Test 2

One- and two-sample inference for means [L3, L4, L5]

STAT218

2024-05-10

## Instructions

You have 48 hours from the release of this assignment to complete and submit your work. You may refer to all class materials, notes, and textbooks, but must complete this assignment on your own. By submitting your work, you are affirming that your work is your own and you have not consulted with anyone else in preparing your answers or generated your answers or analyses using AI. Failure to adhere to this expectation will be considered an act of academic dishonesty and result in loss of credit.

You will find a project with a mostly empty script in the class Posit cloud workspace; use this to complete your analyses where required. Note that not all parts require you to perform any calculations; some questions are purely qualitative. Use the prompts as your guide, not the script.

Once you have completed your analyses for the portions requiring use of statistical software, submit your work by filling out the [test 2 form] (also posted on the course website). The form will automatically save your work, so you can return to it over the course of the 48-hour test window.

The form will stop accepting responses at the deadline, so make sure you submit by **5pm on Friday 5/10**. Lastly, keep in mind that you will be given the opportunity to revise problems that you miss the first time around to earn back credit.

## Question prompts

1. [L3, L4, L5] The dataset lizards contains running speeds measured in a laboratory race track for two species of lizards, Western Fence (WF) and Sagebrush (S) lizards. Speeds are recorded in meters per second.
   1. [L3] Construct side-by-side boxplots of top speed by species. Comment on whether the assumptions for inference using the model seem appropriate.
   2. [L4] Compute point estimates and standard errors for the mean top speed for each species.
   3. [L4] Compute and interpret 99.5% confidence intervals for the mean top speed for each species.
   4. [L5] Test for a difference in mean top speed between species at significance level 0.01. Interpret the test result following the style introduced in class.
   5. [L4] Construct and interpret a 99% confidence interval for the difference in mean top speed.
2. [L3, L4] The tuition dataset contains in-state and out-of-state tuition at a random sample of 25 public universities from 2011-2012.
   1. [L3] Visualize the distribution of differences between in-state and out-of-state tuition. Comment on whether the assumptions for inference using the model seem appropriate.
   2. [L4] Calculate and interpret a 95% confidence interval for the mean difference between in-state and out-of-state tuition.
   3. [L4] Interpret your interval in context following the style introduced in class.
3. [L1, L2, L3, L4, L5] The creativity dataset contains data from an experiment on the effect of intrinsic vs. extrinsic motivation on creativity. A random sample of 47 creative writing students at an unnamed university were randomly assigned to one of two groups, extrinsic and intrinsic; each subject was instructed to write two short poems, but those in the extrinsic motivation group were primed on the task in a way that oriented them to external motivations for writing, and those in the intrinsic group were primed on the task in a way that oriented them to internal motivations for writing. Poems were scored by judges for creativity on a 40-point scale, and each subject received an average score.
   1. [L1] What is the study population? Based on the study description, is the sample representative, and if so, why?
   2. [L2] What type of study is this? Based on the study description, can the data support causal inferences about motivation and creativity, and if so, why?
   3. [L3] Construct an appropriate graphical summary comparing the distributions of average scores by treatment group.
   4. [L3] Provide appropriate summary statistics indicating the center, spread, and number of observations of average scores in each group.
   5. [L5] Test the hypothesis that motivational framing has no effect on creativity at the 1% significance level. Use your results from (c)-(d) to check assumptions.
   6. [L4] Compute an interval estimate for the difference in mean scores at the level corresponding to your test.
   7. [LX] Write a short narrative summary of your results in (e)-(f) following the style introduced in class. (Don’t forget to include a point estimate and standard error.)