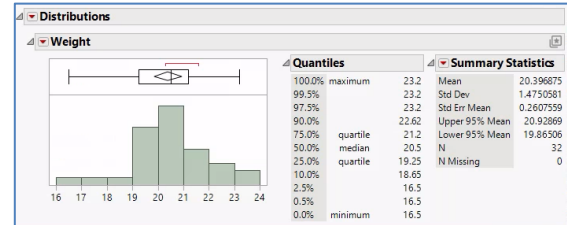# One Sample Equivalence Test for Mean

Use to determine if there is statistical evidence exists to demonstrate that a population mean is within a specified range (i.e., "equivalent") to a hypothesized value.

Equivalence Test for the Mean

Coating.jmp (Help > Sample Data Folder > Quality Control)

1. From an open JMP data table, select **Analyze > Distribution**.
2. Select one or more continuous variables from **Select Columns**, click **Y, Columns** (continuous variables have blue triangles), and click **OK**.
3. From the Distributions report window, select **Test Equivalence** under the **red triangle** next to the variable name.
4. Specify the **Hypothesized Mean**, the **Confidence Level**, and the **difference from the hypothesized value considered practically zero** (i.e., **Margin of Equivalence**). Click **OK**. Here we chose a hypothesized mean of 20, 95% Confidence Level, and a margin of equivalence of +/- 1.
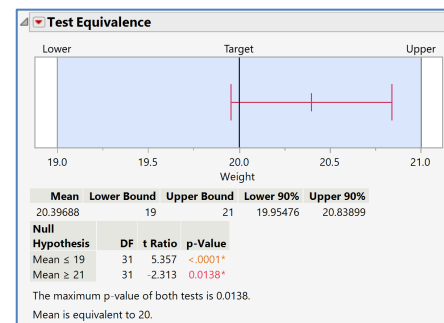
The Null and Alternative Hypothesis in an Equivalence Test is stated as:

$H_0: \mu - \mu_0 \leq -1$ or $\mu - \mu_0 \geq 1$ vs. $H_A: -1 < \mu - \mu_0 < 1$

* This approach is known as "Two One-sided t-tests" (TOST).

Notes:

- Rejecting the Null Hypothesis in favor of the Alternative is essentially concluding there is enough statistical evidence to believe the population mean is within +/- 1 of the hypothesized value. In other words, "Is Equivalent".
- The framework of an Equivalence Test reverses the roles of the Null and Alternative Hypothesis in a traditional hypothesis test for the mean where the hypotheses are: $H_0: \mu = \mu_0$ vs. $H_A: \mu \neq \mu_0$. In the traditional test, if the data does not produce enough statistical evidence to believe the Alterantive Hypothesis, it does not mean that statistical evidence was produced to believe the Null Hypothesis. Instead, the data simply did not produce enough statistical evidence to reject it.

JMP will display a graph showing a $(1 - 2\alpha)$ Confidence Interval comparing it to the Margin of Equivalence, and two separate one-sided t-tests. The Null hypothesis is rejcted in favor of the Alternarive when the largest p-value is less than α. When this is the case, the $(1 - 2\alpha)$ Confidence Interval will be completely within the Margin of Equivalence.

Results with a Margin of Equivalence of +/- 1

Results with a Margin of Equivalence of +/- 0.5
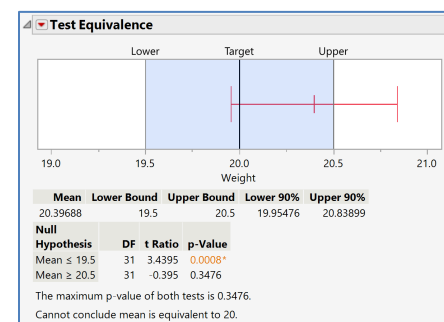
- In the first analysis (Margin of Equivalence of +/- 1), the **statistical evidence was produced** to conclude equivalence.
- In the second analysis (Margin of Equivalence of +/- 0.5), the **statistical evidence was NOT produced** to conclude equivalence.

Visit **Basic Analysis > Distributions > Options for Continuous Variables > Test Equivalence** in **JMP Help** to learn more.