Confidence Interval for Population Mean
COR1-GB.1305 – Statistics and Data Analysis

1. Of the students who filled out the online class survey, 49 reported their GMAT scores. The sample mean of the reported scores was 681, and the sample standard deviation was 42.

   (a) What is a reasonable population to associate with this sample?

   (b) What is the meaning of the "population mean"?

   (c) Find a 95% confidence interval for the population parameter.

   (d) Under what conditions is the confidence interval valid?

2. Use the following sample means and sample standard deviations from the class survey to form 95% confidence intervals for the population mean of each variable.

   (a) Dinners per month: $\bar{x} = 4.2$, $s = 7.1$, $n = 53$.

   (b) Age (years): $\bar{x} = 27.6$, $s = 4.7$, $n = 54$.

   (c) Commute Time (minutes): $\bar{x} = 37.5$, $s = 21.0$, $n = 53$.

3. In Problem 2, what are the relevant populations?

4. In Problem 2, what assumptions do we need for the confidence intervals to be valid? How could we check these assumptions?

5. In each of the following situations, find α and $t_{\alpha/2,n-1}$.

   (a) An 80% confidence interval with $n = 10$.

   (b) A 99% confidence interval with $n = 25$.

   (c) A 90% confidence interval with $n = 30$.

6. A random sample of 36 measurements was selected from a population with unknown mean μ. The sample mean is $\bar{x} = 12$ and the sample standard deviation is $s = 18$. Calculate an approximate 95% confidence interval for μ. Use the approximation $t_{\alpha/2,n-1} = t_{0.025,35} \approx 2$.

7. With respect to the previous problem, which of the following statements are true:

   A. There is a 95% chance that μ is between 6 and 18.

   B. The population mean μ will be between 6 and 18 about 95% of the time.

   C. In 95% of all future samples, the sample mean will be between 6 and 18.

   D. The population mean μ is between 6 and 18.

   E. None of the above.

8. Complete Problem 6, with a 99% confidence interval instead of a 95% confidence interval.

9. Complete Problem 6, with an 80% confidence interval instead of a 95% confidence interval.

10. How reliable is the SoHo Halal Guy's Yelp rating? The SoHo Halal Guy at Broadway and Houston (http://www.yelp.com/biz/soho-halal-guy-new-york) currently has 36 Yelp reviews (1 1-star; 1 2-star; 5 3-star; 12 4-star; and 17 5-star). The average star rating is 4.19 and the sample standard deviation of the star ratings is 0.98. How much should we trust the number "4.19"? We will use a confidence interval to quantify the uncertainty associated with this number.

(a) What is a reasonable population to associate with this sample?

(b) What is the meaning of the population mean, μ?

(c) Find a 95% confidence interval for the population mean, μ.

(d) Under what conditions is the confidence interval valid?

11. La Colombe at Lafayette and 4th St (http://www.yelp.com/biz/la-colombe-new-york-2/) currently has 467 Yelp reviews (10 1-star; 15 2-star; 32 3-star; 148 4-star; and 262 5-star). The average star rating is 4.36 and the sample standard deviation of the star ratings is 0.91. Find a 95% confidence interval for the expected rating of a random La Colombe Yelp reviewer.