7.9 Problem Set 1

1. Question 54, Page 341 Lori Jeffrey is a successful sales representative for a major publisher of college textbooks. Historically, Lori obtains a book adoption on 25% of her sales calls. Viewing her sales calls for one month as a sample of all possible sales calls, assume that a statistical analysis of the data yields a standard error of the proportion of .0625.

   (a) How large was the sample used in this analysis? That is, how many sales calls did Lori make during the month?

   (b) Let $\bar{p}$ indicate the sample proportion of book adoptions obtained during the month. Show the sampling distribution of $\bar{p}$.

   (c) Using the sampling distribution of $\bar{p}$, compute the probability that Lori will obtain book adoptions on 30% or more of her sales calls during a one-month period.

2. Question 46, Page 340 After deducting grants based on need, the average cost to attend the University of Southern California (USC) is $27,175 (u.S. news & World report, america's Best Colleges,2009 ed.). Assume the population standard deviation is $7400. Suppose that a random sample of 60 USC students will be taken from this population.

   (a) What is the value of the standard error of the mean?

   (b) What is the probability that the sample mean will be more than $27,175?

   (c) What is the probability that the sample mean will be within $1000 of the population mean?

   (d) How would the probability in part (c) change if the sample size were increased to 100?

3. Question 41, Page 332: The Food Marketing Institute shows that 17% of households spend more than \$100 per week on groceries. Assume the population proportion is $p = 0.17$ and a sample of 800 households will be selected from the population.

   a. Show the sampling distribution of p, the sample proportion of households spending more than \$100 per week on groceries.

   b. What is the probability that the sample proportion will be within ± 0.02 of the population proportion?

   c. Answer part (b) for a sample of 1600 households.

4. Question 28, Page 326The state of California has a mean annual rainfall of 22 inches, whereas the state of New York has a mean annual rainfall of 42 inches (Current Results website, October 27, 2012). Assume that the standard deviation for both states is 4 inches. A sample of 30 years of rainfall for California and a sample of 45 years of rainfall for New York has been taken.

   (a) Show the probability distribution of the sample mean annual rainfall for California.

   (b) What is the probability that the sample mean is within 1 inch of the population mean for California?

   (c) What is the probability that the sample mean is within 1 inch of the population mean for New York?

   (d) In which case, part (b) or part (c), is the probability of obtaining a sample mean within 1 inch of the population mean greater? Why?

5. Question 26, Page 325 For the year 2010, 33% of taxpayers with adjusted gross incomes between \$30,000 and \$60,000 itemized deductions on their federal income tax return (the Wall Street Journal, October 25, 2012). The mean amount of deductions for this population of taxpayers was \$16,642. Assume the standard deviation is $\sigma = \$2400$.

   (a) What is the probability that a sample of taxpayers from this income group who have itemized deductions will show a sample mean within \$200 of the population mean for each of the following sample sizes: 30, 50, 100, and 400?

   (b) What is the advantage of a larger sample size when attempting to estimate the population mean?

6. Question 16, Page 313A sample of 426 U.S. adults age 50 and older were asked how important a variety of issues were in choosing whom to vote for in the 2012 presidential election (AARP Bulletin, March 2012).

   (a) What is the sampled population for this study?

   (b) Social Security and Medicare was cited as "very important" by 350 respondents. Estimate the proportion of the population of U.S. adults age 50 and over who believe this issue is very important.

   (c) Education was cited as "very important" by 74% of the respondents. Estimate the number of respondents who believe this issue is very important.

   (d) Job Growth was cited as "very important" by 354 respondents. Estimate the proportion of U.S. adults age 50 and over who believe job growth is very important.

   (e) What is the target population for the inferences being made in parts (b) and (d)? Is it the same as the sampled population you identified in part (a)? Suppose you later learn that the sample was restricted to members of the American Association of Retired People (AARP). Would you still feel the inferences being made in parts (b) and (d) are valid? Why or why not?