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Sigma Unknown Part 1

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- [Instructor] Hello, and welcome back.

In the last video, we talked about confidence intervals, but we assumed that sigma was known, the standard deviation.

That, of course, is almost never the case,

so, in this lecture, we'll see how we can come up with a confidence interval



Part 2: Example

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- [Narrator] So, let's say that you wanted

to find the average length of an elephant's trunk, in this case mature African elephant trunks.

So you want to do that, then what you would do,

you would go out to the field and take some measurements

of some trunks and. let's sav



POLL

A confidence interval of mean has confidence level 95%. It means

- ☐ **The confidence interval includes distribution mean with probability 95%**
- ☐ **95% of the observations in the sample fall into this interval**
- ☐ **If we take a new sample point, it falls into this interval 95% of the time**
- ☐ **Non of the above**

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11.7 Confidence Intervals - unknown sigma

0/1 point (graded)

Student's t-distribution can be used to form confidence intervals only when the samples are normal distributed.

☒ True ✖

☐ False ✔

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You have used 1 of 1 attempt

i Answers are displayed within the problem

2

0.0/2.0 points (graded)

To find the average SAT verbal score in a class, six students are sampled and their scores are 560, 610, 500, 470, 660, and 640. Assuming that students' SAT verbal scores follow normal distribution, what is the upper limit for the confidence interval of the distribution mean with confidence level 90%?

574.192346832178

✖ Answer: 636.5

574.192346832178

Explanation

Let X_i , $1 \leq i \leq 6$ denote the samples. Here the sample mean

$\bar{X} = \sum_{i=1}^6 X_i / 6 = 3440 / 6 = 573.333$ The sample variance

$S^2 = \sum_{i=1}^6 (X_i - \bar{X})^2 / (6 - 1) = 29533.33333 / 5 = 5906.667$

Since the data is assumed to be generated from a normal distribution, the 90%

confidence interval for the mean μ is given by $[\bar{X} - \frac{t_{0.9,5}S}{\sqrt{6}}, \bar{X} + \frac{t_{0.9,5}S}{\sqrt{6}}]$ Using the fact

that $t_{0.9,5} = 2.015$, $\bar{X} + \frac{t_{0.9,5}S}{\sqrt{6}} = 573.333 + 2.015 \frac{\sqrt{5906.667}}{\sqrt{6}} = 636.542$ (A tolerance of ± 0.5 about 636.5 is an acceptable answer).

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