Example
An investigation is undertaken to determine how the administration of a growth hormone affects the weight gain of pregnant rats. Weight gains during the gestation are recorded for 6 control rats and 6 rats receiving the growth hormone.

The following summary statistics are obtained:

<table>
<thead>
<tr>
<th></th>
<th>Control Rats</th>
<th>Hormone Rats</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{x}_1$</td>
<td>41.8</td>
<td>60.8</td>
</tr>
<tr>
<td>$s_1$</td>
<td>7.6</td>
<td>16.4</td>
</tr>
</tbody>
</table>

a. Find the 90% CI for $\mu_1 - \mu_2$.

Sample sizes?

$n_1 =$  

$n_2 =$

Large Samples?

Assumption that needs to be made to be able to use the non-pooled t-interval?

Degrees of freedom?

$$\Delta = \sqrt{\frac{(s_1^2/n_1)^2 + (s_2^2/n_2)^2}{n_1-1} + \frac{(s_1^2/n_1)^2}{n_2-1}}$$

$$\frac{s_1^2}{n_1} = ?$$

$$\frac{s_2^2}{n_2} = ?$$

$$\frac{s_1^2}{n_1} = \text{ and } \frac{s_2^2}{n_2} =$$

$$\Delta = \frac{54.46^2}{18.55 + 401.95} = 7.05$$, thus $df = \Delta = $.

-1-
Then the 90% CI is:

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

\[ = (41.8 - 60.8) \pm 1.895 \times \sqrt{9.63 + 44.83} \]

\[ = -19 \pm 13.98 = (-32.98, -5.02) \]

The \text{Implication of CI?} lies between -32.98 and -5.02, with a probability

The weight for control group is indeed

\textbf{Example} (Hormone example continued)

b. Is the weight gain significantly higher for the rats receiving the hormone treatment than those in the control group? Use \( \alpha = 0.10 \).

Recall:

\begin{align*}
\text{Control Rats} & & \text{Hormone Rats} \\
\bar{x}_1 &= 41.8 & \bar{x}_2 &= 60.8 \\
s_1 &= 7.6 & s_2 &= 16.4 \\
n_1 &= 6 & n_2 &= 6 \\
\bar{x}_1 - \bar{x}_2 &= -19.0 \quad \text{df} = \Delta = 7
\end{align*}

\[ \frac{s_1^2}{n_1} = 9.63 \quad \text{and} \quad \frac{s_2^2}{n_2} = 44.83 \]
- \quad H_0 \quad : \\
  H_a \quad : \\

Non-pooled t-test:

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

\[= - \frac{19.0}{7.3797} = -2.5746\]

\[\alpha = \]

Reject \( H_0 \) if

Since \(-2.5746 < -1.415\), do . There is indication that the weight for the control group