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## Chapter 9 Test Review

$\qquad$ 1. Which of the following best describes a ñsampling distributionò?
a. the distribution of all possible parameters
b. the distribution of all possible statistics
c. the distribution of all possible values of a parameter
d. the distribution of all possible values of a statistic
e. the arrangement of the ñfree sampleò carts at Costco
2. The scores of individual students on the American College testing (ACT) program composite college entrance examination have a normal distribution with mean 18.6 and standard deviation 6.0. At Walled Lake Central, 36 seniors take the ACT test. If the scores at this school have the same distribution as the national scores, then the sampling distribution of the average (sample mean) score of $\bar{x}$ for these 36 students is
a. approximately normal, but the approximation is poor
b. approximately normal, but the approximation is good
c. exactly normal
3. As part of a promotion for a new type of cracker, free samples are offered to shoppers in a local supermarket. The probability that a shopper will buy a package of crackers after tasting the free sample is 0.2 . Different shoppers can be regarded as independent trials. Let $\hat{p}$ be the sample proportion of the next 100 shoppers that buy a package of crackers after tasting a free sample. Which of the following best describes the sampling distribution of the statistic $\hat{\mathrm{p}}$ ?
a. It is approximately normal with mean $\mu_{\hat{p}}=0.2$ and standard deviation $\sigma_{\hat{\mathrm{p}}}=0.0016$
b. It is approximately normal with mean $\mu_{\hat{p}}=0.2$ and standard deviation $\sigma_{\hat{\mathrm{p}}}=0.04$
c. it cannot be approximated by a normal distribution
4. Suppose that a pencil machine is set so the average length of a pencil it produces will be 8 inches. They will adjust the machine if they take a sample and the average length is more than 0.1 inches from the mean. If the true mean is really 8 inches, which of the following sample sizes will most likely result in a decision to adjust the machine?
a. $\quad \mathrm{n}=10$
b. $n=100$
c. $\mathrm{n}=1000$
d. $\mathrm{n}=10,000$
e. cannot be determined without the standard deviation
5. In a particular sampling distribution, $\mu_{\hat{\mathrm{p}}}=0.4$ and $\sigma_{\hat{\mathrm{p}}}=0.0673$. What is the sample size?
6. The duration of Alzheimerố disease, from the onset of the symptoms until death, ranges from 3 to 20 years, with a mean of 8 years and standard deviation of 4 years. The administrator of a large medical center randomly selects the medical records of 30 deceased Alzheimerố patients and records the duration of the disease for each one. Find the value of $L$ such that there is a probability of 0.99 that the average duration of the disease for the 30 patients lies less than $L$ years above the overall mean of 8 years.
a. $\quad 0.72$
b. $\quad 1.70$
c. 2.33
7. A university recruiter claims that 60 percent of its basketball and football players graduate in 4 years. A reporter contacts an SRS of players from the past 20 years and finds that only 46 out of 88 graduated in 4 years. Is there sufficient evidence to write an article disputing the claim? Give statistical justification for your conclusion.
8. As part of a promotion for a new type of cracker, free samples are offered to shoppers in a local supermarket. The probability that a shopper will buy a package of crackers after tasting the free sample is 0.2 . Different shoppers can be regarded as independent trials. Let $\hat{p}$ be the sample proportion of the next n shoppers that buy a package of crackers after tasting a free sample. How large should $n$ be so that the standard deviation of $\hat{p}$ is no more than 0.01 ?
a. 4
b. 16
c. $\quad 1600$
9. Suppose that $45 \%$ of the students at MSU are Asian. The Administration has decided to choose a random sample of 50 students to participate in a survey about life at MSU. However, they are worried that some people will complain if the sample of Asians is too high or too low. They believe, however, that if the proportion of Asians in the sample is within 0.10 of the true proportion, then everyone will be satisfied. What is the probability that everyone will be satisfied?
