9.2: Sample Proportion Practice

Directions: Use what you know about the sampling distribution of a sample proportion to answer the following questions. Be sure to write up all four steps neatly!
1) Assumptions 2) Sampling Distribution (show sketch) 3) Probability calculation 4) Interpretation of results.

1. The development of viral hepatitis subsequent to a blood transfusion can cause serious complications for a patient. The article, "Hepatitis in Patients with Acute Nonlymphatic Leukemia" (Amer. J. of Med. (1983): 413-421) reported that in spite of careful screening for those having a hepatitis antigen, viral hepatitis occurs in 7% of blood recipients. Suppose a new treatment is believed to reduce the incidence of viral hepatitis. The treatment is given to 200 blood recipients and only 6 contract hepatitis. Does it appear that the treatment is effective? That is, is it very likely that we would observe only 6/200 contract hepatitis when 7% of the population is known to do so?

2. The article "Should Pregnant Women Move? Linking Risks for Birth Defects with Proximity to Toxic Waste Sites" (Chance (1992): 40-45) reported that in a large study carried out in the state of New York, approximately 30% of the population lived within 1 mile of a hazardous waste site. If an SRS of 400 pregnant women is selected, how likely is it that the sample proportion will be within 5% of the true population proportion? Would this probability be larger or smaller if we selected an SRS of size 500? (You don't need to do a calculation to figure this out...use common sense!)

3. The article "Thrillers" (Newsweek, Apr. 22, 1985) states, "Surveys tell us that more than half of America's college graduates are avid readers of mystery novels." Assume the true proportion is exactly 0.5. What is the probability that an SRS of 225 college graduates would give a sample proportion greater than 0.6?

4. Suppose that a particular candidate for public office is in fact favored by 48% of all registered voters in a sizable metropolitan district. A polling organization takes an SRS of 500 voters and will use the sample proportion to estimate the population parameter. What is the probability that the sample proportion will be greater than 0.5, causing the polling organization to incorrectly predict the results of the upcoming election?

5. The Gallup Poll once asked an SRS of 1540 adults, "Do you happen to jog?" Suppose 15% of all adults jog. Find the probability the poll gave a result within 2% of the actual population proportion.

6. Suppose 47% of all adult women think they do not get enough time to themselves. An opinion poll interviews 1025 randomly selected women and records the sample proportion who feel they don't get enough time for themselves. If this sample were repeated numerous times, in what range would the middle 95% of the sample results fall? What is the probability the poll gets a sample in which fewer than 45% say they do not get enough time for themselves?

7. Voter registration records show 68% of all voters in Indianapolis are registered as Republicans. A random digit dialing device is used to call 150 randomly chosen residential homes in Indianapolis. Of the 150 registered voters who are contacted, 73% are registered Republicans. Should you suspect the random digit dialing device of favoring phone numbers of Republicans?

9.3: Sample Mean Practice

Directions: Use what you know about the sampling distribution of a sample means (ie, the Central Limit Theorem) to answer the following questions. Be sure to write up all four steps neatly!
1) Assumptions 2) Sampling Distribution (show sketch) 3) Probability calculation 4) Interpretation of results.

1. According to the article, "Song Dialects and Colonization in the House Finch" (Condor (1975): 407-422) reported the mean value of song duration for the population of house finches is 1.5 min with a standard deviation of .9 min. Suppose an SRS of 25 finches is selected. How likely is it that the average song duration of the sample will be greater than 1.7 min?

2. A soft drink bottler claims that, on average, cans contain 12 oz. of soda. Suppose the true distribution of soda volumes is normally distributed with a mean of 12 oz. and a standard deviation of .16 oz. Sixteen cans are randomly selected and their volumes are measured. What is the probability the average volume will be between 11.96 and 12.08 oz.?

3. A hot dog manufacturer claims its most popular brand of weenie has an average fat content of 18 g per hot dog. Suppose the standard deviation of the fat content of all hot dogs is 1 g. An independent testing organization selects an SRS of 36 hot dogs and finds the average fat content is 18.4 g. Does this result indicate the manufacturer's claim is incorrect?

4. The time a randomly selected individual waits for an elevator in an office building has a uniform distribution with a mean of 0.5 min and standard deviation of 0.289 min. What are the mean and standard deviation of the sampling distribution of means for SRS of size 50? Does it matter that the underlying population distribution is not normal? What is the probability a sample of 50 people will wait longer than 45 seconds for an elevator?

5. A manufacturing process is designed to produce bolts with a 0.5 in diameter. Once each day, a random sample of 36 bolts is selected and the average diameter is calculated. If the sample mean is less than 0.49 in or greater than 0.51 in, the process is shut down for adjustment. The standard deviation for the production process is .02 in. What is the probability the process will be shut down on any given day?

6. Suppose the mean value of interpupillary distance for all adult males is 65 mm and the population 5 mm. If 25 adult males are selected, what is the probability the average distance for all 25 will be between 64 and 67 mm?

7. Using the information from problem 6, answer the following questions:
   a) Approximately 95% of the time, the sample mean falls between_____ and _____

   b) Approximately .3% of the time, the sample mean is farther than _____ from the true mean.