Practice: Conducting a One-Sample t Test

For this practice, you use the data from Michelson's first speed of light experiment. The data are in the file **Michelson 1879 Trial 1.jmp**.

Michelson's research was based on an apparatus developed by Leon Foucault. Foucault estimated the speed of light to be 299,796 km/second. In this practice, you determine whether Michelson's measurements are consistent with Foucault's.

1. Conduct a one-sample t test to determine whether Michelson's measurements are consistent with Foucault's.

   Hint: Use **Analyze**, **Distribution**. Select **Test Mean** from the red triangle for the analysis. Enter the hypothesized mean, and click **OK**.

2. In words, what are the null and alternative hypotheses?

   The null hypothesis is that the mean of measurements from Michelson's apparatus equals 299,796. The alternative is that the mean is not equal to this value.

3. What is the t ratio for this test?

   The t ratio is 4.8163.

4. Which p-value do you use? What is this value?

   You use the p-value for the two-tailed test, labeled **Prob > |t|**. The p-value is 0.0001.

5. What conclusions can you draw? Use a significance level of 0.05.

   There is a statistically significant difference between the mean of Michelson's measurements and Foucault's estimate.

6. What is a practical interpretation of the test results?

   Michelson's apparatus and procedure yielded a higher estimate of the speed of light than Foucault's.

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