ACTIVITY 7.3   Hypothesis Tests for a Mean

USE GEOGEBRA TO TEST FOR A MEAN

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You can use **_Geogebra_** for hypothesis tests for a mean to see if you should reject the null or fail to reject the null. You begin by opening the program and selecting "Probability" from the menu options. To start the hypothesis test, select the "Statistics" tab (see red oval below). You will then be able to select several tests including the Z-test of a mean and the T-test of a mean. Decide which test to use for the problems below.

Explore

Step 1 Specify a value for n.
Step 2 Specify a distribution.
Step 3 Specify a value for the mean.
Step 4 Specify a value for the standard deviation.
Step 5 Specify a value for the null mean.
Step 6 Specify an alternative hypothesis.
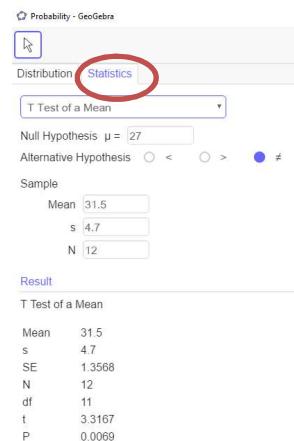
TAKE SCREEN SHOTS OF THE GEOGEBRA RESULTS

Deciding on a Distribution *In the following exercises, decide whether you should use a normal sampling distribution or a t-sampling distribution to perform the hypothesis test. Justify your decision. Then use the distribution to test the claim. Write a short paragraph about the results of the test and what you can conclude about the claim.*

1. **Credit Card Balances** To test the claim that the mean credit card debt for individuals is greater than $5000, you do some research and find that a random sample of 6 cardholders has a mean credit card balance of $5434 with a standard deviation of $625. You conduct a statistical experiment where and At $\alpha = 0.05$, explain why you cannot reject Assume the population is normally distributed. *(Adapted from TransUnion)*

2. **Gas Mileage** A car company says that the mean gas mileage for its luxury sedan is at least 23 miles per gallon (mpg). You believe the claim is incorrect and find that a random sample of 5 cars has a mean gas mileage of 22 mpg and a standard deviation of 4 mpg. At $\alpha = 0.05$, test the company's claim. Assume the population is normally distributed.

3. **Private Law School** An education publication claims that the average in-state tuition for one year of law school at a private institution is more than $35,000. A random sample of 50 private law schools has a mean in-state tuition of $34,967 and a standard deviation of $5933 for one year. At $\alpha = 0.01$, test the publication's claim. Assume the population is normally distributed. *(Adapted from U.S. News and World Report)*

4. **Writing** You are testing a claim and incorrectly use the normal sampling distribution instead of the t-sampling distribution. Does this make it more or less likely to reject the null hypothesis? Is this result the same no matter whether the test is left-tailed, right-tailed, or two-tailed? Explain your reasoning.