**Problem Set 5**

This problem set covers material from class on March 8 and March 15, including material from OIS Sections 6.2, 7.1, and 7.2. It makes use similar data to that we discussed in class. Partial credit may be given for answers that are correct in part, but not in full. As a reminder, you are allowed to work with others, but your answer should be your own. What that means is that on problems that require you to write interpretations or responses, you should make sure that you and those you work with do not provide answers that are constructed similarly. This problem set is due at 11:59 pm on March 16, 2021.

**Part I: Rasmussen vs. Rasmussen 2 (40 pts.)**

In addition to the approval rating numbers from over the summer for President Trump that we used in class, both Rasmussens also more recently came out with numbers for President Biden’s approval rating.

These poll results are summarized below:

* Rasmussen Reports: Approve 49% Disapprove 48%, 1500 likely voters.
* RMG Research (Scott Rasmussen’s firm): Approve 54% Disapprove 40%, 1,200 likely voters.

1. For this question, we are first going to focus on **Joe Biden’s approval** in these two polls.
   1. Please calculate and interpret the 95% confidence interval for the difference in **Biden’s approval** in the two polls. Please show your work. Does there appear to be a significant difference between the two polls? How do you know? (For this problem, you can assume that the necessary conditions have been met.) (10 points.)
   2. Now please calculate the z-score for the difference in **Biden’s** **approval** in these polls and then find and interpret the associated p-value. Please show your work for the z-score and explain how you got the p-value. (15 points.)
   3. Finally, please calculate the z-score for the difference in **Biden’s disapproval** in these polls and then find and interpret the associated p-value. Please show your work for the z-score and explain how you got the p-value. (15 points.)

**Part II: A “Tea” Test (30 pts.)**

Following the 2008 Election, a conservative movement known as the Tea Party rose up in opposition to President Obama. While their influence has since [waned](https://apnews.com/64b634a91a2d4933b8bca4c95baa1309), the caucus had significant influence following the 2010 Election. In this section, you will be working with data from the 2010 [Cooperative Congressional Election Study.](https://cces.gov.harvard.edu/book/cces-2010)

1. In the 2010 CCES, respondents were asked to rate their favorability toward the Tea Party on a scale from 1 to 7, with 1 being most favorable and 7 being least favorable. The mean rating for the Tea Party after the election was 2.93, the sample standard deviation was 1.70, and 41,692 respondents answered that question. (25 points)
   1. Please find and interpret a 95% confidence interval for the mean feeling towards the Tea Party in the 2010 CCES. Please explain how you found your t-critical value. Does this t-distribution closely approximate a normal distribution? Why? (10 pts.)
   2. Let’s say that your null hypothesis was that the average voter had a neutral view of the Tea Party (i.e., they would give a value of 4 on the CCES). Find a t-score and p-value at the 95% confidence level to test the alternative hypothesis that the mean rating for the Tea Party is different from 4. Please show your work, interpret your p-value, and explain how you found the p-value. (10 pts.)
   3. The 2010 CCES also asked people to rate the ideology of the Tea Party on a seven-point scale from 1 to 7, where 1 was most liberal and 7 was most conservative. The mean score was 6.14, with a standard deviation of 1.34. 46669 respondents answered this question. Your null hypothesis is that the mean rating of the Tea Party was 4 (at the middle of the scale). Do voters recognize that the Tea Party is a conservative movement? Please test the alternative hypothesis that the mean rating for the Tea Party is *greater* than 4. Please show your work, interpret your p-value, and explain how you found the p-value. (15 pts.)
2. The World Apple and Pear Foundation has collected data on the number of pears (and apples) imported by each country from 2003 to 2014. You are tasked with finding whether there exists a different in US and Canadian pear importation. (25 pts.)
   1. The mean difference in the number of pears imported (i.e., US pears imports minus Canadian pears imports) is 7,551.25 and the standard deviation of the difference is 15,180.45 for the 12 years included in the data. Please conduct and interpret a “peared” t-test at the 95% confidence level to examine whether there is a difference between the number of imported by the US and the number imported by Canada. Please discuss how you found your p-value. (15 pts.)
   2. The below histogram shows the distribution of the difference between the number of pears produced in the United States and the number of pears produced in Canada. Given the number of years included in the study, should this histogram give us pause in conducting this test and interpreting our results? Why or why not? (10 pts.)

