1. We want to estimate the average coffee intake of Coursera students, measured in cups of coffee. A survey of 1,000 students yields an average of 0.55 cups per day, with a standard deviation of 1 cup per day. Which of the following is **not necessarily true**?

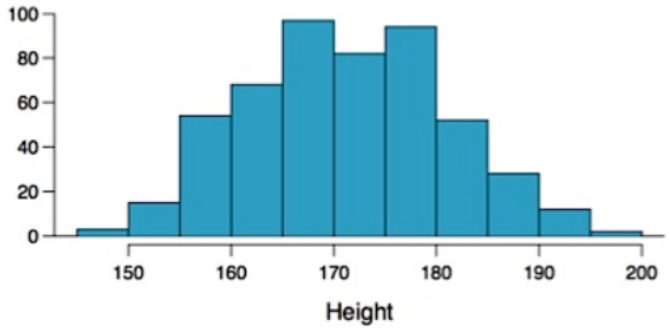
- ○ $\bar{x} = 0.55, s = 1$
- ○ The sample distribution is right skewed.
- ○ 0.55 is a point estimate for the population mean.
- ◉ $\mu = 0.55, \sigma = 1$

✓ **Correct**

This question refers to the following learning objective(s): Define sample statistic as a point estimate for a population parameter, for example, the sample mean is used to estimate the population mean, and note that point estimate and sample statistic are synonymous.

Just because the sample statistics are these values doesn't mean the population values will be exactly equal to them, therefore it's not necessarily true that $\mu = 0.55, \sigma = 1$.

2. Researchers studying anthropometry collected various body and skeletal measurements for 507 physically active individuals. The histogram below shows the sample distribution of heights in centimeters. If the 507 individuals are a simple random sample - and let's assume they are - then the sample mean is a point estimate for the mean height of all active individuals. What measure do we use to quantify the variability of such an estimate? Compute this quantity using the data from this sample and choose the **best** answer below.



Min	147.2
Q1	163.8
Median	170.3
Mean	171.1
SD	9.4
Q3	177.8
Max	198.1

- (●) standard error = 0.417
- ( ) standard error = 0.019
- ( ) standard deviation = 0.417
- ( ) standard deviation = 0.019
- ( ) mean squared error = 0.105

3. The standard error measures:

- (●) the variability of sample statistics
- ( ) the variability of the sampled observations
- ( ) the variability in the population
- ( ) the variability of population parameters

✓ **Correct**

This question refers to the following learning objective(s): Distinguish standard deviation (σ or s) and standard error (SE): standard deviation measures the variability in the data, while standard error measures the variability in point estimates from different samples of the same size and from the same population, i.e. measures the sampling variability.

4. Which of the following is false about the central limit theorem (CLT)?

- ( ) The CLT states that the sampling distribution will be centered at the true population parameter.
- (●) If we take more samples from the original population, the sampling distribution is more likely to be nearly normal.
- ( ) If the population distribution is normal, the sampling distribution of the mean will also be nearly normal, regardless of the sample size.
- ( ) As the sample size increases, the sampling distribution of the mean is more likely to be nearly normal, regardless of the shape of the original population distribution.

✓ **Correct**

Taking more samples from the original population (with each sample of the same fixed size n), does not ensure that the sampling distribution will be more likely to be nearly normal. However, if we let the **size** n of each sample increase, then the sampling distribution is more likely to be nearly normal. So the n of interest is not the number of samples but instead the sample size.

5. The General Social Survey (GSS) is a sociological survey used to collect data on demographic characteristics and attitudes of residents of the United States. In 2010, the survey collected responses from over a thousand US residents. The survey is conducted face-to-face with an in-person interview of a randomly-selected sample of adults. One of the questions on the survey is "For how many days during the past 30 days was your mental health, which includes stress, depression, and problems with emotions, not good?"

   Based on responses from 1,151 US residents, the survey reported a 95% confidence interval of 3.40 to 4.24 days in 2010. Given this information, which of the following statements would be most appropriate to make regarding the true average number of days of "not good" mental health in 2010 for US residents?

   - ○ For all US residents in 2010, there is a 95% probability that the true average number of days of "not good" mental health is between 3.40 and 4.24 days.
   - ◉ For all US residents in 2010, based on this 95% confidence interval, we would reject a null hypothesis stating that the true average number of days of "not good" mental health is 5 days.
   - ○ There is not sufficient information to calculate the margin of error of this confidence interval.
   - ○ For these 1,151 residents in 2010, we are 95% confident that the average number of days of "not good" mental health is between 3.40 and 4.24 days.

   ✓ **Correct**

   This question refers to the following learning objective(s):

   - Interpret a confidence interval as "We are XX% confident that the true population parameter is in this interval", where XX% is the desired confidence level.
   - Define margin of error as the distance required to travel in either direction away from the point estimate when constructing a confidence interval.

6. Suppose we collected a sample of size $n = 100$ from some population and used the data to calculate a 95% confidence interval for the population mean. Now suppose we are going to increase the sample size to $n = 300$. Keeping all else constant, which of the following would we expect to occur as a result of increasing the sample size?

   1. The standard error would decrease.

   2. Width of the 95% confidence interval would increase.

   3. The margin of error would decrease.

   - ○ II and III
   - ◉ I and III
   - ○ I and II
   - ○ I, II, and III
   - ○ None

7. A company offering online speed reading courses claims that students who take their courses show a 5 times (500%) increase in the number of words they can read in a minute without losing comprehension. A random sample of 100 students yielded an average increase of 415% with a standard deviation of 220%.

   Calculate a 95% confidence interval for the average increase in number of words students can read in a minute without losing comprehension. Choose the closest answer.

   - ○ (411.37, 418.63)
   - ○ (378.7, 451.3)
   - ○ (412.09, 417.91)
   - ◉ (371.88, 458.12)