Due in recitation Thursday, April 13, 2000.

1. Find the correct t score for an $\alpha = 0.05$ test of the null hypothesis $\mu = 43$ vs the alternative hypothesis $\mu \neq 43$, based on an i.i.d. sample of $n = 5$ from a NORMAL population. The test employs a TEST STATISTIC 
$$\frac{|\bar{x} - 43|}{s / \sqrt{n}}.$$ 
The test REJECTS the null hypothesis if 
TEST STATISTIC > t. 
Otherwise, the test FAILS TO REJECT THE NULL HYPOTHESIS.

To achieve $\alpha = 0.05$ we choose $t$ so that 
$$P(\text{TEST STATISTIC} > t \mid \mu = 43) = \alpha = 0.05.$$

2. Same as (1) for $n$ very large and $\alpha = 0.05$.

3. If in (1) the data reports $\bar{x} = 43.8$, $s = 12.6$, what action is taken (i.e. does the test REJECT the null hypothesis or not)?

4. For (1) sketch the general appearance of the curve
$$P(\text{TEST REJECTS NULL HYPOTHESIS} \mid \mu) \text{ vs } \mu.$$ 
Identify $\alpha = 0.05$ in your sketch.

5. In your sketch (4) sketch also the curve (ideal) for extreme large $n$ and $\alpha = 0.05$.

6. In a practical sense, what is wrong with the curve (5)?

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7. Find the correct t score for an $\alpha = 0.05$ test of the null hypothesis $\mu = 43$ vs the alternative hypothesis $\mu > 43$, based on an i.i.d. sample of $n = 5$ from a NORMAL population. The test employs a TEST STATISTIC 
$$\frac{\bar{x} - 43}{s / \sqrt{n}}$$ (no absolute value as was the case (1)). 
The test REJECTS the null hypothesis if
TEST STATISTIC > t. Otherwise, the test FAILS TO REJECT THE NULL HYPOTHESIS.

To achieve \( \alpha = 0.05 \) we choose \( t \) so that
\[
P(\text{TEST STATISTIC} > t \mid \mu = 43) = \alpha = 0.05.
\]

8. Same as (7) for \( n \) very large and \( \alpha = 0.05 \).

9. If in (7) the data reports \( x_{\text{BAR}} = 43.8, s = 12.6 \), what action is taken (i.e. does the test REJECT the null hypothesis or not?)

10. For (7) sketch the general appearance of the curve
\[
P(\text{TEST REJECTS NULL HYPOTHESIS} \mid \mu) \text{ vs } \mu.
\]
Identify \( \alpha = 0.05 \) in your sketch.

11. In your sketch (10) sketch also the curve (ideal) for extreme large \( n \) and \( \alpha = 0.05 \).

12. In a practical sense, what is wrong with the curve (11) ?

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13. Be sure you can do all of the above for \( \alpha = 0.01 \).

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14. In any test, which is the most serious error that might occur?
   a) the null hypothesis is true and the test rejects it (for the given data)
   b) the null hypothesis is false and the test fails to reject it (for the given data)
   c) the null hypothesis is true
   d) the null hypothesis is false