Proportion and Confidence Interval Problems

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. In a congressional election, 55% of the electorate prefers candidate A. If you take a random sample of 200 voters, what is the probability that candidate A will get less than half the vote? That is, what is the probability that you will project the wrong candidate as the winner?

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. The numbers on the opposite page 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 15.
   f. What would happen to the range of the interval if you used a sample of 25 instead of 5?