Prob/StatDiscrete **Name____**

Worksheet 6.4

In Exercises 1-4, a population has a mean $\mu = 100$ and a standard deviation $\sigma = 15$. Find the mean and the standard deviation of a sampling distribution of sample means with the given sample size n.

1. n = 50
2. n = 100
3. n = 250
4. n = 1000

True or False? *In Exercises 5-7, determine whether the statement is true or false. If false, rewrite it as a true statement.*

5. As the size of a sample increases, the mean of the distribution of sample means increases.
6. As the size of a sample increases, the standard deviation of the distribution of sample means increases.
7. If the size of a sample is at least 30, you can use z-scores to determine the probability that a sample means falls in a given interval of the sampling distribution.

Finding Probabilities *In Exercises 8-11, the population mean and standard deviation are given. Find the required probability and determine whether the given sample mean would be considered unusual. If convenient, use technology to find the probability.*

8. For a sample of n = 36, find the probability of a sample mean being less than 12.2 if $\mu = 12$ and $\sigma = 0.95$.
9. For a sample of n = 100, find the probability of a sample mean being greater than 12.2 if $\mu = 12$ and $\sigma = 0.95$.
10. For a sample of n = 75, find the probability of a sample mean being greater than 221 if $\mu = 220$ and $\sigma = 3.9$.
11. For a sample of n = 36, find the probability of a sample mean being less than 12,750 or greater than 12,753 if $\mu = 12{,}750$ and $\sigma = 1.7$.

Using the Central Limit Theorem *In Exercises 12-17, use the Central Limit Theorem to find the mean and standard error of the mean of the indicated sampling distribution. Then sketch a graph of the sampling distribution.*

12. **Heights of Trees** The heights of fully grown sugar maple trees are normally distributed, with a mean of 87.5 feet and a standard deviation of 6.25 feet. Random samples of size 12 are drawn from the population and the mean of each sample is determined.
13. **Fly Eggs** The number of eggs female house flies lay during their lifetime is normally distributed, with a mean of 800 eggs and a standard deviation of 100 eggs. Random samples of sixe 15 are drawn from this population and the mean of each sample is determined.
14. **Digital Cameras** The mean price of digital cameras at an electronics store is $224, with a standard deviation of $8. Random samples of size 40 are drawn from this population and the mean of each sample is determined.
15. **Employees' Ages** The mean age of employees at a large corporation is 47.2 years, with a standard deviation of 3.6 years. Random samples of size 36 are drawn from this population and the mean of each sample is determined.
16. **Red Meat Consumed** The per capita consumption of red meat by people in the United States in a recent year was normally distributed, with a mean of 110 pounds and a standard deviation of 38.5 pounds. Random samples of size 20 are drawn from this population and the mean of each sample is determined.
17. **Soft Drinks** The per capita consumption of soft drinks by people in the United States in a recent year was normally distributed, with a mean of 51.5 gallons and a standard deviation of 17.1 gallons. Random samples of size 25 are drawn from this population and the mean of each sample is determined.

Finding Probabilities *In Exercises 18-23, find the probabilities. If convenient, use technology to find the probabilities.*

18. **Plumber Salaries** The population mean annual salary for plumbers, is \$46,700. A random sample of 42 plumbers is drawn from this population. What is the probability that the mean salary of the sample is less than \$44,000? Assume σ = \$5600.
19. **Nurse Salaries** The population mean annual salaries for registered nurses is \$59,100. A random sample of 35 registered nurses is selected from this population. What is the probability that the mean annual salary of the sample is less than \$55,000? Assume σ = \$1700.
20. **Gas Prices: New England** During a certain week the mean price of gasoline in the New England region was \$2.818 per gallon.. A random sample of 32 gas stations is drawn from this population. What is the probability that the mean price for the sample was between \$2.768 and \$2.918 that week? Assume σ = \$0.045.
21. **Gas Prices: California** During a certain week the mean price of gasoline in California was \$3.305 per gallon. A random sample of 38 gas stations is drawn from this population. What is the probability that the mean price for the sample was between \$3.310 and \$3.320 that week? Assume σ = \$0.049
22. **Heights of Women** The mean height of women in the United States (ages 20-29) is 64.1 inches. A random sample of 60 women in the age group is selected. What is the probability that the mean height for the sample is greater than 66 inches? Assume σ = 2.71 inches.
23. **Heights of Men** The mean height of men in the United States (ages 20-29) is 69.6 inches. A random sample of 60 men in this age group is selected. What is the probability that the mean height for the sample is greater than 70 inches? Assume σ = 3.0 inches.
24. **Lumber Cutter** Your lumber company has bought a machine that automatically cuts lumber. The seller of the machine claims that the machine cuts lumber to a mean length of 8 feet (96 inches) with a standard deviation of 0.5 inch. Assume the lengths are normally distributed. You randomly selected 40 boards and find the mean length is 96.25 inches.
    a) Assuming the seller's claim is correct, what is the probability the mean of the sample is 96.25 inches or more?
    b) Using your answer from part (a), what do you think the seller's claim?
    c) Would it be unusual to have an individual board with a length of 96.25 inches? Why or Why not?
25. **Ice Cream Carton Weights** A manufacturer claims that the mean weight of its ice cream cartons is 10 ounces with a standard deviation of 0.5 ounce. Assume the weights are normally distributed. You test 25 cartons and find their mean weight are normally distributed.
    a) *Assuming the manufacture's claim is correct, what is the probability the mean of the sample is 10.21 ounces or more?*
    b) *Using your answer from part (a), what do you think of the manufacture's claim?*
    c) *Would it be unusual to have an individual carton with a weight of 10.21 ounces? Why or Why not?*
26. **SAT Scores** The average math SAT score is 518 with a standard deviation of 115. A particular high school claims that its students have unusually high math SAT scores. A random sample of 50 students from this school was selected, and the mean math SAT score was 530. Is the high school justified in its claim? Explain.