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Purpose

To demonstrate your ability to analyze data and identify and quantify statistically significant differences in means based on population characteristics. In particular, you'll

- set up and conduct hypothesis tests
- construct and interpret confidence intervals, and
- identify and comment on associations between statistical factors (display of a "Staff" parking sticker) and an outcome variable (mean vehicle speed).

Background

A group of statistics students investigated the speed of vehicles passing Lot 5 on the college loop road, where the legal speed limit is 20 mph. They recorded the speed of 224 vehicles, and noted whether the vehicle displayed a "Staff" parking sticker. Their full dataset is available in Canvas as LoopRoadSpeed.csv.

SPEED LIMIT 20

What to Do

- Describe the observed vehicle speeds (mean, standard deviation, and sample size) for all vehicles and for the subsamples of employees (vehicles displaying a "Staff" parking sticker) and students & visitors (vehicles without a "Staff" sticker). Identify any potential outliers.
- Set up and conduct a test of the hypothesis that the mean vehicle speed differs between employees and students & visitors
  - state your null and alternative hypotheses
  - select and justify a significance level
  - compute a p-value and interpret it as the conditional probability $P(\text{data} \mid H_0)$
  - make a decision about your alternative hypothesis, and
  - follow up with an appropriate confidence interval for the difference in means.
- Construct and interpret a confidence interval for the mean vehicle speed
  - overall; and
  - for each subpopulation (two intervals).
- Set up and conduct a test of the hypothesis that the proportion of drivers who obey the speed limit differs between employees and students & visitors. Follow up with appropriate confidence intervals for the difference in proportions, and for each population proportion.
- Summarize your work in a statistical report of no more than two pages. If appropriate, comment on the impact of any outlier observations on the overall statistical results.
- Write a one-page reflection on your experience with this task. What did you learn?
- Please give credit to the people and resources you found helpful.

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