

## Chapter 9 Practice Test

- Following a dramatic drop of 500 points in the Dow Jones Industrial Average in September 1998, a poll conducted for the Associated Press found that 92% of those polled said that a year from now their family financial situation will be as good as it is today or better. The number 92% is a  
(a) Statistic      (b) Sample      (c) Parameter      (d) Population      (e) None of the above.
- In a large population, 46% of the households own VCRs. A simple random sample of 100 households is to be contacted and the sample proportion computed. The mean of the sampling distribution of the sample proportion is  
(a) 46      (b) 0.46      (c) about 0.46, but not exactly 0.46      (d) 0.00248      (e) not enough info
- If a population has a standard deviation  $\sigma$ , then the standard deviation of the mean of 100 randomly selected items from this population is  
(a)  $\sigma$       (b)  $100(\sigma)$       (c)  $\sigma/10$       (d)  $\sigma/100$       (e) 0.1
- The distribution of values taken by a statistic in all possible samples of the same size from the same population is  
(a) the probability that the statistic is obtained.      (b) the population parameter.  
(c) the variance of the values.      (d) the sampling distribution of the statistic.  
(e) none of the above.
- If a statistic used to estimate a parameter is such that the mean of its sampling distribution is equal to the true value of the parameter being estimated, the statistic is said to be  
(a) random      (b) biased      (c) a proportion      (d) unbiased      (e) none of the above.
- A simple random sample of 1000 Americans found that 61% were satisfied with the service provided by the dealer from which they bought their car. A simple random sample of 1000 Canadians found that 58% were satisfied with the service provided by the dealer from which they bought their car. The sampling variability associated with these statistics is  
(a) exactly the same.  
(b) smaller for the sample of Canadians because the population of Canada is smaller than that of the United States, hence the sample is a larger proportion of the population.  
(c) smaller for the sample of Canadians because the percent satisfied was smaller than that for the Americans.  
(d) larger for the Canadians because Canadian citizens are more widely dispersed throughout the country than in the United States, hence they have more variable views.  
(e) about the same.
- The central limit theorem is important in statistics because it allows us to use the Normal distribution to make inferences concerning the population mean:  
(a) provided that the sample size is reasonably large (for any population).  
(b) provided that the population is Normally distributed and the sample size is reasonably large.  
(c) provided that the population is Normally distributed (for any sample size).  
(d) provided that the population is Normally distributed and the population variance is known (for any sample size).  
(e) provided that the population size is reasonably large (whether the population distribution is known or not).
- The chipmunk population in a certain area is known to have a mean weight of 84 gm and a standard deviation of 18 gm. A wildlife biologist weighs 9 chipmunks that have been caught in live traps before releasing them. Which of the following best describes what we know about the sampling distribution of means for the biologist's sample? [Assume the 9 chipmunks represent a simple random sample of chipmunks in the area.]
  - $\mu_{\bar{x}} = 84; \sigma_{\bar{x}} = 18$ ; distribution approximately Normal
  - $\mu_{\bar{x}} = 84; \sigma_{\bar{x}} = 6$ ; shape of distribution unknown
  - $\mu_{\bar{x}} = 84; \sigma_{\bar{x}} = 6$ ; distribution approximately Normal
  - $\mu_{\bar{x}} = 84; \sigma_{\bar{x}}$  unknown; distribution approximately Normal
  - $\mu_{\bar{x}} = 84; \sigma_{\bar{x}}$  unknown; shape of distribution unknown

9. The distribution of prices for home sales in a certain New Jersey county is skewed to the right with a mean of \$290,000 and a standard deviation of \$145,000. Suppose you take a simple random sample of 100 home sales from this (very large) population. What is the probability that the mean of our sample is above \$325,000?

- a. 0.0015      b. 0.0027      c. 0.0079      d. 0.4046      e. 0.4921

10. Given that 58% of all gold dealers believe next year will be a good one to speculate in South African gold coins, in an SRS of 150 dealers, what is the probability that between 55% and 60% believe that it will be a good year to speculate?

- a. 0.500      b. 0.1192      c. 0.3099      d. 0.4619      e. 0.9215

**Part 2: Free Response** *Communicate your thinking clearly and completely.*

11. A survey asks a random sample of 1500 adults in Ohio if they support an increase in the state sales tax from 5% to 6%, with the additional revenue going to education. Let  $\hat{p}$  denote the proportion in the sample who say they support the increase. Suppose that 40% of all adults in Ohio support the increase.

- (a) If  $\hat{p}$  is the proportion of the sample who support the increase, what is the mean of the sampling distribution of  $\hat{p}$  ?  
(b) What is the standard deviation of the sampling distribution of  $\hat{p}$  ?  
(c) Explain why you can use the formula for the standard deviation of  $\hat{p}$  in this setting.  
(d) Check that you can use the Normal approximation for the distribution of  $\hat{p}$  .  
(e) Find the probability that  $\hat{p}$  takes a value between 0.37 and 0.43.  
(f) How large a sample would be needed to guarantee that the standard deviation of  $\hat{p}$  is no more than 0.01? Explain.

12. A certain beverage company is suspected of underfilling its cans of soft drink. The company advertises that its cans are normally distributed with an average volume of 12 ounces and a standard deviation of 0.4 ounce. For the questions that follow, suppose that the company is telling the truth.

- (a) Can you calculate the probability that a single randomly selected can contains 11.9 ounces or less? If so, do it. If not, explain why you cannot.  
(b) A quality control inspector measures the contents of an SRS of 50 cans of the company's soda and calculates the sample mean  $\bar{x}$  . What are the mean and standard deviation of the sampling distribution of  $\bar{x}$  for samples of size  $n = 50$ ?  
(c) The inspector in part (b) obtains a sample mean of  $\bar{x} = 11.9$  ounces. Calculate the probability that a random sample of 50 cans produces a sample mean fill of 11.9 ounces or less.  
(d) What would you conclude about whether the company is underfilling its cans of soda? Justify your answer.

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

14. 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?

15. Define the following distributions:

- a) Population distribution –  
b) Distribution of the sample –  
c) Sampling distribution –

16. Define the following symbols:  $\bar{x}$ ,  $\hat{p}$ ,  $p$ ,  $\mu$ ,  $\sigma$ ,  $s$ ,  $\mu_{\hat{p}}$ ,  $\mu_{\bar{x}}$ ,  $\sigma_{\hat{p}}$ ,  $\sigma_{\bar{x}}$

16. Draw a sampling distribution for a statistic that has...

- a) Low bias, low variability.      c) High bias, high variability.  
b) Low bias, high variability.      d) High bias, low variability.