**Measuring Weight Loss for an Alternate-Day Fasting Diet**

Heilbronn, Smith, Martin, Anton and Ravussin[[1]](#footnote-1) conducted a study with 16 nonobese subjects to determine the effect of fasting every other day. The subjects participated in the experiment for 22 days. One variable that was measured was the weight of the subjects before and after the experiment was conducted.

**Research Question:** Is alternate-day fasting a feasible method of dietary restriction in nonobese humans?

**Discuss the Following Questions**

1. If you are examining weight loss, what statistic is of interest? Are you looking at a one-sample mean, two-sample means, or mean of paired data? Explain.

The table below contains the weight (in pounds) before and after the study for the 16 subjects as well as the difference between the two. The mean weight before and after the study was 164.19 and 160.10, respectively.

|  |  |  |  |
| --- | --- | --- | --- |
| **ID** | **Before** | **After** | **Weight Loss**  **After - Before** |
| 1 | 112 | 109 | 3.0 |
| 2 | 118 | 118.5 | -0.5 |
| 3 | 121 | 117.1 | 3.9 |
| 4 | 149 | 144.7 | 4.3 |
| 5 | 149 | 145.2 | 3.8 |
| 6 | 153 | 147.8 | 5.2 |
| 7 | 163 | 158.7 | 4.3 |
| 8 | 163 | 157.5 | 5.5 |
| 9 | 168 | 163.9 | 4.1 |
| 10 | 170 | 166.3 | 3.7 |
| 11 | 178 | 173.6 | 4.4 |
| 12 | 179 | 175.1 | 3.9 |
| 13 | 187 | 182.2 | 4.8 |
| 14 | 191 | 186.7 | 4.3 |
| 15 | 211 | 206.1 | 4.9 |
| 16 | 215 | 209.2 | 5.8 |

1. Person 2 has a weight loss of -0.5. What does it mean to have a negative weight loss?
2. How is this data similar to a one-sample situation?
3. What is the mean weight loss?
4. Why should you not look at just the sample mean weight loss? Why should you compute a bootstrap interval?

* Go to <http://lock5stat.com/statkey>.
* Simulate at least 10,000 bootstrap samples for the average weight loss. You will need to manually enter the appropriate data provided on the first page of this activity.

1. Create a 95% bootstrap interval to estimate the true mean weight loss using the standard error approach.
2. Another approach to creating intervals is the percentile approach. Based on your reading, describe how the percentile approach is used to create a bootstrap interval.
3. Create a 95% bootstrap interval to estimate the true mean weight loss using the percentile approach.
4. Did you get the same bootstrap interval using the standard error approach and the percentile approach?
5. In order to answer the research question, provide an interpretation of the interval you created.
6. What does it mean if an interval has both a lower and upper limit that are positive?
7. What does it mean if an interval has both a lower and upper limit that are negative?
8. What does it mean if an interval includes 0 between the limits?
9. Look at the bootstrap interval you created. Is 0 in the interval? What does this tell you about the difference?
10. Describe how you would calculate a bootstrap interval that had a different confidence level than 95%.
11. Create a 90% bootstrap interval to estimate the true mean weight loss using the percentile approach.
12. Compare the 95% and 90% bootstrap intervals that estimate the true mean weight loss. Which one is wider? Why?
13. Write a general rule that relates the confidence level to the width of an interval.

1. Heilbronn, L. K., Smith, S. R., Martin, C. K., Anton, S. D. & Ravussin, E. (2005). Alternative-day fasting in nonobese subjects: Effects on body weight, body composition, and energy metabolism. *The American Journal of Clinical Nutrition, 81*(1), pp. 69-73. [↑](#footnote-ref-1)