 MULTIPOLYGON (((-118.594 33...
## 2 29343721650 MULTIPOLYGON (((-86.93428 4...
## 3  2391577745 MULTIPOLYGON (((-117.243 44...
## 4 18949864226 MULTIPOLYGON (((-97.22904 4...
## 5  1085996889 MULTIPOLYGON (((-96.62187 4...
## 6  2487215790 MULTIPOLYGON (((-95.76564 4...
```

```
head(census)
```

```
## # A tibble: 6 x 6
##   state pop_2020 pop_2010 seats_2020 seats_2010 seats_1910
##   <chr>    <dbl>    <dbl>      <dbl>      <dbl>      <dbl>
## 1 AL     5024279  4779736          7          7         10
## 2 AZ     7151502  6392017          9          9          0
## 3 AR     3011524  2915918          4          4          7
## 4 CA    39538223 37253956         52         53         11
## 5 CO     5773714  5029196          8          7          4
## 6 CT     3605944  3574097          5          5          5
```

Exercise 1

Be respectful of everyone's opinions. Attend group meetings. Complete all of the work you're supposed to get through.

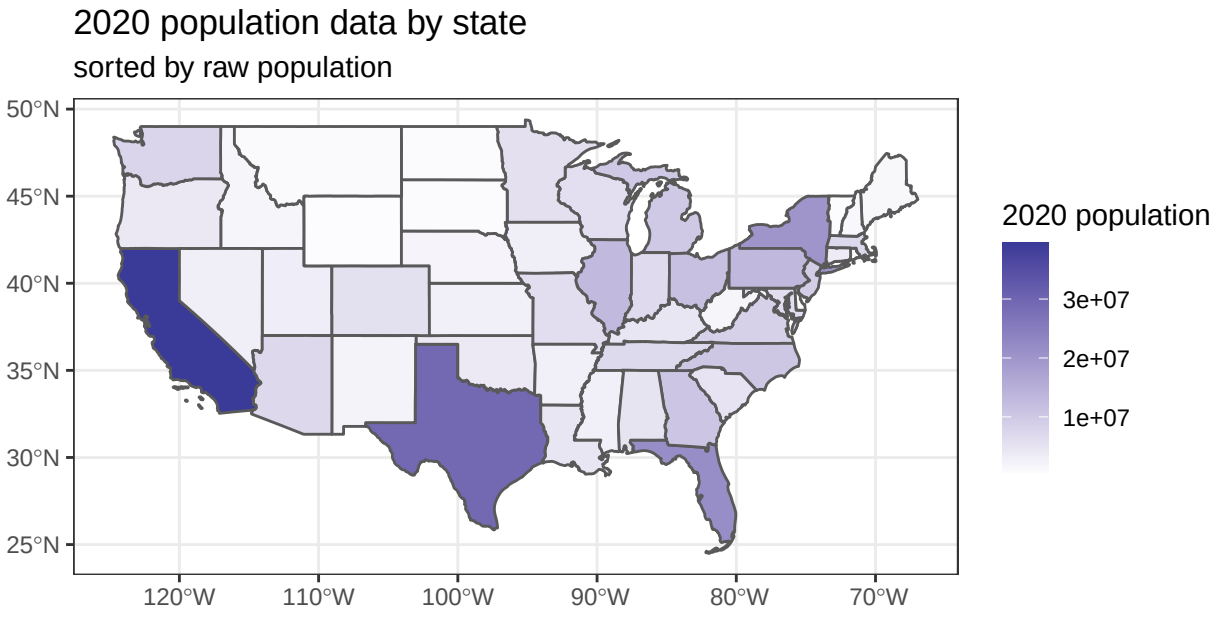
Exercise 2

```
census_data <- states %>%
  full_join(census, by = c("STUSPS" = "state")) %>%
  filter(STUSPS != "AK" & STUSPS != "HI" & STUSPS != "PR")
```

Use the proper join to create the `census_data` data set and please remember to name your chunk.

Exercise 3

