Chapter 8 And Chapter 9 Problems

**8.3.2)** Determine the values of the following χ2 percentiles:

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**8.3.5)** An article in the Austraian Journal of Agricultureal Research determined that the essential amino acid (Lysines) composition level of soybean meals is as shown here (g/kg):

20.2 24.9 22.5 26.5 27.0 24.5 26.0 23.5 25.4 24.0

(a) Constrict a 98% two-sided confidence interval for σ2.

(b) Construct a 99% lower confidence bound on for σ2.

(c) Calculate a 95% lower confidence bound for σ.

(d) Compare the intervals that you computed in parts (a) and (b).

**8.4.3)** A random sample of 60 suspension helmets used by motorcycle riders and automobile race-car drivers was subjected to an impact test, and some damage was observed on 22 of these helmets.

1. Find a 99% two-sided confidence interval on the true proportion of helmets that would show damage from this test.
2. Using the point estimate of p from 60 helmets, how many helmets must be tested to be 99% confident that the error in estimating p is less than 0.015?
3. How large must the sample be if we wish to be at least 99% confident that the error in estimating p is less than 0.02 regardless of the true value of p?

**8.6.3)** Consider the suspension rod diameter measurements described in Exercise 8.2.9 (use the modified data of 8.2.9 as given in Chapter 8 homework problems), Compute a 99% prediction interval on the diameter of the next rod tested. Compare the length of the prediction interval with the length of the 99% CI on the population mean.

**8.6.8)** Consider the suspension rod diameter data in Exercise 8.2.9 (use the modified data of 8.2.9 as given in Chapter 8 homework problems). Compute a 99% tolerance interval on the diameter of the rods described that has 95% confidence. Compare the length of the tolerance interval with the length of the 99% CI on the population mean. Which interval is shorter? Discuss the difference in the interpretation of these two intervals.

**9.1.2**) The mean pull-off force of a connector depends on cure time

1. State the null and alternative hypotheses used to demonstrate that the mean pull-off force is more than 20 newtons.
2. Assume that the previous test does not reject the null hypothesis. Does this result provide strong evidence that the mean pull-off force is less than or equal to 20 newtons?
3. Assume that the previous rejects the null hypothesis. Does this result provide strong evidence that the mean pull-off force is more than 20 newtons?

**9.1.3)** The heat evolved in calories per gram of a cement mixture is approximately normally distributed. The mean is thought to be 100, and the standard deviation is 4. You wish to test H0: μ= 100 versus

H1: μ< 100. Use sample size n = 10.

1. If the acceptance region is defined as , find the type I probability error α.
2. Find β error for the case in which the true mean heat evolved is 103.
3. Find β error for the case in which the true mean heat evolved is 105. This value of β error

Is smaller than the one found in part (b). why?

**9.1.4)** Rework modified Exercise 9.1.3 when the sample is 16 and the boundaries of the acceptance region do not change. What impact does the sample size have on the results of parts (a) and (b)?

**9.1.8)** Foam height is normally distributed and has a standard deviation of 18 millimeters. The company wishes to test H0: μ= 175 millimeters versus versus H1: μ ≠ 175 millimeters, using the results of n = 10 samples. Calculate the probability of a type II error if the true foam height is 185 millimeters and

1. α = 0.01 and n = 10
2. α = 0.01 and n = 16
3. Compare the values of calculated in parts (a) and (b). What conclusion can you draw.

**9.1.10)** A manufacturer is interested in the output voltage of a power supply used in a PC. Output voltage is assumed to be normally distributed with a standard deviation of 0.2 volt, and the manufacturer wishes to test H0: μ= 5 volts against H1: μ ≠ 5 volts, using n = 10 units.

1. The acceptance region is 4.80 ≤ ≤ 5.20. Find the value of α.
2. Find the power of the test for detecting a true mean output voltage of 5.1 volts.

**9.2.1)** State the null and alternative hypothesis in each case.

1. A hypothesis test will be used to potentially provide evidence that the population mean is not equal to 10.
2. A hypothesis test will be used to potentially provide evidence that the population mean is less than 7.
3. A hypothesis test will be used to potentially provide evidence that the population mean is more than 5.

**9.2.2)** A hypothesis will be used to test that a population mean equals 15 against the alternative that the population mean is less than 15 with known variance σ2. What is the critical value for the test statistic Z0 for the following significance levels?

1. 0.10 (b) 0.02 (c) 0.05 (d) 0.01.