Math 22, Test #3 Note Sheet

Ch. 10 - 11

If the population is normal or \( n \geq 30 \), the sampling distribution of the sample means has
1. normal shape
2. \( \mu_{\bar{x}} = \mu \)
3. \( \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} \)

If \( n \geq 20, n\pi \geq 5, \) and \( n(1-\pi) \geq 5 \), the sampling distribution of the sample proportions has
1. normal shape
2. \( \mu_{\hat{p}} = \pi \)
3. \( \sigma_{\hat{p}} = \sqrt{\frac{\pi(1-\pi)}{n}} \)

Draw and label a picture that shows the shape, mean, standard deviation, bounds, and shaded area of interest.

Confidence intervals

Point estimate \( \pm \) margin of error
Margin of error is the distance from the center to a bound.
Point estimate for \( \mu \) is \( \bar{x} \), point estimate for \( \pi \) is \( \hat{p} \).

For the population mean

<table>
<thead>
<tr>
<th>Interval Type</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>z-interval</td>
<td>( \bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}} )</td>
</tr>
<tr>
<td>t-interval</td>
<td>( \bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}} )</td>
</tr>
</tbody>
</table>

For the population proportion

<table>
<thead>
<tr>
<th>Interval Type</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prop Z Int</td>
<td>( \hat{p} \pm z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} )</td>
</tr>
<tr>
<td>Confidence level, What you are estimating, Bounds</td>
<td>( \frac{n}{2} \pm \frac{z_{\alpha/2} \sqrt{n}}{2} )</td>
</tr>
</tbody>
</table>

Draw and label a picture that shows the shape, center, bounds, and confidence level.

No picture.

Sample size needed

To estimate the population mean

\[ n = \left( \frac{z_{\alpha/2} \sigma}{ME} \right)^2 \]

To estimate the population proportion

\[ n = \left( \frac{z_{\alpha/2}}{ME} \right)^2 \hat{p}(1-\hat{p}) \]

Use \( \hat{p} = 0.5 \) if there is no previous study.

Ch. 12

One Sample Hypothesis Tests

<table>
<thead>
<tr>
<th>Test Type</th>
<th>mean, ( \sigma ) unknown</th>
<th>median</th>
<th>proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>assumptions: ( n \geq 30 ) or normal population</td>
<td>No assumptions</td>
<td>assumptions: ( n \geq 20 ) ( n\pi \geq 5, n(1-\pi) \geq 5 )</td>
<td></td>
</tr>
<tr>
<td>( H_0: \mu \ (\geq, \leq ) ) value</td>
<td>( H_0: \theta \ (\geq, \leq ) ) value</td>
<td>( H_0: \pi (\geq, \leq ) ) value</td>
<td>( H_0: \pi (\neq, &lt;, &gt; ) ) value</td>
</tr>
<tr>
<td>( H_a: \mu (\neq, &lt;, &gt; ) ) value</td>
<td>( H_a: \theta \ (\neq, &lt;, &gt; ) ) value</td>
<td>( H_a: \pi (\neq, &lt;, &gt; ) ) value</td>
<td>( H_a: \pi (\neq, &lt;, &gt; ) ) value</td>
</tr>
<tr>
<td>t-test</td>
<td>Sign test</td>
<td>1 prop z test</td>
<td></td>
</tr>
<tr>
<td>Sample evidence is ( \bar{x} )</td>
<td>Below, Equal, Above</td>
<td>( z )</td>
<td></td>
</tr>
</tbody>
</table>

Sample evidence is \( \hat{p} \)

Picture includes the center, the sample evidence, and the p-value.

No picture needed.

Picture includes the center, the sample evidence, and the p-value.

\( *p\)-value > \( \alpha \), Fail to reject \( H_0 \)
\( p\)-value \( \leq \alpha \), Reject \( H_0 \)
\( \alpha \) is the chance you are willing to take of making the Type I Error.
\( p\)-value is the chance you are actually taking of making the Type I Error.
Conclusion includes the level of significance, a statement about the evidence, restate \( H_a \).