

Name: _____ Hour: _____ Date: _____



Learning Targets

- State and check the Random, 10%, and Normal/Large Sample conditions for performing a significance test about a population mean.
- Calculate the standardized test statistic and P-value for a test about a population mean.
- Perform a significance test about a population mean.



Lesson 9.3: Day 1: Are you getting enough sleep?



It's recommended that teenagers get 8 hours of sleep a night. Mrs. Cowells believes her AP Stats students are getting less than the recommended 8 hours of sleep per night. To test her belief, take a random sample of 10 students in class and record the number of hours of sleep for each. Do these data provide convincing evidence that the AP stats students get less than 8 hours of sleep per night using $\alpha = 0.05$?

1. Calculate the sample mean and standard deviation.
2. State the appropriate hypotheses for a significance test. Be sure to define the parameter of interest.
3. What conditions must be met? Check them.
4. Give the formulas for the mean and standard deviation of the sampling distribution of \bar{x} and calculate the values.
5. Draw a picture and then calculate the test statistic.

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6. Remember, since we are working with means, the test statistic is a t value. Use table B to find the P-value.

7. What conclusion can we make?

Lesson 9.3 Day 1– Significance Test for μ

Important ideas:

L.T. #1 Conditions:

L.T. #2 Test Statistic

L.T. #3 P-value

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Check Your Understanding

The level of dissolved oxygen (DO) in a stream or river is an important indicator of the water's ability to support aquatic life. A researcher measures the DO level at 30 randomly chosen locations along a stream. Here are the results in milligrams per liter (mg/l): $\bar{x} = 4.77$ and $s_x = 0.939$. An average dissolved oxygen level below 5 mg/l puts aquatic life at risk. Do the data provide convincing evidence at the $\alpha = 0.05$ significance level that aquatic life in this stream is at risk?

State: Parameter:

Statistic:

Hypotheses:

α Level:

Plan: Name of procedure:

Check conditions:

Do: General:

Picture:

Specific:

Work:

Test Statistic:

P-value:

Conclude:

Based on your conclusion, what type of error (Type I or Type II) could you have made? Describe the error in context and name a consequence of the error.

Two sided significance tests

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In the children's game Don't Break the Ice, small plastic ice cubes are squeezed into a square frame. Each child takes turns tapping out a cube of "ice" with a plastic hammer hoping that the remaining cubes don't collapse. For the game to work correctly, the cubes must be big enough so that they hold each other in place in the plastic frame but not so big that they are too difficult to tap out. The machine that produces the plastic ice cubes is designed to make cubes that are 29.5 millimeters (mm) wide, but the actual width varies a little. To make sure the machine is working well, a supervisor inspects a random sample of 50 cubes every hour and measures their width. The output summarizes the data from a sample taken during one hour.

variable	N	Mean	SEmean	stdDev	Min	Q1	Median	Q3	Max
Width	50	29.4874	0.0132	0.0935	29.2717	29.4225	29.4821	29.5544	29.7148

Do these data give convincing evidence that the mean width of cubes produced this hour is **not** 29.5 mm?

State:

Plan:

Do:

Conclude: