15.17. Two tax assessors are asked to make property evaluations on 8 properties. Their evaluations, in thousands of dollars are:

<table>
<thead>
<tr>
<th>Property</th>
<th>Assessor A</th>
<th>Assessor B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>76.3</td>
<td>75.1</td>
</tr>
<tr>
<td>2</td>
<td>88.4</td>
<td>86.8</td>
</tr>
<tr>
<td>3</td>
<td>80.2</td>
<td>77.3</td>
</tr>
<tr>
<td>4</td>
<td>94.7</td>
<td>90.6</td>
</tr>
<tr>
<td>5</td>
<td>68.7</td>
<td>69.1</td>
</tr>
<tr>
<td>6</td>
<td>82.8</td>
<td>81.0</td>
</tr>
<tr>
<td>7</td>
<td>76.1</td>
<td>75.3</td>
</tr>
<tr>
<td>8</td>
<td>79.0</td>
<td>79.1</td>
</tr>
</tbody>
</table>

(a) Use the sign test to determine if the two assessors differ significantly in their assessments (evaluations). Use Table 3. Recall that it gives the cumulative probabilities.

Hₐ:  H₀:  

Use the binomial table, Table 1, to get the p-value.

\[ p = \frac{\text{number of matched pairs}}{n} \]

Now use the normal table, Table 3, but ignore the continuity correction. \( n \leq 10 \), so the approximation will be bad.

\[ \mu_x = \frac{n}{2} \]

\[ \sigma_x = \sqrt{\frac{n}{12}} \]

\[ z = \frac{\text{sample mean} - \text{population mean}}{\text{standard deviation}} \]

(b) Use the paired-differences test (with Student's \( t \) distribution since \( n < 30 \), see Lecture 22) to determine if the two assessors differ significantly in their assessments.

Hₐ:  H₀:  

\[ d = \frac{\text{assessor A} - \text{assessor B}}{\sqrt{\text{assessor A}^2 + \text{assessor B}^2}} \]

\[ s_d = \sqrt{\frac{\sum (d^2)}{n-1}} \]

\[ n = \frac{\text{number of pairs}}{2} \]

\[ df = n - 1 \]

\[ SE = \frac{s_d}{\sqrt{n}} \]

\[ t = \frac{d - \mu_d}{SE} \]

\[ p = \frac{\text{number of matched pairs}}{n} \]

Use ( ), not [ ] for p-values. This choice affects the next answer.

Is the difference significant?

15.19. To determine if the use of handguns in indoor firing ranges can cause lead poisoning, a study is made of 17 law enforcement trainees before and after a 3-month firearm instruction conducted in an indoor firing range. None had elevated levels of lead before the instruction period. Afterwards, 15 of the 17 had elevated lead levels, 2 did not. Use the sign test (with the normal approximation since \( n > 10 \)) to determine if there is significant evidence for an increase (not just a difference) the level of lead in the blood stream.

Hₐ:  H₀:  

\[ n = 17 \]

\[ x = 15 \]

Since \( n > 15 \), you must use the normal approximation.

\[ \mu_x = \frac{n}{2} \]

\[ \sigma_x = \sqrt{\frac{n}{12}} \]

\[ z = \frac{\text{sample mean} - \text{population mean}}{\text{standard deviation}} \]

\[ p = \frac{\text{number of matched pairs}}{n} \]

For one-sided tests, do not multiply by 2.

Is the difference significant?