Doç.Dr.Çiğdem Arıcıgil Çilan 2011-2012 Spring Semester Statistical Analysis – 2nd Week Tutorial

29 Feb 2012 Wednesday

Confidence Interval Estimation for the Mean and Proportion

1. Suppose that shopping times for customers at a local grocery store are normally distributed. A random sample of 16 shoppers in the local grocery store had a mean time of 25 minutes. Assume σ=6 minutes. Find the standard error, margin of error, and width for a 95% confidence interval for the population mean, μ. (Source: Statistics for Business and Economics, 2007, 6th edition, Prentice Hall, by Paul Newbold, William L. Carlson, Betty Thorne. pp.286)
2. A process produces bags of refined sugar. The weights of the contents of these bags are normally distributed with standard deviation 1.2 ounces. The contents of a random sample of 25 bags had a mean weight of 19.8 ounces. Find the upper and lower confidence limits of a 99% confidence interval for the true mean weight for all bags of sugar produced by the process. (Source: Statistics for Business and Economics, 2007, 6th edition, Prentice Hall, by Paul Newbold, William L. Carlson, Betty Thorne. pp.287)
3. A business school placement director wants to estimated the mean annual salaries five years after students graduate. A random sample of 45 such graduates found a sample mean of $42,740 and a sample standard deviation of $4,780. Find a 90% confidence interval for the population mean, assuming that the population distribution is normal.
4. Gasoline prices rose drastically during the early years of this century. Suppose that a recent study was conducted using truck drivers with equivalent years of experience to test run 24 trucks of a particular model over the same highway. Estimate the population mean fuel consumption for this truck model with 90% confidence if the fuel consumption, in miles per gallon, for these 24 trucks was:

15.5	19.2	19.8	19.7	17.5	20.3	18.6	18.5	18.2	19.8	20.2	20.5
16.5	19.1	19.3	18.0	18.2	14.5	21.0	18.7	18.0	16.9	18.5	21.8

   Here, $\sum x = 448.3$ and $\sum (x - \bar{x})^2 = 66.1$

   (Source: Statistics for Business and Economics, 2007, 6th edition, Prentice Hall, by Paul Newbold, William L. Carlson, Betty Thorne. pp.292)
5. Times (in minutes) that a random sample of 5 people spend driving to work are 30, 42, 35, 40 and 45. (Source: Statistics for Business and Economics, 2007, 6th edition, Prentice Hall, by Paul Newbold, William L. Carlson, Betty Thorne. pp.294)
   a. Calculate the standard error.
   b. Find $t_{v,\alpha/2}$ for a 95% interval for the true population mean
   c. Calculate width for a 95% confidence interval for the population mean time spent driving to work
6. A clinic offers a weight-reduction program. A review of its records found the following weight losses, in pounds, for a random sample of 10 clients at the conclusion of the program: 18, 25, 6, 11, 15, 20, 16, 19, 12 and 17. (Source: Statistics for Business and Economics, 2007, 6th edition, Prentice Hall, by Paul Newbold, William L. Carlson, Betty Thorne. pp.294)
   a. Calculate the sample variance of weight losses.
   b. Find a 99% confidence interval for the population mean.
7. Find the reliability factor, $t_{v,\alpha/2}$, to estimate population mean, μ, for the following:
   a. n=20, 90% confidence level
   b. n=7, 98% confidence level
   c. n=16, 95% confidence level
   d. n=23; 99% confidence level

   (Source: Statistics for Business and Economics, 2007, 6th edition, Prentice Hall, by Paul Newbold, William L. Carlson, Betty Thorne. pp.294)
8. Find the margin of error for each of the following:
   a. n=20, 90% confidence level; s=36
   b. n=7, 98% confidence level; s=16
   c. n=16, 95% confidence level; s^2=43

   (Source: Statistics for Business and Economics, 2007, 6th edition, Prentice Hall, by Paul Newbold, William L. Carlson, Betty Thorne. pp.294)
9. Management wants an estimate of the proportion of the corporation's employees who favor a modified bonus plan. From a random sample of 344 employees it was found that 261 were in favor of this particular plan. Find a 90% confidence interval estimate of the true population proportion that favors this modified bonus plan. (pp.296)
10. In a random sample of 95 manufacturing firms 67 indicated that their company attained ISO certification within the last two years. Find a 99% confidence interval for the population proportion of companies that have been certified within the last 2 years. (pp.298)
11. From a random sample of 400 registered voters in one city, 320 indicated that they would vote in favors of a proposed policy in an upcoming election. (pp.298)
    a. Calculate the LCL (Lower confidence limit) for a 98% confidence interval estimates for the population proportion of this policy.
    b. Calculate the width of a 90% confidence interval estimates for the population proportion in favor of this policy