STAT 3115C – Homework 7

Due April 16

Instructions:

Please include the following information on the first page of your completed homework.

- Name
- STAT 3115C
- Homework 7

Please remember to show your work and explain answers as necessary. Answers that are not supported by good reasoning will not receive full credit. Homework should be stapled if it is longer than one page.

Section 5.4: 50, 54

Ice Cream Manufacturing. Ice cream cartons from a certain manufacturer have a *true* average weight of 12 ounces, with a population standard deviation of 1 ounce. You take a random sample of 100 cartons.

a. Find the expected value and standard deviation of the average weight $\overline{X}$ in the sample of 100 cartons.

b. Find the (approximate) probability that the average weight among these 100 cartons is between 11.8 and 12.15 ounces.

c. What theorem are you using the calculate the above probability? What assumption is necessary in order for this theorem to hold?

Section 7.1: 2

Helium Porosity. Assume that the helium porosity (in percentage) of coal samples taken from a particular seam is normally distributed with a population standard deviation of 0.69. We are interested in constructing a confidence interval for the true average helium porosity μ in the seam.

a. Find a 95% confidence interval for μ when a random sample of 25 coal samples are taken yielding a sample mean of 4.56.

b. Find a 95% confidence interval for μ when a random sample of 100 coal samples are taken yielding a sample mean of 4.56.

c. Compare the widths of (a) and (b), stating how the samples size affects the width.

d. Find a 98% confidence interval for μ when a random sample of 100 coal samples are taken yielding a sample mean of 4.56.

e. Compare the widths of (b) and (d), stating how the confidence level affects the width.

f. How large of a sample size is needed to ensure a width of 0.4 or a 95% confidence interval?

Section 7.2: 24

Night School Students. A sample of 60 night school students is obtained in order to estimate the mean age of all night school students at a university. The sample mean is 25.3 years and the sample standard deviation is 4. Find a 99% confidence interval for μ.