Homework 1

STA 209, Week 1

Due: 11:59pm, Friday January 27

Instructions

Work through the problems below, and upload answers to the STA 209 gradescope page.

For this first assignment, you may type or handwrite your homework solutions and upload them to Gradescope as a .pdf or image.

Acknowledgements

If you work with a classmate, please write a note acknowledging this.

Exercise 1

A migraine is a particularly painful type of heaadache which some patients treat with acupuncture. Interested in determining whether acupuncture effectively reduces migraine pain, researchers conducted a study where female participants diagnosed with migraine headaches were assigned into two groups:

- Participants in the first group, called the *treatment group*, received acupuncture designed to treat their migraines.
- Participants in the second group, called the *control group*, received placebo acupuncture, where an acupuncture needle was inserted in locations not thought to relieve migraine pain. (For further discussion of placebo acupunction, you can review the .pdf article for this study here.)

Twenty-four hours later, the participants were asked if they were pain-free. The following table summarizes the data collected.

	In Pain	Pain-Free
Treatment	33	10
Control	44	2

a. Assuming that data was recorded from all participants, how many people participated in the study? How many were in the control group? Treatment group?

b. What proportion of patients in the treatment group were pain-free 24 hours after receiving accupuncture?

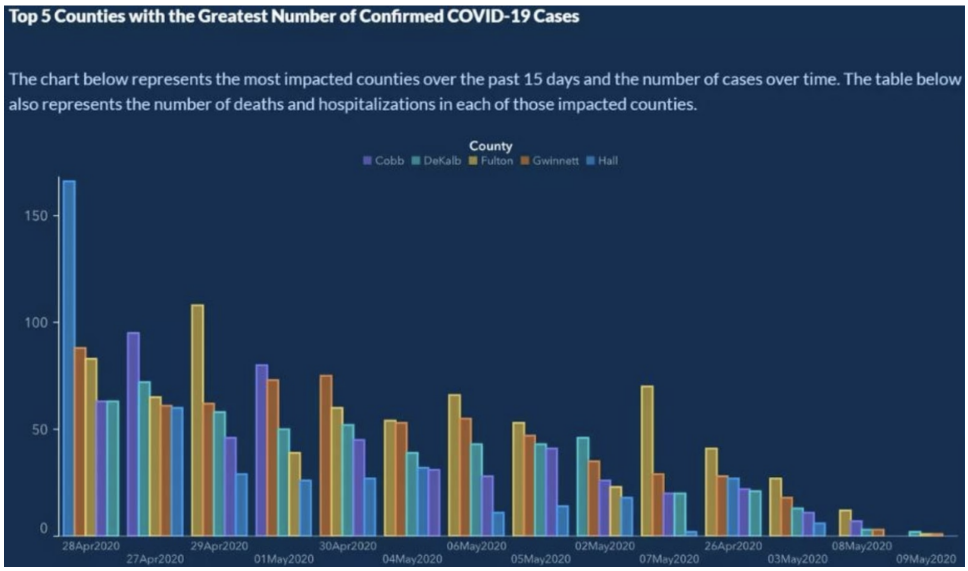
c. What proportion were pain-free in the control group?

d. In which group was a higher proportion of participants pain-free after 24 hours?

e. One explanation for the researchers' data might be that acupuncture is an effective treatment for migraine pain. What is another possible explanation for the difference in percentages of pain-free patients in the two groups?

