Quantitative Methods – Assignment #1

Winter 2021/2022

Due date: November 16, 2021

This assignment is due Tuesday, November 16, 2021, by 6pm. Submit your assignment through Slack to Felix Hagemeister or Timm Betz, depending on your tutorial. You are encouraged to work in groups. However, you must hand in your own work, written in your own words. All answers must be in complete sentences. You do not have to provide R code. Providing R code only, without written answers, is not sufficient. Make sure to write your name on top of your homework.

1. Consider a sample of test scores from eight students: $4, 8, 7, 9, 10, 8, 2, 8$. What is the average test score in the sample? Create a sample with a larger variance but the same average by changing two of the test scores. [5 points]

2. Find data online on countries' military expenditure, either in US$ or as a percentage of gross domestic product. If you find data for several years, use the most recent year. Load the data in R. Find the average, the minimum, the maximum, the median, and the variance of the data. Graph the distribution in a histogram. When graphing the distribution, make sure your graph includes appropriate labels and looks reasonably polished. List the military expenditures of the United States, Russia, and Germany. [10 points]

3. Listen to the interview with John Hibbing, a political scientist at the University of Nebraska, in the episode "More Divided Than Ever? Excavating the Roots Of Our Political Landscape" of the podcast 'Hidden Brain' (you can find the podcast online and on Moodle) – this will be the first 24 minutes of the episode. The episode discusses research on the roots of political views. Around minute 17, the podcast raises the issue of confounding (or endogeneity), which makes it difficult to identify the causal effects the episode is interested in. First, state the causal effects the episode is interested in. Then, explain the problem of confounding discussed in the podcast. You can use a diagram if you want to, but you must also provide a written explanation. Then explain how the twin studies discussed in the podcast help overcome this type of confounding. [10 points]

4. Propose two estimators for the mean. Explain what it means for an estimator to be unbiased. Does an unbiased estimator produce an estimate that is identical to the true value in every given sample? Why or why not? Are your proposed estimators biased? [5 points]