One-Sample t-Test

Answers a yes/no question about a population mean μ. Tests whether there is statistically significant evidence that the population mean μ is different from μ_0.

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} \qquad H_0\colon\ \mu = \mu_0 \qquad H_A\colon\ \mu \neq \mu_0$$

- $\bar{x}$ is the sample mean
- s is the sample standard deviation
- μ_0 comes from the null hypothesis
- n is the sample size

Steps

1. **Make hypotheses.** The **null hypothesis** H_0 is a specific statement about the population mean. The **alternative hypothesis** H_A can be one-sided if you have prior knowledge or two-sided if you aren't sure. Don't use sample data to make hypotheses!

2. **Calculate t-value.** Use the formula.

3. **Find the p-value.** Use the Probability Distributions app. Degrees of freedom (df or ν) is $n - 1$.

4. **Explain what it means.** The lower the p-value, the more statistically significant the result is. Here are some common **significance levels** people use.

   - **Moderate** ($p < 5\%$). Moderate evidence that the null hypothesis is wrong.
   - **Strong** ($p < 1\%$). Strong evidence that the null hypothesis is wrong.
   - **Very Strong** ($p < 0.1\%$). Very strong evidence that the null hypothesis is wrong.

   If $p > 5\%$, then the evidence is too weak to reject H_0, but that doesn't mean we accept H_0. It just means our results are not statistically significant. The observed difference between $\bar{x}$ and μ_0 could just be due to random chance.

Assumptions

These are the same as with a **one sample t-confidence interval**.