Exercises: Paired Sample

Review Questions

1. What is the defining feature of a paired sample?
2. Describe ways to get paired samples.
3. What is the opposite of a paired sample?
4. List the symbols used to identify summary statistics from (a) the first sample, (b) the second sample, (c) the within-pair differences.
5. This is the name of the variable used to store information about the within-pair differences.
6. In order to explore the within-pair differences, you should plot the data from (a) the first sample, (b) the second sample, (c) the within-pair differences.
7. Describe the shape, location, and spread of t pdfs.
8. How do t pdfs differ from the N(0,1) pdf?
9. A t pdf with 30 or more df is nearly the same as a _____ _____ pdf.
10. What parameter do you want to estimate with paired samples?
11. What is the point estimator of the parameter you identified in #10?
12. With matched pairs, the null hypothesis is usually _____.
13. A paired t procedure based on 20 observations has this many df.
14. A t test derives a P value of .06. The P value represents the probability that [M/C]: (a) the null hypothesis is true (b) the null hypothesis is false (c) the data or data more extreme assuming the null hypothesis is true
15. A 95% CI for μ_d is used to infer the value of the [M/C]: (a) sample mean (b) expected mean difference (c) expected standard deviation
16. A 95% CI for μ_d is (−0.91, 1.36). From this we can infer that the population mean not *probably* [M/C] (a) not less than −0.91 (b) not more −0.91 (c) not more than 1.36
17. Paired samples can be achieved via [M/C] (a) pre-test/post-test analysis [M/C] (b) matching on extraneous factors such as age and sex (c) both *a* and *b*
18. List the determinants of sample size requirements when estimating μ_d with confidence.
19. List the determinants of the power of a paired t test.

Exercises

7.1 A study determined the number of cavity-free children per 100 children in 16 North American cities BEFORE and AFTER public water fluoridation projects. Data are shown on the next page and are linked to the course calendar.
(A) Calculate the mean and standard deviation for the cavity-free rates before fluoridation.
(B) Calculate the mean and standard deviation for the cavity-free rates after fluoridation.
(C) Calculate the mean and standard deviation for change (DELTA) in cavity-free rates.
(D) Explore the change in cavity-free rates with a stemplot. Interpret your findings so far.
(E) Estimate the effect of fluoridation with 95% confidence. Show all work. Interpret your confidence interval.
(F) Test the change for statistical significance. Show all NHST steps (hypothesis statements, test statistic, P value, brief interpretation using the model language in the chapter).

FLUORIDE data

AFTER	BEFORE
49.2	18.2
30.0	21.9
16.0	5.2
47.8	20.4
3.4	2.8
16.8	21.0
10.7	11.3
5.7	6.1
23.0	25.0
17.0	13.0
79.0	76.0
66.0	59.0
46.8	25.6
84.9	50.4
65.2	41.2
52.0	21.0