## Reflection Exercise 4

## Sophia Brothers

Data was obtained through Integrated Public Use Microdata Series USA (IPUMS USA) (Ruggles et al. 2021) and contains data surrounding the 2022 American Community Survey (ACS). Two variables were extracted from the 2022 ACS: STATEICP and EDUC. After selecting the correct data and converting the file from a .dat to a .dta, you could download the data extract from IPUMS USA. You then unzip the file and import it into R (R Core Team 2023).

The ratio estimators approach was used in order to estimate the total number of respondents in each state. This approach allows you to take the ratio between two means for a subset of your data in which you know both values, and broad apply it to the broader pool in which you only have one of the two values needed. Given the actual number of respondents in California and after extracting the number of doctoral respondents in California, we were able to determine the ratio of respondents to doctoral respondents. This ratio was then applied to the number of doctoral respondent in every state, giving us an estimated total number of respondents per state.

In Table 1, we see the number of doctoral respondents, the estimated number of total respondents, and the actual number of total respondents per state.

In some instances the estimated amount of total respondents is very close to the actual value. In others, such as Massachusetts (STATEICP = 2) or Indiana (STATEICP = 22), we see large discrepancies. These numbers are so off in these states because the proportion of state populations who have doctoral degrees varies widely from state to state. In Massachusetts our estimated total is much higher than the actual because a larger proportion of respondents in Massachusetts have doctoral degrees compared to California. The same applies to Indiana but in the reverse, in which they have a lower proportion of doctoral respondents than California.

## References

R Core Team. 2023. R: A Language and Environment for Statistical Computing. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Ruggles, Steven, Sarah Flood, Sophia Foster, Ronald Goeken, Jose Pacas, Megan Schouweiler, and Matthew Sobek. 2021. "IPUMS USA: Version 11.0." Minneapolis, MN: IPUMS. https://doi.org/10.18128/d010.v11.0.

Table 1: The number of doctoral respondents vs estimated respondents vs actual respondents in each state

stateicp doctoral_count         estimated_total         actual_total           cfct>         cint>         cdbl>         cint>           1 1         600         37043         37369           2 2         165         10187         14523           3 3         2014         124340         73077           4 4         244         15064         14077           5 5         177         10928         10401           6 6         131         8088         6860           7 11         152         9384         9641           8 12         1438         88779         93166           9 13         2829         174656         203891           10 14         1620         100015         132605           11 21         1457         89952         128046           12 22         620         38277         69843           13 23         991         61182         101512           14 24         1213         74888         12066           15 25         513         31672         61967           16 31         258         15928         33586           17 32         321         19818 </th <th># A tibble:</th> <th>51 x 4</th> <th></th> <th></th>	# A tibble:	51 x 4		
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