```
ggplot(census_data) +
  geom_sf(aes(fill = pop_2020)) +
  labs(title = "2020 population data by state",
       subtitle ="sorted by raw population", fill = "2020 population" ) +
  theme_bw() +
  scale_fill_gradient2()
```

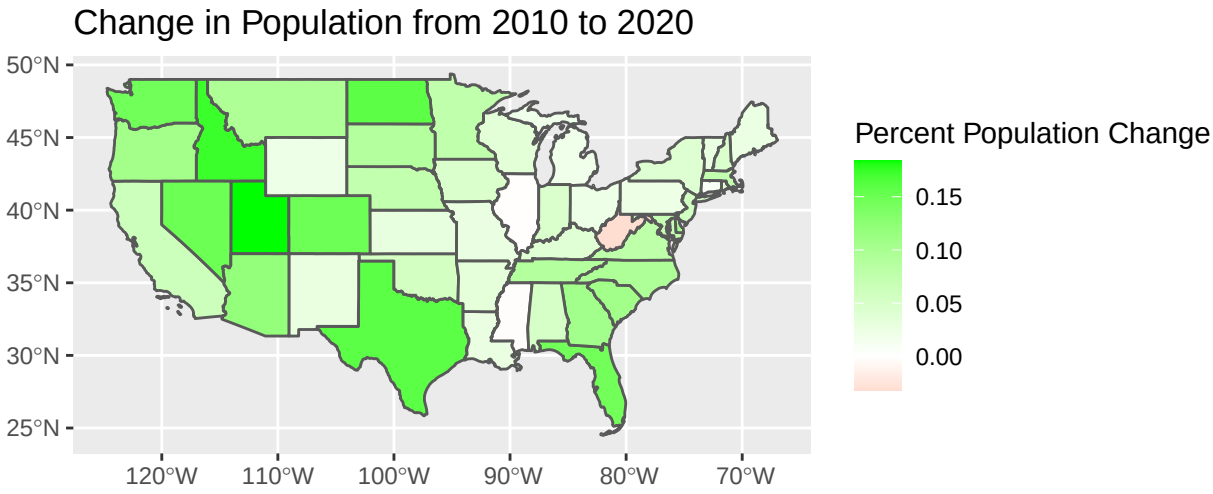


Exercise 4

