Notes: The T-Test

The Student’s t-test is a statistical test that compares the _______________ and ______________ of two samples to see if there is a ________________ between them.

\[ t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{(s_1)^2}{n_1} + \frac{(s_2)^2}{n_2}}} \]

Where:
- x\(_1\) is the mean of sample 1
- s\(_1\) is the standard deviation of sample 1
- n\(_1\) is the sample size of sample 1
- x\(_2\) is the mean of sample 2
- s\(_2\) is the standard deviation of sample 2
- n\(_2\) is the sample size in sample 2

<table>
<thead>
<tr>
<th>Student Height (cm)</th>
<th>Students in Room 1</th>
<th>Students in Room 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>145  140  138  142  154</td>
<td>148  153  157  161  162</td>
</tr>
<tr>
<td>154  158  160  166  166</td>
<td>162  163  167  172  172</td>
<td></td>
</tr>
</tbody>
</table>

**HOW TO CALCULATE T:**

1. Calculate the mean (X) of each sample
   - Room 1: ____________
   - Room 2: ____________

2. Find the **absolute value** of the difference between the means

3. Work out the standard deviation for each sample (use a calculator...)
   - Room 1: ____________
   - Room 2: ____________

4. Square the standard deviation for each group

5. Divide each squared standard deviations by the sample size of that group

6. Add these two values

7. Take the square root of the number

8. Divide the difference in the means (step 2) by the standard error of the difference (step 7)
9. Determine the degrees of freedom (df) for the test. In the t-test, the degrees of freedom is the sum of the sample sizes of both groups minus 2.

10. Given the df, look up the critical t-value in a standard table of significance.

11. Check your answers on-line using the t-test calculator posted at www.biologyforlife.com

**SO WHAT?**

If your calculated t value is ________ than the number in the table, you conclude that the difference between the means for the two groups is ____________ different. Meaning: __________________________

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Do not worry if you do not understand how or why the test works .... Follow the instructions CAREFULLY.