WS #6 - CIs

Wednesday, September 17, 2025

Math 154 - Jo Hardin

Name: _____

Names of people you worked with: _____

Work in groups of 3-4. Can you name everyone in your group? Tell your group about one talk/performance/event/activity not related to your classes that you are looking forward to in the coming weeks.

Task: Consider the situation where many hundreds of researchers are asking the exact same question with the same sample size from the same population (but they each take a different sample). With their sample of data, they estimate the shape of the sampling distribution and use it to find a 95% confidence interval for the true value of $p = P(H)$.

(a) Will every researcher's interval capture the true value of p? Why or why not?

(b) If a particular researcher didn't capture the true value of p is that evidence that their data (or data collection method) was wrong? Explain.

Solution:

(a) No, some researchers will create intervals that will not capture p. That's because the original dataset is farther from p than given by the shape of the sampling distribution.

(b) No, a single researcher failing to capture p is not an indication of an error in the data. In fact, we expect 5% of good samples to fail to capture p in 95% confidence intervals.

If the researcher happened to get a sample with an extremely high proportion of successes, or an extremely low proportion of successes, the statistic (sample proportion on the observed data) will be far from the parameter (true population proportion). How far? Farther than we measure when approximating the shape of the sampling distribution.