LEARNING CHECK

1. If the estimated standard deviation for a population is 20, and the sample size is 100, what is the estimated standard error of the mean ($s_{x\text{-bar}}$)?

   A:
   $$S_{x\text{-bar}} = \frac{20}{\sqrt{100}}$$
   $$= \frac{20}{10}$$
   $$= 2$$

2. From the previous question, what happens to the value of the estimated standard error of the mean ($s_{x\text{-bar}}$) as the sample size gets larger? That is, with a larger sample size, does $s_{x\text{-bar}}$ increase or decrease in value?

   A: As the sample size gets larger, the estimated standard error of the mean decreases. Exactly as we discussed with the *z* test, the larger the sample size, the better it reflects the population. Therefore, we have less sampling error and a smaller estimated standard error of the mean.

3. Consider the following set of scores on an organic chemistry exam: 50%, 62%, 81%, 78%, 35%, 91%, 69%, 71%, 78%, and 65%. The mean is 68%. What are the degrees of freedom in this example?

   A: With 10 scores, the degrees of freedom are 9 (i.e., 10 − 1). The mean is irrelevant in calculating the degrees of freedom.

4. Explain when researchers should use the *z* test and when they should use the one-sample *t* test. Stated differently, what is the difference between the *z* test and the one-sample *t* test?

   A: The *z* test is used to compare a sample mean with its population mean when the population standard deviation is known. The one-sample *t* test is used to compare a sample mean with its population mean when the population standard deviation is not known.