10. The sampling distribution of the mean sample $\bar{x}$ is formed from random samples of size 16 taken from a population with mean $\mu=64$ and standard deviation $\sigma=10$. What are the mean and standard deviation of the sampling distribution $\overline{\mathrm{x}}$ ?
a. $\quad$ mean $=64$, standard deviation $=0.625$
b. $\quad$ mean $=8$, standard deviation $=2.5$
c. mean $=64$, standard deviation $=2.5$
11. In a simple random sample of 1000 Americans, it was found that $61 \%$ were satisfied with the service provided by the dealer from which they bought their car. In a simple random sample of 1000 Canadians, $58 \%$ said they were satisfied with the service provided by their car dealer. Which of the following concerning the sampling variability of these statistics is true?
a. The sampling variability is about the same in both cases
b. The sampling variability is much smaller for the statistic based on the sample of 1000

Canadians since the population of Canada is smaller than that of the United States, and therefore the sample is a larger proportion of the population
c. The sampling variability is much larger for the statistic based on the sample of 1000 Canadians, since Canada has a lower population density than the United States, having subjects living farther apart always increases sampling variability
12. A news magazine claims that $30 \%$ of all New York City police officers are overweight. Indignant at this claim, the New York City police commissioner conducts a survey in which 200 randomly selected New York City police officers are weighed. 52, or $26 \%$, of the surveyed officers turn out to be overweight. Which of the following statements about this situation is true?
a. The number $26 \%$ is a statistic
b. The number $30 \%$ is a statistic
c. The number $26 \%$ is a parameter
13. As part of a promotion for a new type of cracker, free samples are offered to shoppers in a local supermarket. The probability that a shopper will buy a package of crackers after tasting the free sample is 0.2 . Different shoppers can be regarded as independent trials. Let $\hat{p}$ be the sample proportion of the next 100 shoppers that buy a package of crackers after tasting a free sample. The probability that fewer than $30 \%$ of these individuals buy a package of crackers after tasting a sample is approximately:
a. 0.3
b. 0.9938
c. 0.0062
14. The duration of Alzheimerố disease, from the onset of the symptoms until death, ranges from 3 to 20 years, with a mean of 8 years and standard deviation of 4 years. The administrator of a large medical center randomly selects the medical records of 30 deceased Alzheimerố patients and records the duration of the disease for each one. Find the probability that the average duration of the disease for the 30 patients will exceed 8.25 years.
a. 0.6331
b. 0.3660
c. 0.4761
15. Fifty-three percent of adults say they have trouble sleeping. If a doctor contacts an SRS of 85 adults, what is the probability that over 55 percent will say they have trouble sleeping?
16. In a statistics class containing 250 students, each student is instructed to toss a coin 20 times and record the value of $\hat{\mathrm{p}}$, the sample proportion of heads. The instructor then makes a histogram of the 250 values of $\hat{\mathrm{p}}$ obtained. In a second statistics class containing 200 students, each student is told to toss the coin 40 times and record the value of $\hat{p}$, the sample proportion of heads. The instructor then makes a histogram of values of $\hat{p}$ obtained. Which of the following statements regarding the two histograms of $\hat{\mathrm{p}}$-values is true?
a. The first class $\hat{\alpha}$ histogram is more biased since it derived from a smaller number of tosses per student
b. The first classố histogram has a greater spread (variability) since it is derived from a smaller sample
c. The first classố histogram has less spread since it was derived from a larger number of students
17. The average age of a student in Walled Lakeô 3 main high schools is 15.6 years with a standard deviation of 1.3 years. If you were to choose 60 students at random, what is the probability that the average age is at most 15 ?
18. Suppose the average outstanding loan for college graduates is $\$ 23,500$ with a standard deviation of $\$ 7,200$. In an SRS of 50 graduating college students, what is the probability that their mean outstanding loan is under \$21,000?
19. Suppose that a population has 5 members $\{1,2,3,4,5\}$ and you take samples of size 3 without replacement and calculate the sample mean. List the 10 possible sample sizes of 3 and determine the sampling distribution of the sample mean. Hint: one possible sample is $\{1,2,3\}$.
20. The duration of Alzheimerô disease, from the onset of the symptoms until death, ranges from 3 to 20 years, with a mean of 8 years and standard deviation of 4 years. The administrator of a large medical center randomly selects the medical records of 30 deceased Alzheimer $\hat{\alpha}$ patients and records the duration of the disease for each one. Find the probability that the average duration of the disease for the 30 patients will lie within 1 year of the overall mean of 8 years.
a. 0.8294
b. 0.1706
c. 0.4147

