Coding lab project

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Your final project is quite simple. You will pick a data set that speaks to you and try to uncover something interesting which you will visualize in a plot. You will also compute some summary statistics that you will show in a summary table. Your TAs will review your work.

Suggested due date: September 17, 5pm upload your Rmd and pdf to Gradescope. Feel free to submit your work earlier. **Extended due date: September 24, 5pm** We will not review work that is turned in after that point.

Format:

You will turn in a knitted pdf that has the following sections. - `graph` in which you load your data set and provide the minimal code that produces your graph. - `table` in which you create and print a summary table with minimal code. - `appendix` (optional) in which you share code you used during data exploration, e.g. extensions of your main plot, other plots you attempted on your search for your main plot.

I have provided a sample project at the end of this document.

You are welcome to use google and stackoverflow as you procede. Please cite your sources if you borrow code from stackoverflow or someone's blog. To cite, just add a comment with the url. See, the last code line of the sample project where I used stackoverflow to figure out how to reformat my legend.

We will review how to use Rmds with you. But here are some quick tips.

- You make a new section in Rmd using `# section title`.
- When you read in you data, we do not want to see messages or warnings. To avoid this start the code block where you read the data with the following `{r, message = FALSE, warning = FALSE}`.

- If you have a line of code that is too long, it will be cutoff. Most R code can be split across two lines.
- Knit early and often! This is how you know if the Rmd is working how you think it is.
- To make your table look nice, you can use `knitr::kable(your_data)`. (See example below).

Datasets:

Below is a list of suitable data sources. You are welcome to and encouraged to find a data source not on this list that speaks to your policy interests. Many of these data sources have a wide range of data sets. Pick one that comes in tabular format with several variables that are interesting[1]. I recommend that once you pick a data source that is sufficient stick with it, so you have ample time to focus on your R skills.

[1] By which I mean there's variation.

Description	url
Weekly Covid data from US CDC (several datasets available, follow links)	https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/
Washington Post fatal police shooting data has records of every fatal shooting in the United States by a police officer in the line of duty since Jan. 1, 2015. Their github has other data mixed in with code they use for other stuff.	https://github.com/washingtonpost/data-police-shootings
Open Policing has traffic stop data for several police departments with varying time horizons and variables	https://openpolicing.stanford.edu/data/
Eviction Lab has eviction data at the block group / tract level from 2000-2016	https://evictionlab.org/get-the-data/
Google maps data aggregating how visits to places, such as grocery stores and parks, are changing in each geographic region since February 15, 2020 until today (3-4 days delay), compared to the same week of the day in January, 2020.	https://www.google.com/covid19/mobility/index.html?hl=en
World Inequality Database which allows you to download a customizable dataset. You are able to choose the indicators you want (per adult gdp, top 10% income share & dozens others), countries you want and date range that you want.	https://wid.world/data/
The Humanitarian Data Exchange (HDX) is an open platform for sharing data across crises and organizations. They host thousands of datasets including development indicator data, geospatial data, damage assessments, and more.	https://data.humdata.org/
World Bank publishes hundreds of different global development related datasets including datasets on World Development Indicators, all of World Bank's lending projects and access to sample survey data etc. Also able to search data by country or indicator.	https://data.worldbank.org/
The City of Chicago publishes many different datasets, including ones on public finance, public safety, transportation, and education	https://data.cityofchicago.org/
NYC also has an open data initiative that aims to provide data from different agencies in one central platform. Data on ride-share programs can be found there as well, but of course, the public version	https://opendata.cityofnewyork.us/
List of datasets related to black lives and police violence. Kaggle is a platform for learning data science through competitions.	https://www.kaggle.com/data/177628

FiveThirtyEight is a website focused on opinion poll analysis, politics, economics, and sports blogging. Currently, it has a unique repository of datasets about 2020 election polls and forecasts, Trump's popularity, Americans' view on COVID crisis Trump's response, NBA/NFL/MLB/Soccer predictions, among others.	https://data.fivethirtyeight.com/
Propublica is a investigative news organization that does in-depth data reporting. Browse data sets about Health, Criminal Justice, Education, Politics, Business, Transportation, Military, Environment, Finance, or Religion. Not all data here is free.	https://www.propublica.org/datastore/
National Bureau of Economic Research has a master page of data resources.	https://data.nber.org/data/
Google also has a dataset search tool that is pretty handy for finding data without having to comb through niche websites. I would not rely on this completely, though, since not all datasets follow the standards required to show up in these search results	https://datasetsearch.research.google.com/

