

## Proportion and Confidence Interval Problems

[Answers](#)

1. Government data show that 10% of males under age 25 are unemployed. A random sample is taken of 400 males who are in the labor force and under age 25. Find the probability that the sample unemployment rate is .12 or more.
2. Suppose that in a congressional election, 55% of the electorate votes for candidate A. An exit poll of 200 voters is taken on election night. What is the probability candidate A will receive less than half the sampled vote? That is, what is the probability that you will project the wrong candidate as the winner? Increase the sample size to 400 voters and calculate the chance the poll gets it wrong.
3. Suppose a local Best Buy store surveys the merchandise remaining in stock at the end of the month. A sample of 50 items was randomly selected. The mean value of the sampled items was found to equal \$542.50 with a sample standard deviation of \$120.56.
  - a. Describe the population mean. What is the sample mean estimating?
  - b. Construct a 95% confidence interval for the population mean. Interpret.
  - c. Construct a 90% confidence interval for the population mean. Interpret.
4. According to a survey performed by a real estate institute at USC, the sample mean rent in 2003 was \$1,300 for Los Angeles County and \$1,260 in Orange County. Assume the survey sampled 250 rents in each county. Also assume the standard deviation in rents was \$350 in Los Angeles County and \$450 in Orange County.
  - a. Calculate a 95% confidence interval for the population mean rent for Los Angeles. Interpret.
  - b. Calculate a 95% confidence interval for the population mean rent for Orange County. Interpret.
  - c. Is there a good chance that the population mean rent in Orange County is higher than that in Los Angeles County? Explain.
5. An assembly process includes a torque wrench device that automatically tightens compressor housing bolts. The device has a known process standard deviation of  $\sigma=3$  lb-ft in the torque applied. A random sample of 35 nuts is selected; the mean torque to which they have tightened is 150 lb-ft.
  - a. Calculate a 95% confidence interval for the population mean torque being applied during the assembly process.
  - b. What is the 90% confidence interval for the population mean?

6. An airline whose policy has been to allow two carry-on bags per passenger is considering changing the policy to one bag. The change is intended to speed the loading and unloading of passengers. Before deciding on the change, the airline collects data on the behavior of its customers. A 1000 passengers were observed; it was found that 350 of them carried more than one bag on a flight.
  - a. Construct a 95% confidence interval for the population proportion of passengers carrying on more than one bag.
  - b. Construct a 90% confidence interval.
  - c. How would confidence intervals inform the airline's decision?
  
7. [These values](#) follow a normal distribution. Select a sample of five values and calculate the sample mean and sample standard deviation. Use the sample statistics to generate a 90% confidence interval.
  - a. The actual population mean,  $\mu$ , is 70. Does the value of 70 fall within the interval you calculated?
  - b. If the actual  $\mu$  value does not fall within an individual interval, does that mean you incorrectly calculated your confidence interval?
  - c. What confidence did you have that  $\mu$  would fall within the interval?
  - d. Why doesn't your sample mean exactly equal  $\mu$ ?
  - e. Why doesn't your sample variance exactly equal the population variance? The actual population variance is 10.
  - f. What would happen to the range of the interval if you used a sample of 25 instead of 5?