<u>Comparing Two Independent Means</u>

IQ and Lead Exposure
Data Set 5 in Appendix B lists full IQ scores for a random sample of subjects with medium lead levels in their blood and another random sample of subjects with high levels in their blood. The statistics are summarized below. Use a 0.05 significance level to test the claim that the mean IQ score of people with medium lead levels is higher that the mean IQ score of people with high lead levels.

Medium Lead Level:	$n_1 = 22,$	$\bar{x}_1 = 87.22727,$	$s_1 = 14.29263$
High Lead Level:	$n_2 = 21,$	$\bar{x}_2 = 86.90476,$	$s_2 = 8.988352$

$\alpha = 0.05$

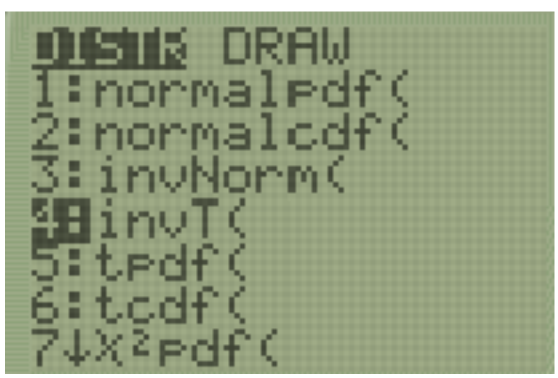
We are testing that people with medium lead levels have a higher average IQ than people with high lead levels, or Group 1 > Group 2.

$H_0 = \mu_1 \leq \mu_2$
$H_A = \mu_1 > \mu_2$

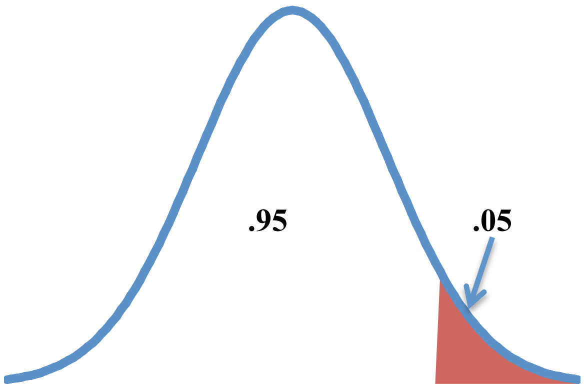
This problem is testing the difference between means. Since we are not given the population standard deviation, we must use <u>**T Tests**</u> for this problem.

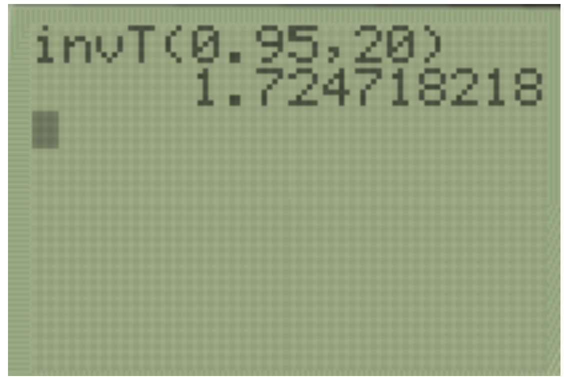
<u>**Calculating Critical Value**</u>

Push **2ND,** then **VARS**. Select **invT(** and hit **ENTER**.



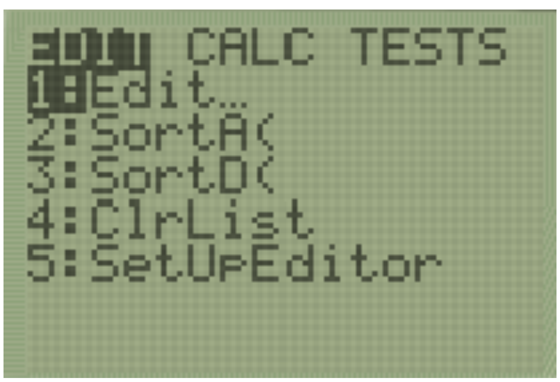
Next, we need to input two numbers into this function. First is the area from the left leading up to our rejection region (0.95). The last number is the degrees of freedom of our smallest sample size ($n_2 = 21$, $df = n - 1 = 20$). Then hit **ENTER**. The number below is our critical value.