Example project:

Introduction

I analyze weekly covid-19 data from the US Center for Disease Control. I show the extent to which racial disparities exist as measured by the percentage change in deaths in 2020 compared to 2015-2019. The plot below shows data for the United States except the tri-state area NY-NJ-CT. NYC is a large diverse city that was particularly hard hit by the coronavirus, so it is plausible that the racial disparities reported on are driven by those facts. The plot shows that NYC does not appear to drive the disparities. In the appendix, I examine the same question in states with high Latinx populations that experienced a covid-19 surge in the late summer (TX-CA-AZ-FL). And, I look at the least densely populated states.

The data description is found here: https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/ The data can be downloaded directly from here: https://data.cdc.gov/api/views/qfhf-uhaa/rows.csv?accessType=DOWNLOAD&bom=true&format=true%20target=

graph

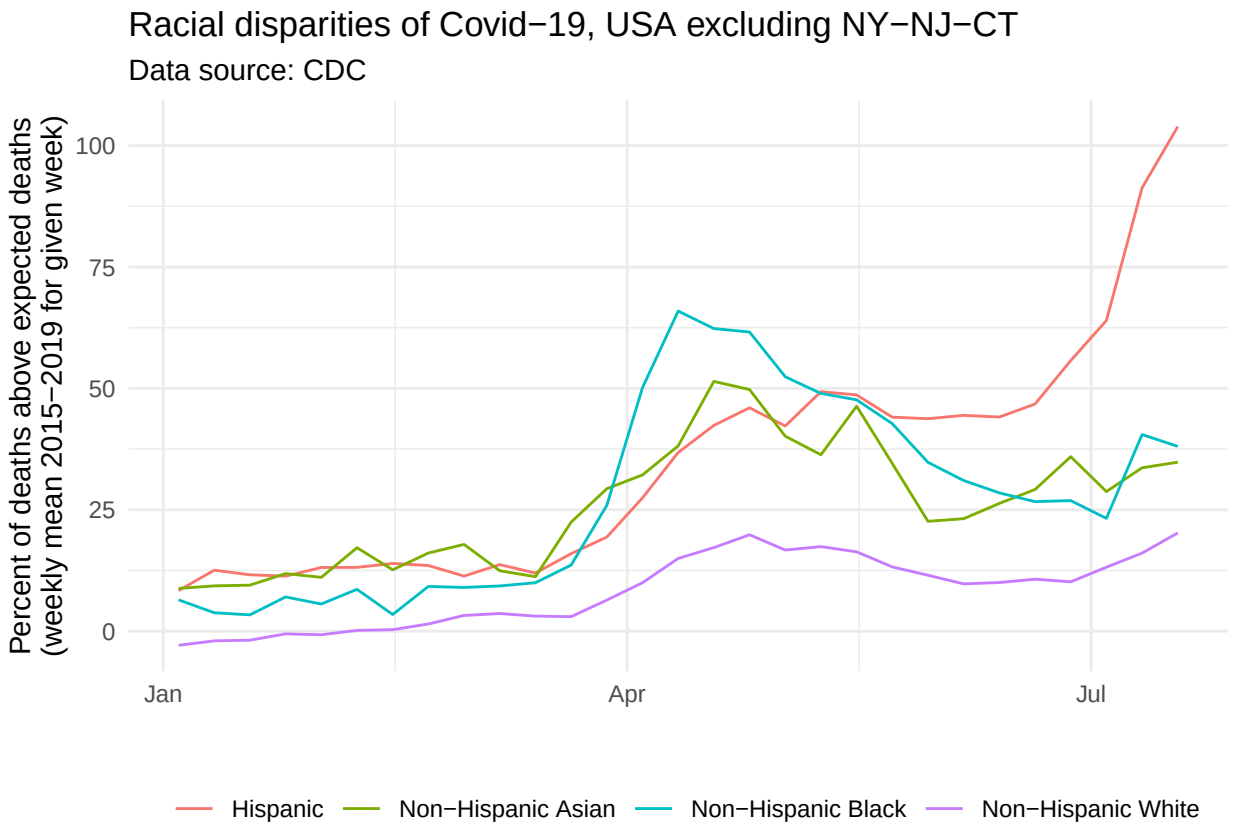
```
library(tidyverse)

covid_data <-
  read_csv("../data/Weekly_counts_of_deaths_by_jurisdiction_and_race_and_Hispanic_origin.csv",
           col_types = cols(Suppress = col_character())) %>%
    mutate(week = `Week Ending Date`,
           race_ethnicity = `Race/Ethnicity`,
           n_deaths = `Number of Deaths`,
           diff = `Difference from 2015-2019 to 2020`,
           expected_deaths = n_deaths - diff,
           perc_diff = `Percent Difference from 2015-2019 to 2020`,
           year = MMWRYear,
           week_no = MMWRWeek,
           jurisdiction = Jurisdiction,
           state = `State Abbreviation`
           )  %>%
    filter(`Time Period` == "2020", Outcome == "All Cause", Type != "Unweighted") %>%
    select(jurisdiction, state, week, year, week_no,
           race_ethnicity, n_deaths, expected_deaths, diff, perc_diff)
```

```
data_for_plot <-
covid_data %>%
  mutate(week = lubridate::mdy(week)) %>%
  filter(race_ethnicity %in%
          c("Hispanic", "Non-Hispanic White", "Non-Hispanic Black", "Non-Hispanic Asian")) %>%
  filter(! state %in% c("US","NY","YC", "NJ",  "CT", "PR"), week_no <= 29) %>%
  group_by(race_ethnicity, week ) %>%
  summarize(actual_deaths = sum(n_deaths, na.rm  = TRUE),
            diff_deaths = sum(diff, na.rm = TRUE),
            expected_deaths = actual_deaths - diff_deaths,
            perc_above_expected = 100 * diff_deaths / expected_deaths)
```

