Time Frame: 50 minutes

Subject Matter: Confidence Intervals TELL ME

Objective: TSWBAT find the confidence interval for the mean when the standard deviation is known or n is greater ten or equal to 30.

Standards: DA – 4.9

 Materials: PowerPoint Presentation, Calculator, and Worksheets

SHOW ME

Presentation of Information.

The teacher will discuss the following.

**Would You Change the Channel?**

A survey by the Roper Organization found that 45% of the people who were offended by a television program would change the channel, while 15% would turn off their TV sets. The survey further stated that the margin of error is 3 percentage points and 4000 adults were interviewed.

Several questions arise;

1. How do these estimates compare with the true population percentages?
2. What is meant by a margin of error of 3 percentages points?
3. Is the sample of 4000 people large enough to represent the population of all adults who watch TV in the USA?

**One aspect of inferential statistics is *estimation*, which is the process of estimating the value of a parameter from information obtained from a sample.**

The formula for the Confidence of Interval of the Mean for a Specific $α$

$$\overbar{x}- z\_{{α}/{2}}\left(\frac{σ}{\sqrt{n}}\right) <μ <\overbar{x}+ z\_{{α}/{2}}\left(\frac{σ}{\sqrt{n}}\right)$$

For a 90% confidence interval,$ z\_{{α}/{2}}$ = 1.65; for a 95% confidence interval, $z\_{{α}/{2}}$= 1.96; and for a 99% confidence interval, $z\_{{α}/{2}}$ = 2.58.

The term $z\_{{α}/{2}}\left(\frac{σ}{\sqrt{n}}\right)$ is called the ***maximum error of estimate.***

Example:

The president of a large university wishes to estimate the average age of the students presently enrolled. From past studies, the standard deviation is known to be 2 years. A sample of 50 students is selected, and the mean is found to be 23.2 years. Find the 95% confidence of interval of the population mean.

Solution:

Since the 95% confidence interval is desired, $z\_{{α}/{2}}$ = 1.96.

$$\overbar{x}- z\_{{α}/{2}}\left(\frac{σ}{\sqrt{n}}\right) <μ <\overbar{x}+ z\_{{α}/{2}}\left(\frac{σ}{\sqrt{n}}\right)$$

$$23.2- 1.96\left(\frac{2}{\sqrt{50}}\right) <μ <23.2+ 1.96\left(\frac{2}{\sqrt{50}}\right)$$

$$23.2- 0.6 <μ <23.2+ 0.6$$

$$22.6 <μ <23.8$$

Hence, the president can say, with 95% confidence, that the average age of the students is between 22.6 and 23.8 years, based on 50 students.

\*After discussing the example above the teacher will show the students how to solve the same problem using the statistical tool of TI – 83 calculators.

Let Me Try

1. A survey of 50 adults found that the mean age of a person’s primary vehicle is 5.6 years. Assuming the standard deviation of the population is 0.8 year, find the 99% confidence interval of the population mean.
2. A sample of the reading scores of 35 fifth-graders has a mean of 82. The standard deviation of the sample is 15.
	1. Find the 95% confidence interval of the mean reading scores of all fifth-graders.
	2. Find the 99% confidence interval of the mean reading scores of all fifth-graders.
	3. Which interval is larger? Explain why.
3. A study of 40 English composition professors showed that they spent, on average, 12.6 minutes correcting a student’s term paper.
	1. Find the 90% confidence interval of the mean time for all composition papers when the standard deviation is 2.5 minutes.
	2. If a professor stated that he spent , on average, 30 minutes correcting a term paper, what would be your reaction?
4. A study of 40 bowlers showed that their average score was 186. The standard deviation of the population is 6.
	1. Find the 95% confidence interval of the mean score for all bowlers.
	2. Find the 95% confidence interval of the mean score if a sample of 100 bowlers is used instead of a sample of 40.
	3. Which interval is smaller? Explain why.
5. A survey of individuals who passed the seven exams and obtained the rank of Fellow in the actuarial field finds the average salary to be $150,000. If the standard deviation for the sample of 35 Fellows was $15,000, find the 95% confidence of interval of the mean salary of all Fellows.

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