**HW #9 (2 pages)**

read in textbook: pages 272-273, 276 -279 middle (we will use eq. 7.11, not 7.10), 280-281, 285-289 middle, 300-304 middle, 310-313 middle, 314 middle-316 middle

1. A random sample of 200 items yields 35 that are non-conforming. Find the 90% confidence interval for the true population proportion non-conforming.

2. In a random sample of 500 families owning TV sets in a certain community, it was found that 340 families subscribed to HBO. Find the 95% confidence interval for the actual proportion of TV-owning families who subscribe to HBO.

3. How large a sample of nail lengths do we need to take in order to be 95% sure that our estimate of the population mean nail length is within .05 millimeters of the true population average length? Assume a standard deviation of nail lengths of 0.3 millimeters.

4. We wish to estimate the population proportion of mice with a certain skin characteristic.

a) How large a sample must we take to be 95% confident that our estimate of this proportion is within 0.02 of the true population proportion if we know that the true proportion is around .68?

b) How large a sample must we take to be 95% confident that our estimate of this proportion is within 0.02 of the true population proportion if we have no idea what the true proportion is?

5. A sample of 20 items resulted in a mean measurement of 1584 with a standard deviation of 607. Assuming that these measurements are approximately normally distributed, calculate a 99% confidence interval for the true population mean of this measurement.

6. The following weight measurements were taken from a random sample of 20 items, and the weights are assumed to be approximately normally distributed. Calculate the 95% confidence interval for the mean weight of the population.

.95 .85 .92 .95 .93 .86 1.00 .92 .85 .81 .78 .93 .93 1.05 .93 1.06 1.06 .96 .81 .96

7. Define, for Statistical Hypothesis Testing:

a) null hypothesis

b) alternate hypothesis

c) test statistic

d) critical or rejection region

e) Type I error

f) Type II error

g) Significance level of the test

8. Consider a test where the null hypothesis is that the average weight of male students at a certain college is 68kg vs. the alternative hypothesis it is unequal to 68kg, that is:

: µ = 68

vs. : µ ≠ 68

Assume also that the standard deviation of the population of weights is equal to 3.6 .

a) If we arbitrarily choose the critical region (for rejecting ) to be values of the sample statistic

< 67 and > 69, with a sample size of n=36, what is the probability of a Type I error

( α, the level of significance of the test)?

b) re-do part a) if the sample size were increased to 64.

9. The history of melting point data for a certain product indicates that the long-term average melting point has been 95 degrees. It is desired to test to see if the average is still 95 degrees or whether it has changed.

a) Set up the statistical test at a 0.01 significance level and draw the conclusion using the sample data that follows: the average of a sample of 16 randomly chosen melting points is 94.32 degrees. Assume that the distribution of melting points is normal with σ = 1.20 .

b) What is the critical region for this test, both in terms of the sample average and the z-score?

10. To test whether the true average percentage of a chemical in a compound is 5.5 for a particular product, 16 independent random samples were taken and the sample average was 5.25.

a) Assuming σ = 0.3, test the hypothesis (at the 99% level) that the mean percentage is 5.5 . (Hint: this wording implies a 2-sided test.)

b) Show both critical regions: for the z-values and for the values.

11. It is desired to perform a one-sided test (at α= .01) on paint-drying time for a sample size of 25, where

: µ = 75

vs. : µ < 75

Assume that the distribution of paint drying times is normal with σ = 9.0 .

a) What is the critical region for this test, both in terms of the sample average and the z-score?

b) What is the conclusion of the test if the sample mean is 72.3?

12. A random sample of 100 recorded deaths in the United States during the past year showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use a 0.05 level of significance.