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

```
data_for_plot %>%
  ggplot(aes(x = week, color = race_ethnicity)) +
    geom_line(aes(y = perc_above_expected)) +
  theme_minimal() +
  labs(y = "Percent of deaths above expected deaths\n(weekly mean 2015-2019 for given week)",
       x = "",
       title = "Racial disparities of Covid-19, USA excluding NY-NJ-CT" ,
       subtitle = "Data source: CDC",
       color = "") +
  theme(legend.position = "bottom")
```



table

```
summary_table <-
covid_data %>%
  filter(state == "US") %>%
  group_by(race_ethnicity) %>%
  summarize(expected_deaths = sum(expected_deaths, na.rm = TRUE),
            total_additional_deaths = sum(diff, na.rm = TRUE),
            percent_diff = 100 * total_additional_deaths / expected_deaths
            )

summary_table %>%
  knitr::kable()
```

race_ethnicity	expected_deaths	total_additional_deaths	percent_diff
Hispanic	121787	54977	45.141928
Non-Hispanic American Indian or Alaska Native	10749	2335	21.722951
Non-Hispanic Asian	40741	14364	35.256867
Non-Hispanic Black	204431	61969	30.312917
Non-Hispanic White	1337231	130967	9.793895
Other	15094	2613	17.311515

Appendix

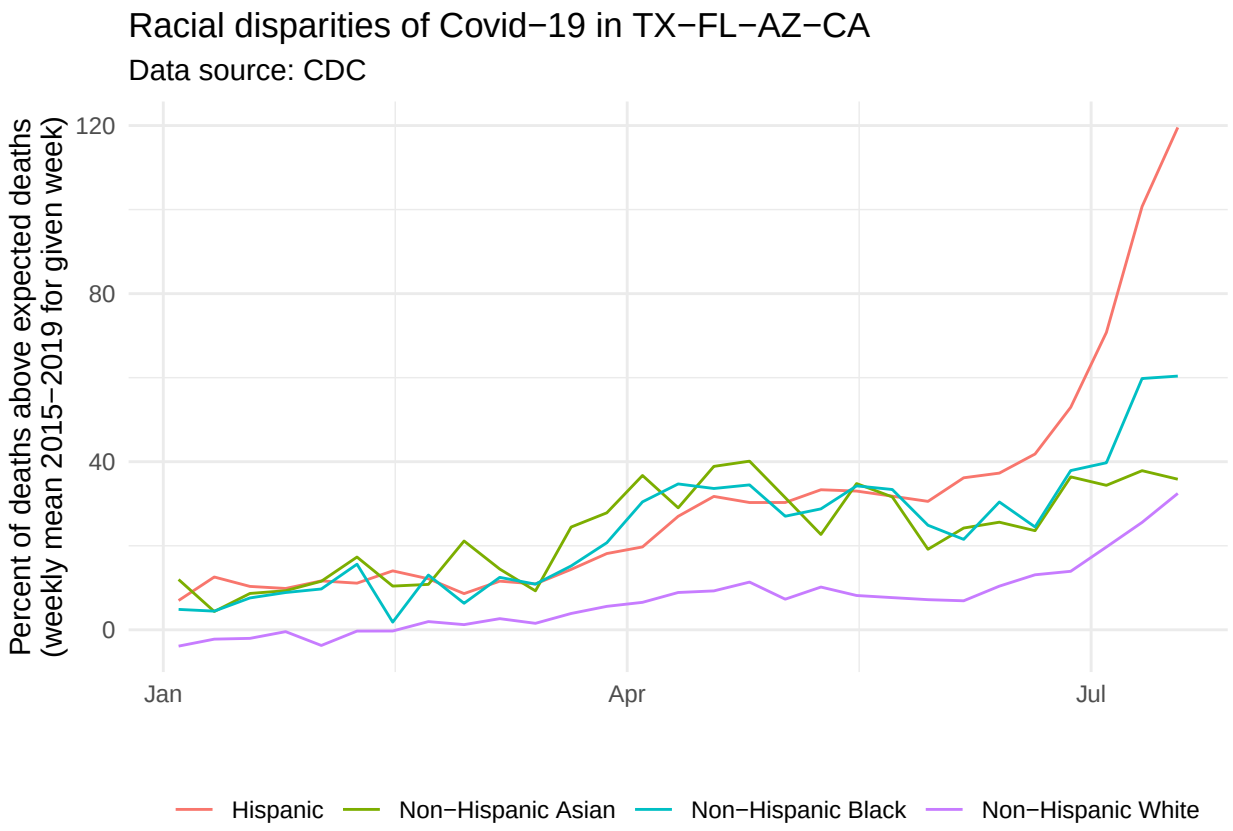
```
