# Two Sample t-Test and Confidence Intervals

Use to Estimate via a confidence interval and perform a hypothesis test for the difference between two population means. If more than two means (more than two levels of the categorical X variable), refer to the **One-Way ANOVA** guide.

Comparison of Two Population Means

Big Class.jmp (Help > Sample Data Folder)

1. From an open JMP® data table, select **Analyze > Fit Y by X**.
2. Click on a continuous variable from **Select Columns**, and click **Y, Response**.
3. Click on a two-level categorical variable and click **X, Factor**.
4. Click **OK**.
   The Oneway Analysis output window will display.
5. Click on the **red triangle** and select **Means/Anova/Pooled t**.

Some of the additions to the report include:

- Mean diamonds (95% Confidence Intervals) added to the graph.
- T-test Statistic and p-values for testing the hypotheses:
  H_0: $\mu_1 = \mu_2$ vs. H_A: $\mu_1 \neq \mu_2$; or H_A: $\mu_1 > \mu_2$; or H_A: $\mu_1 < \mu_2$
- Confidence Interval for ($\mu_1 - \mu_2$).
- Individual Confidence Intervals for μ_1 and μ_2.
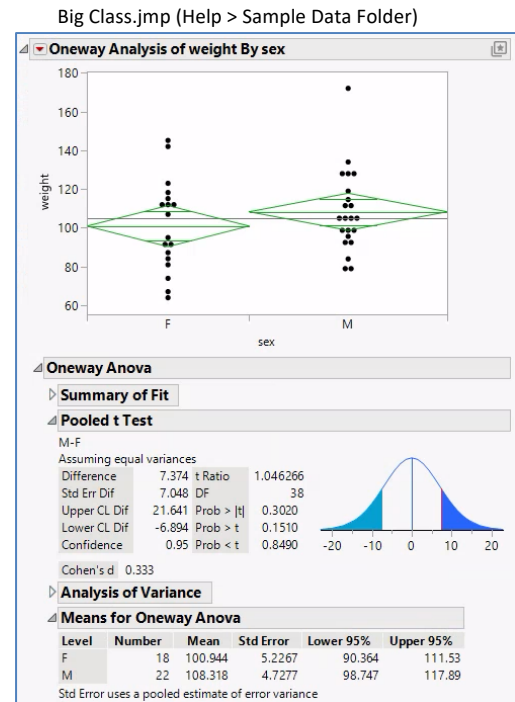
Note: **Means/Anova/Pooled t** is the test under the assumption of equal variances.
For a test without the assumption of equal variances, select **t Test** under the **red triangle** instead.

Results

- **Upper CL Dif** and **Lower CL Dif** give the 95% CI for ($\mu_1 - \mu_2$), the difference between the two population means.
  Here we estimate that difference to be (-6.89 , 21.64). Since the 95% CI contains zero, we conclude that there is not the statistical evidence needed to conclude a significant difference between the means.
- **Prob > |t|** is the p-value for the two-tailed test. The null hypothesis is that means are equal (the mean difference is zero). Since Prob > |t| is greater than 0.05, cannot reject the null hypothesis (i.e., we cannot conclude that there is a significant difference between the two population means).
- 95% Confidence Intervals for the Individual Means are shown in the **Means for OneWay Anova** table. We estimate, with 95% confidence, that the population mean Weight for Females to be between 90.4 and 111.5 and to be between 98.7 and 117.9 for Males.
  Note: The default confidence level is 95% (i.e., significant level of 0.05.) Select **Set α Level** under **the red triangle** to change.

This analysis can also be performed using the **Hypothesis Test for Two Means** and **Confidence Intervals for Two Means Calculators** under **Help > Sample Index > Calculators** or **Student > Calculators** in JMP Student Subscription.

Visit **Discovering JMP > Analyze Your Data > Analyze Relationships** and **Basic Analysis > Oneway Analysis** in **JMP Help** to learn more.