Section 8.5 - Comparing means using paired pair samples

Before/After Test

<table>
<thead>
<tr>
<th>Stress Levels</th>
<th>Before Counseling</th>
<th>After Counseling</th>
</tr>
</thead>
<tbody>
<tr>
<td>X = Before</td>
<td>66  71  80  78  85  90</td>
<td>64  65  79  81  81  91</td>
</tr>
<tr>
<td>Y = After</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d = x - y</td>
<td>2   6  1  -3  4  -1</td>
<td></td>
</tr>
</tbody>
</table>

Notation: \( \mu_1 = \) before mean, \( \mu_2 = \) after mean, \( \mu_d = \) mean difference = \( \mu_1 - \mu_2 \)

Parameter: \( \mu_d = \mu_1 - \mu_2 \)

Hypothesis: \( H_0: \mu_1 = \mu_2 \) \( (\mu_d = 0) \)

\( H_1: \mu_1 > \mu_2 \) \( (\mu_d > 0) \)

Requirement: \( n = \# \) of pairs > 30 or pop. of differences is normal.

Gather: \( n = 6 \) pairs, \( \bar{d} = \frac{\sum d}{n} = 1.5 \), \( S_d = 3.27 \)

\( \alpha = 0.05 \)

Test Statistic: \( t = \frac{\bar{d} - \mu_d}{S_d/\sqrt{n}} = 1.5 - 0 \)

Critical Value

Table A2

\( \alpha = 0.05 \), the tail

\( n-1 = 5 \) \( \rightarrow \) 2.015

Critical Value

Table A3

\( T_s \) \( df \rightarrow n-1 = 5 \)

\( T_s = 2.015 \rightarrow 0.05 \)

\( p-val = 1 - 0.8393 = 16.07 > 0.05 = \alpha \) → Fail to reject \( H_0 \)

Conclusion: The data do not support the claim that counseling lowers mean stress levels.