# We don't expect you to use functions. For this project it's acceptable to repeat code.
# As you grow as a programmer, when you find that you want to copy and paste a code block
# over and over again. It means it's time for a function or a loop. We'll discuss these
# in the fall.
data_for_plot <-
  function(states,
    ethnicities = c("Hispanic", "Non-Hispanic White", "Non-Hispanic Black", "Non-Hispanic Asian")) {

    covid_data %>%
      mutate(week = lubridate::mdy(week)) %>%
      filter(race_ethnicity %in% ethnicities) %>%
      filter(! state %in% "US", state %in% states, week_no <= 29) %>%
      group_by(race_ethnicity, week ) %>%
      summarize(actual_deaths = sum(n_deaths, na.rm  = TRUE),
                diff_deaths = sum(diff, na.rm = TRUE),
                expected_deaths = actual_deaths - diff_deaths,
                perc_above_expected = 100 * diff_deaths / expected_deaths)
}

make_plot <- function(data_for_plot, title) {
    data_for_plot %>%
      ggplot(aes(x = week, color = race_ethnicity)) +
        geom_line(aes(y = perc_above_expected)) +
      theme_minimal() +
      labs(y = "Percent of deaths above expected deaths\n(weekly mean 2015-2019 for given week)",
           x = "",
           title = glue::glue("Racial disparities of Covid-19 {title}"),
           subtitle = "Data source: CDC",
           color = "") +
      theme(legend.position = "bottom")
}

data_for_plot(c("AZ", "TX", "FL", "CA")) %>% make_plot("in TX-FL-AZ-CA")
```