```
census_data <- census_data %>%
  mutate(pop_change = (pop_2020 - pop_2010)/pop_2010)
```

Exercise 5

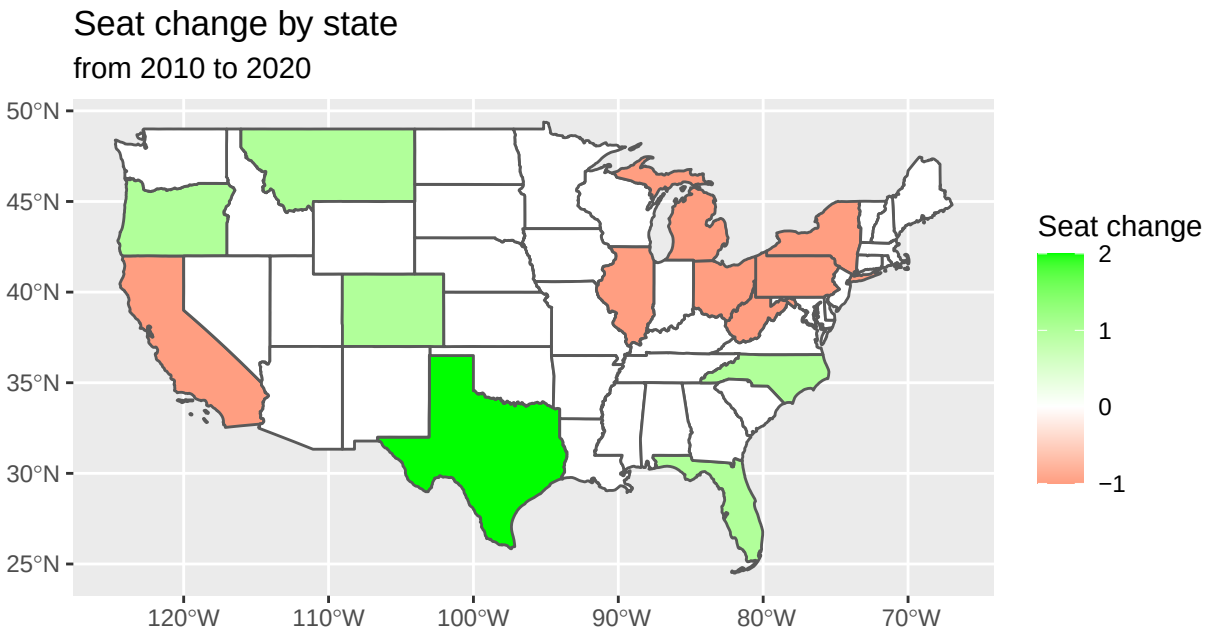
```
ggplot(census_data) +
  geom_sf(aes(fill = pop_change)) +
  scale_fill_gradient2(low = "red", high = "green", midpoint = 0) +
  labs(title = "Change in Population from 2010 to 2020",
       fill = "Percent Population Change")
```



West Virginia had a net loss of population. The West seems to have generally experienced fairly significant population gain, while the area around the Mississippi River and the Northeast seems to have remained fairly stagnant in terms of population change.

Exercise 6

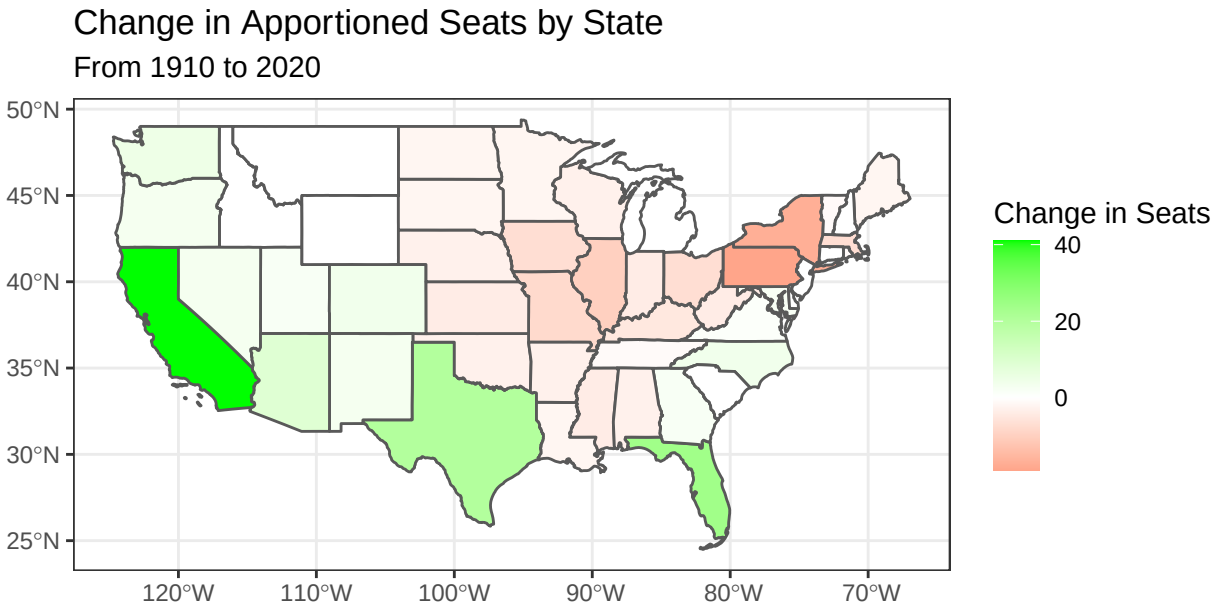
```
census_data %>%
  mutate(seat_change_2010 = seats_2020 - seats_2010) %>%
ggplot(.) +
  geom_sf(aes(fill = seat_change_2010 )) +
  scale_fill_gradient2(low = "red", high = "green", midpoint = 0) +
  labs(title = "Seat change by state", subtitle = "from 2010 to 2020",
       fill = "Seat change ")
```



The majority of states didn't experience a seat change. A cluster of states in the midwest experienced a loss in seats, and also California. 6 states experienced an increase in seat numbers.

Exercise 7

```
census_data %>%
  mutate(seat_change_1910 = seats_2020 - seats_1910) %>%
ggplot(.) +
  geom_sf(aes(fill = seat_change_1910)) +
  scale_fill_gradient2(low = "red", high = "green", midpoint = 0) +
  labs(title = "Change in Apportioned Seats by State",
       subtitle = "From 1910 to 2020", fill = "Change in Seats") +
  theme_bw()
```



Given that the geographic distribution of the US has changed drastically over the past 110 years but that the number of Representatives in the House has remained fixed over that same time period, the trend in seats clearly reflects population shift patterns. In the Northeast and Midwest (and to an extent, parts of the Deep South), seats were lost - especially in former colonial powerhouses Pennsylvania and New York, which are both still large but less so in terms of relative size compared to where they were 100 years ago. In much of the West, states gained a lot of seats - with the largest gains in California, Texas, and Florida (which isn't the West, admittedly).