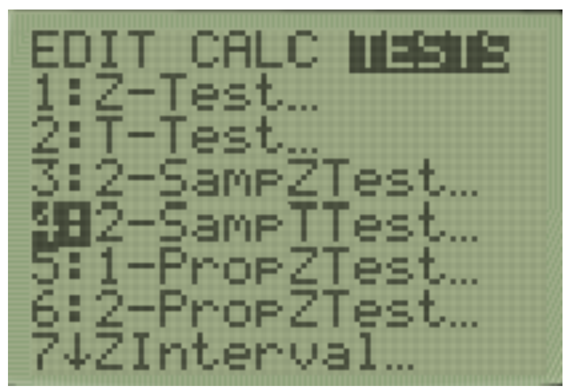




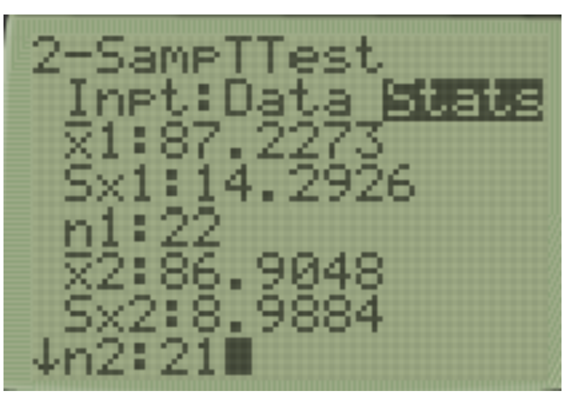
Calculating Test Statistic and P Value

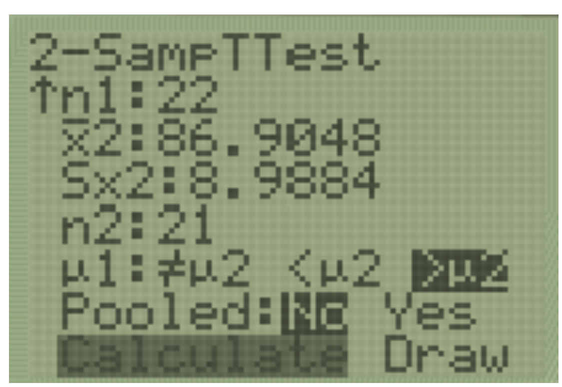
Push **STAT**, then select **TESTS** in the upper right hand corner. Select **2-PropZTest...** and hit **ENTER**.



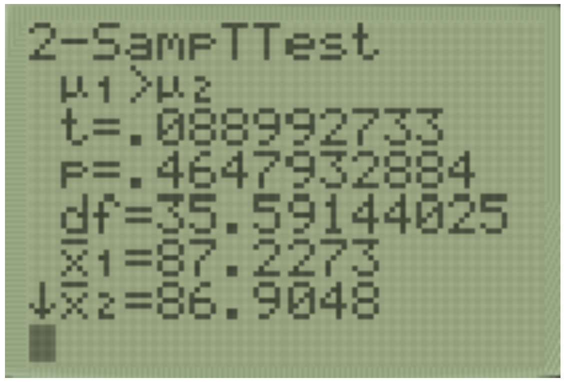


First, for Input, select **Stats**. Next, add in the data for both groups and choose our alternative hypothesis ($H_A = \mu_1 > \mu_2$). For Pooled, choose **NO**. Now select **Calculate** and hit **ENTER**.





The **t** = is our test statistic and the **p** = is our p value.



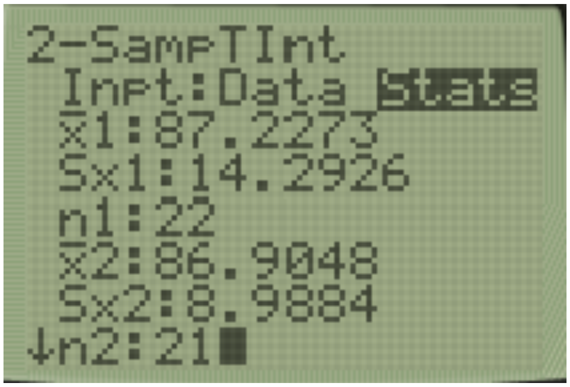
<u>Calculating a Confidence Interval</u>

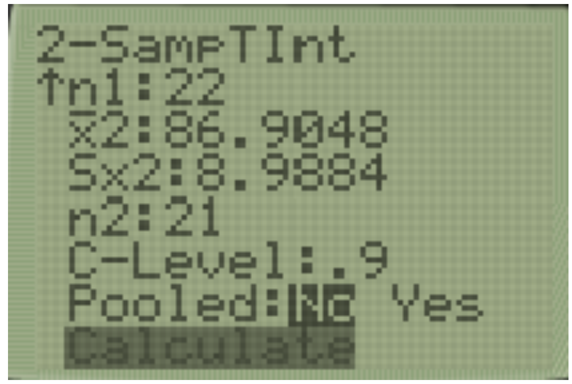
We refer to the following table to choose our confidence level. We have a one-tailed test and $\alpha = 0.05$, so we will use a confidence level of 90%.

	α	Two-Tailed Test	One-Tailed Test
Significance	0.01	99%	98%
Level for	0.05	95%	90%
Hypothesis Test	0.10	90%	80%

Push **STAT**, then select **TESTS** in the upper right hand corner. Select **2-SampTInt...** and hit **ENTER**.

First, for Input, select **Stats**. Next, add in the data for both groups and choose our confidence level (90%). For Pooled, choose **NO**. Now select **Calculate** and hit **ENTER**.





The top numbers in parentheses is our confidence interval.