Homework #4

Due: Friday, March 3, 2017

Wislawa Szymborska (1923 - 2012), Nobel winning poet, translated from Polish by Stanislaw Baranczak and Clare Cavanagh (copyright by The Nobel Foundation 1996):

> I've mentioned inspiration. Contemporary poets answer evasively when asked what it is, and if it actually exists. It's not that they've never known the blessing of this inner impulse. It's just not easy to explain something to someone else that you don't understand yourself ... inspiration is not the exclusive privilege of poets or artists generally. There is, has been, and will always be a certain group of people whom inspiration visits. It's made up of all those who've consciously chosen their calling and do their job with love and imagination. It may include doctors, teachers, gardeners - and I could list a hundred more professions. Their work becomes one continuous adventure as long as they manage to keep discovering new challenges in it. Difficulties and setbacks never quell their curiosity. A swarm of new questions emerges from every problem they solve. Whatever inspiration is, it's born from a continuous "I don't know."

1. Let $Y_1, ..., Y_n$ be a SRS from $N(\mu, \sigma^2)$. Consider the sample variance of the 1st two sample points only, $\hat{\sigma}^2 = \frac{1}{2}(Y_1 - Y_2)^2$.

   (a) Show that $\hat{\sigma}^2$ is an unbiased estimator of σ^2.

   (b) Is $\hat{\sigma}^2$ a consistent estimator of σ^2? Explain.

2. Do exercise 9.20. Use Theorem 9.1.

3. Do exercise 9.24. You've proven part a in a previous homework problem, so just cite that result. To do part b, use Theorem 9.1.

4. Do exercise 9.32. Your book states the Weak Law of Large Numbers (WLLN) as Example 9.2. This problem is asking you to see whether the assumptions of WLLN are satisfied.

5. Do exercise 9.36. Recall that Theorem 9.3 is a more specific form of Slutsky's Theorem.

6. Do exercise 9.38, parts a and b only (because we will do part c in class). Use Theorem 9.4.

7. Do exercise 9.42. Use Theorem 9.4.

8. Do exercise 9.56. Here, you are assuming that μ is known, and so you get a different answer than we got in Example 9.8.

9. Refer to Exercise 9.42. Show that $\bar{Y}$ is the MVUE for $1/p$.

Other practice problems:

Chapter 9: 17, 19, 25, 31, 35, 37, 39, 43.