Confidence Interval

Steps to Create a **Confidence Interval for the mean** (Large Sample)

1. List all given sample data from the problem including sample size and C-level
2. Find $z_{\alpha/2}$
3. Calculate the margin of error, $E = z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$
4. Calculate $\left[\overline{x} - E, \overline{x} + E\right]$

Steps to Create a **Confidence Interval for the mean** (Small Sample)

1. List all given sample data from the problem including sample size and C-level
2. Find $t_{\alpha/2}$
3. Calculate the margin of error, $E = t_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$
4. Calculate $\left[\overline{x} - E, \overline{x} + E\right]$

Steps to create a **Confidence Interval for a population proportion**:

1. Gather sample data: x (or $\hat{p}$), n, and C-level, calculate $\hat{p} = \frac{x}{n}$ & (1 - $\hat{p}$) = $\hat{q}$
2. Find $Z_{\alpha/2}$
3. Calculate the Margin of Error, E = $Z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{n}}$
4. Finally, form $\left[\hat{p} - E, \hat{p} + E\right]$

Sample Size for Estimating the Mean:

$$n = \left[\frac{z_{\alpha/2}\sigma}{E}\right]^2$$

Steps to **test a hypothesis:**

1. Express the original claim symbolically
2. Identify the Null and Alternative hypothesis
3. Record the data from the problem
4. Calculate the test statistic using either $z = \frac{\overline{x} - \mu_0}{\frac{\sigma}{\sqrt{n}}}$ or $t = \frac{\overline{x} - \mu_0}{\frac{s}{\sqrt{n}}}$ or $\rho = \frac{\hat{p} - \rho_0}{\sqrt{\frac{p_0 q_0}{n}}}$
5. Determine your rejection region (or find your p-value).
6. Find the initial conclusion
7. Word your final conclusion

Steps to calculate a p-value:

1. Draw a bell curve
2. Place your test statistic on the curve (on the right if it's positive, on the left if it's negative)
3. Use the z-table to find one of the following:
    - the area to the left of the test statistic if Ha uses a < sign
    - the area to the right of the test statistic if Ha uses a > sign
    - twice the tail area beyond the test statistic if Ha uses a $\neq$