Homework #3

Due: February 13, 2016

Siddhartha Gautama Buddha (563 BC to 483 BC):

What we think, we become.

- 1. Do exercise 8.64, parts a and b. Also, do:
 - (c) Interpret the CI in terms of the problem.
 - (d) Do the data suggest that in the population of all Americans, that either the 18-34 group or the 60+ group identifies with "very patriotic" more so than the other? Explain.
 - (e) In order for your inferences to be valid, what assumptions must be true?
- 2. Do exercise 8.72.
- 3. For the following, find a sample size to estimate μ with 95% confidence.
 - (a) Do exercise 8.74. Be sure to address the question: "Would it be valid to collect all of your samples from a single rainfall?"
 - (b) Do exercise 8.74 again, but now don't assume that $\sigma = .5$. Instead, use the "range rule" outlined in class to estimate σ . Do a little research to get some rough guidelines for what the range is. Be sure to report what range you are using in your write-up, and cite your source.
 - (c) Do exercise 8.74 again, but now assume that you have no clue what σ is, and no clue what the range is either. By setting your margin of error to some multiple of the true standard deviation $m = c\sigma$, show that the sample size calculation is

$$n = \left(z_{1-\alpha/2}/c\right)^2.$$

Now do three sample size calculations, one where $m = .5\sigma$, one for $m = 1\sigma$, and one for $m = 2\sigma$.

- 4. (a) Do exercise 8.88. Use R and turn in your R code.
 - (b) Interpret your confidence interval in terms of the problem.
 - (c) What assumptions did you make in your analysis?
 - (d) Do the data provide evidence at 90% confidence that the LC50 measurement is larger than 6 parts per million? Explain.
- 5. Do exercise 8.90, part (a). Also do:
 - (b) Interpret the CI in terms of the problem.
 - (c) Do the data suggest that in the population of all students, that either the engineering majors or the literature majors perform better on the verbal SAT on the average than the other? Explain.
 - (d) In order for your inferences to be valid, what assumptions must be true?

- 6. Do exercise 8.100. Use R and turn in your R code. In addition to the CI calculation and the two questions asked by your book, also interpret the CI in terms of the problem.
- 7. Do exercise 8.125.
- 8. Refer to the alligator data from Exercise 8.91, also available at the course web site. Use the results from #7 to build a 90% CI for $\frac{\sigma_{summer}^2}{\sigma_{spring}^2}$. Does this interval refute the assumption (that we made in class) that $\sigma_{summer} = \sigma_{spring}$? Explain.
- 9. Do exercise 8.133. In addition to parts (a) and (b), also do (c): Which estimator would you use for σ^2 : S_1^2 , S_2^2 , or S_p^2 ? Justify your answer by comparing the bias and variance of each of the three estimators.

Other practice problems:

Chapter 8: 59-65 odd (if you are using the sample standard deviation, use a t critical value when you construct the CI, even though your text says to use a z), 67a, 71, 83, 85, 91, 95, 101