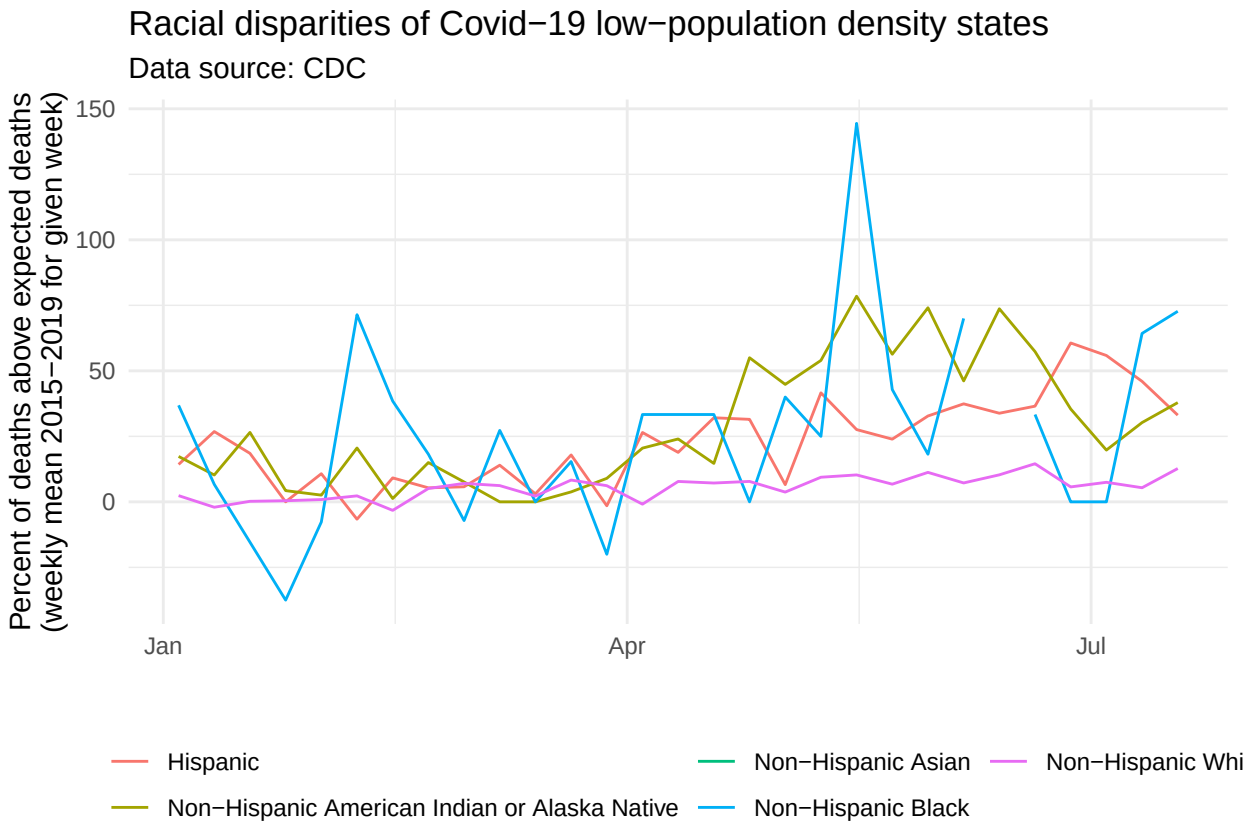
```
## `summarise()` has grouped output by 'race_ethnicity'. You can override using the `.groups` argument.
```




```
data_for_plot(c("AK","MT", "WY", "SD", "ND", "NM", "NE", "ID"),
              ethnicities = c("Hispanic", "Non-Hispanic White",
                              "Non-Hispanic Black", "Non-Hispanic Asian",
                              "Non-Hispanic American Indian or Alaska Native")
              ) %>% make_plot("low-population density states") +
  # code from https://stackoverflow.com/questions/10332387/wrap-legend-text-in-ggplot2
  guides(colour = guide_legend(nrow = 2))
```

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

```
## Warning: Removed 29 row(s) containing missing values (geom_path).
```


Racial disparities of Covid−19 low−population density states
Data source: CDC
Percent of deaths above expected deaths
(weekly mean 2015−2019 for given week)
150
100
50
0
Jan
Apr
Jul
Hispanic
Non−Hispanic Asian
Non−Hispanic Whi
Non−Hispanic American Indian or Alaska Native
Non−Hispanic Black