

1. Which of the following conditions implies that the Central Limit Theorem can be applied?

- ☐ A. The population is approximately normally distributed
- ☐ B. μ is known
- ☐ C. The sample is approximately normally distributed
- ☐ D. σ is not known
- ☐ E. μ is not known

2. Which of the following conditions implies that the Central Limit Theorem can be applied?

- ☐ A. μ is known
- ☐ B. μ is not known
- ☐ C. The sample is approximately normally distributed
- ☐ D. σ is not known
- ☐ E. The sample size is at least 30

3. $\mu_{\bar{x}}$ is

- ☐ A. the mean of the sample means
- ☐ B. the sampling distribution of the sample mean
- ☐ C. the standard error of the mean
- ☐ D. the standard deviation of the sample means

4. $\sigma_{\bar{x}}$ is

- ☐ A. the mean of the sample means
- ☐ B. the standard deviation of the sample means
- ☐ C. the sampling distribution of the sample mean
- ☐ D. the standard distribution of the mean

5. The *standard error of the mean* is

- ☐ A. $\mu_{\bar{x}}$
- ☐ B. μ
- ☐ C. $\sigma_{\bar{x}}$
- ☐ D. None of the above

6. A sample of 42 items was drawn from a population with mean 24.1 and standard deviation 3.5. Compute each of the following using the Central Limit Theorem. Round your answers to four decimal places.

$$\mu_{\bar{x}} = \boxed{}$$

$$\sigma_{\bar{x}} = \boxed{}$$

7. The weight of a 9.5-inch by 6-inch paperback book published by Leaden Publications, Inc., is 15.7 oz. The standard deviation is 2.3 oz. What is the probability that the average weight of a sample of 38 such books is less than 15.51 oz? (Round your answer to four decimal places.) $\boxed{}$
8. The human lower intestine has a mean length of 298 cm with a standard deviation of 30 cm. If a sample of 40 people is taken, what is the probability that the mean length of their lower intestines is greater than 313 cm? (Round your answer to four decimal places.) $\boxed{}$
9. The length of the human index finger is normally distributed with mean 6 cm and standard deviation 0.5 cm. If 14 people are chosen at random, then the probability that the average length of their index fingers is between 5.78 cm and 6.20 cm is $\boxed{}$. (Round your answer to four decimal places.)
10. Suppose that many simple random samples of size n are drawn from a population with mean μ and standard deviation σ . According to the Central Limit Theorem, if n is large enough, then
- ☐ A. the means of the samples will be approximately normally distributed
 - ☐ B. the standard deviation of all of the samples is $\sigma n^{-1/2}$
 - ☐ C. the distribution of the population mean is approximately normal
 - ☐ D. the standard deviations of the samples will be approximately normally distributed

11. If samples of size 33 are taken from a population with mean 113 and standard deviation 9, then $P(\bar{x} < 112.1) = \boxed{}$ (Round your answer to four decimal places.)
12. If samples of size 31 are taken from a population with mean 99 and standard deviation 7, then $P(\bar{x} > 97.9) = \boxed{}$ (Round your answer to four decimal places.)
13. 'Snails!, Inc., a manufacturer of fasteners, makes a 12d common nail with a mean diameter of 0.14 inches and a standard deviation of 0.011 inches. If a random sample of 44 of these nails is taken, what is the probability that its mean will be greater than 0.140 inches? $\boxed{}$ (Round your answer to four decimal places.)
14. If X is normally distributed, which of the following is the area question equivalent to "What is $P(14.3 < X < 22.2)$ "?
- ☐ A. What is the area under the curve to the left of 22.2?
 - ☐ B. What is the area under the curve between 14.3 and 22.2?
 - ☐ C. What is the area under the curve to the left of 14.3?
 - ☐ D. What is the area under the curve to the right of 22.2?
 - ☐ E. What is the area under the curve to the right of 14.3?
15. Suppose X is normally distributed. Which of the following is the probability question equivalent to "What is the area under the curve to the left of 24.3?"
- ☐ A. What is $P(X > 24.3)$?
 - ☐ B. What is $P(16.7 < X < 24.3)$?
 - ☐ C. What is $P(X < 24.3)$?
 - ☐ D. What is $P(X < 16.7)$?
 - ☐ E. What is $P(X > 16.7)$?
16. In 2016, the mean annual salary for registered nurses in Virginia was approximately \$61,340. A sample of 23 Virginia registered nurses was taken. What is the probability that the sample mean was more than \$63,671? Assume

that $\sigma = 8,100$.

- ☐ A. 0.9162
- ☐ B. -0.6132
- ☐ C. Can't work this; normality of $\bar{x}$ not satisfied
- ☐ D. -0.9162

17. In 2015, the mean annual income for plumbers in the U.S. was approximately \$52,660. A sample of 39 such plumbers was taken. What is the probability that the sample mean was between \$53,359 and \$54,759? Assume that $\sigma = 4,750$.

- ☐ A. 0.1762
- ☐ B. 0.1790
- ☐ C. 0.1122
- ☐ D. Can't work this; normality of $\bar{x}$ not satisfied

18. The average height of an adult American woman is 64 inches. Assume that $\sigma = 3$ inches. A sample of 40 adult American women was taken. What is the probability that the $\bar{x}$ was more than 63 inches for this sample?

- ☐ A. 0.0175
- ☐ B. 0.9825
- ☐ C. Can't work this; normality of $\bar{x}$ not satisfied
- ☐ D. 0.6306

19. The number of eggs that a female house fly lays during her lifetime is normally distributed with mean 840 and standard deviation 92. Random samples of size 100 are drawn from this population, and the mean of each sample is determined. What is the probability that the mean number of eggs laid would differ from 840 by less than 25? Round your answer to four decimal places.

20. If samples of size 39 are taken from a bimodal population, the distribution of sample means will be approximately normal. How can I be so sure of this?

- ☐ A. The Central Limit Theorem says so
 - ☐ B. The Law of Large Numbers says so
 - ☐ C. The data is normal because the problem says so
 - ☐ D. It is a basic property of probability
21. The length of time to complete a door assembly on an automobile factory assembly line is normally distributed with mean $\mu=7.3$ minutes and standard deviation $\sigma=2.1$ minutes. Samples of size 110 are taken. What is the mean value for the sampling distribution of the sample means?
22. The length of time to complete a door assembly on an automobile factory assembly line is normally distributed with mean $\mu=7.2$ minutes and standard deviation $\sigma=2.5$ minutes. Samples of size 120 are taken. To the nearest thousandth of a minute, what is the standard deviation of the sampling distribution of the sample means?
23. Find $P(47 \leq \bar{x} \leq 53)$ for a random sample of size 33 with a mean of 49 and a standard deviation of 11. (Round your answer to four decimal places.)