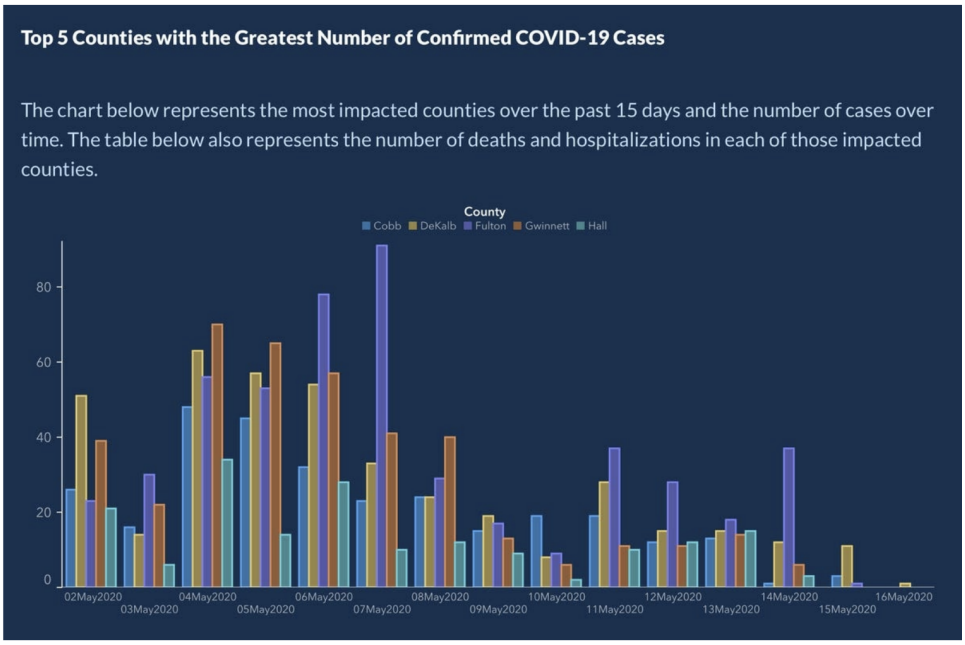
Exercise 2

There have been many data visualizations related to COVID-19. In May 2020, the Georgia Department of Public Health posted the following graph:



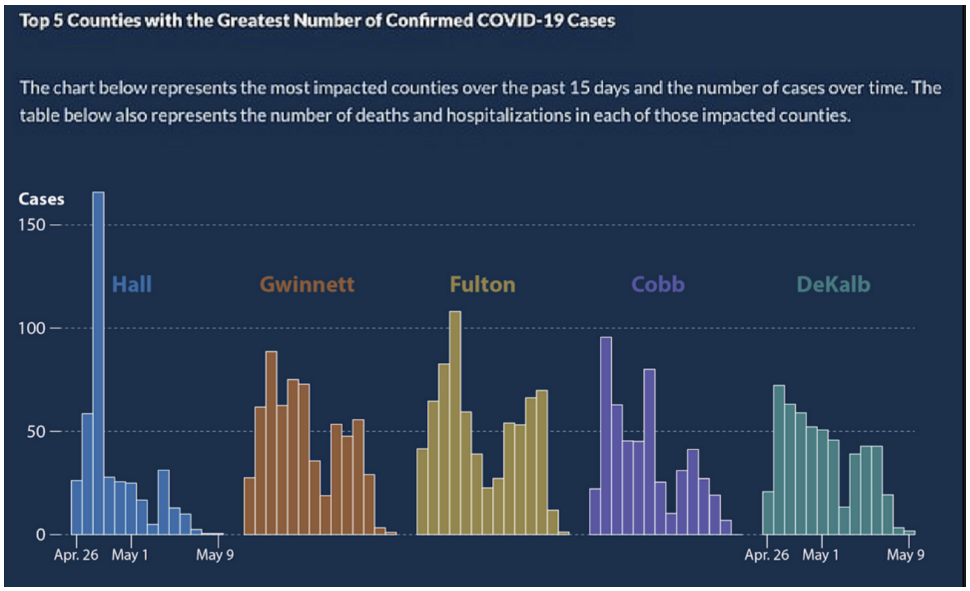
a. Because the y-axis represents the number of deaths and hospitalizations in each county, a quick glance at the bar graph seems to indicate that COVID these numbers are decreasing. Look closely–what aspects of this graph are misleading?

b. After public outcry, the Georgia Department of Public Health published the following updated graphic:



Based on this second graphic, do COVID cases seem to be decreasing over time? Why or why not?

c. Alberto Cairo, a journalist and designer, used the Georgia Department of Public Health data to create the following bar graph:



Explain how Cairo's graph is different from the previous graphs.

d. A key principle of data visualization is to "help the viewer make meaningful comparisons." Which of the graphs makes it easiest to facilitate meaningful comparisons and what specifically are you comparing? Explain your thinking!