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## The Confidence Interval



SPEAKER: MICHAEL J. MAHOMETA, Ph.D.

Confidence.

What does it mean in the context of statistics?

It all has to do with a sample, and its relationship to the population

it was drawn from.

We know that there is a

▶ 0:00 / 6:29

▶ 1.0x



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## Comprehension Check

1. The average resting pulse of adult women is about 74 beats per minute. The standard deviation in the population is believed to be 13 beats per minute. The distribution of resting pulse rates is known to be skewed right.

(1/1 point)

1a. You take a sample of 36 women from this population and obtain a sample mean of 77 beats per minute. What is the shape of the sampling distribution from which your mean comes?

- ☒ The sampling distribution will be nearly Normal because the sample size of 36 is sufficiently large. ✓
- ☐ The sampling distribution will be skewed right because the population is skewed right.
- ☐ The sampling distribution will not be Normal because the sample size is too small.

(1/1 point)

1b. What value should be at the center of the sampling distribution?

- ☐ 70 beats per minute
- ☒ 74 beats per minute ✓
- ☐ 77 beats per minute

(1/1 point)

1c. How much variation should we expect in sample means given a sample size of 36? In other words, what is the value of the standard error?

- ☐ 0.37
- ☒ 2.17 ✓
- ☐ 2.90
- ☐ 7.29

(1/1 point)

1d. What is the z-score of our sample mean of 77 in the sampling distribution given sample sizes of 36? (Round to 2 decimal places.)

☐ -1.19

☐ 0.23

☒ 1.38 ✓

☐ 2.54

(1/1 point)

1e. What is the probability of observing our sample mean of 77, or one that is larger, when the true population mean is 74 beats per minute?

☐ 0.0002

☒ 0.0838 ✓

☐ 0.2146

☐ 0.9127

1f. Construct a 95% confidence interval around your sample mean of 77 beats per minute using this formula:

 confidence interval

(1/1 point)

What are the bounds of the 95% confidence interval?

☐ (59.40, 92.40)☐ (69.45, 78.75)☒ (72.75, 81.25) ✓☐ (74.15, 75.85)

(1/1 point)

1g. Does the 95% confidence interval give you results that are consistent or inconsistent with your earlier z-score?

☒ Consistent. The 95% confidence interval shows that the population mean from which the sample was drawn could be 74. Similarly, the z-score of the sample mean places it clearly within the expected sample mean values for a known population mean of 74. ✓☐ Inconsistent. The 95% confidence interval includes 74 as a possible sample mean, but the z-score of our sample mean is extreme. It is unlikely that our sample mean would be seen if the true population average is 74 beats per minute, as claimed.☐ There is no relationship between the sampling distribution and the confidence interval, so we cannot answer this question.

2. Consumer reports tested 14 brands of vanilla yogurt and found the following numbers of calories per serving:

180	200	190	230	80	160	170

130

140

220

110

120

100

170

(1/1 point)

2a. What is the sample mean? (Round to 2 decimal places.)



Answer: 157.14

**157.1429**

(1/1 point)

2b. If the standard deviation reported by the yogurt industry is 48.5 calories, how much variation should we expect between sample means for samples of size 14? (Round to 2 decimal places.)



Answer: 12.96

\(\)

(1/1 point)

2c. What is the margin of error if the standard deviation is 48.5 and the samples are of size 14? (Assume 95% confidence and round to 1 decimal place.)



Answer: 25.4

\(\)

(2/2 points)

2d. What is the 95% confidence interval for the average calorie content of vanilla yogurt? (Round to 1 decimal place.)

Lower Bound



Answer: 131.7

\(\)

Upper Bound

✓ Answer: 182.5

\(\)

(1/1 point)

2e. The FDA reports that the average caloric content of vanilla yogurt is 150 calories. Does your confidence interval support or refute this claim?

☒ Support ✓☐ Does not support

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