

Sample Size and Power for Two Sample Means

Use to interactively explore the relationships between Power, Sample Sizes, and Differences to Detect for testing a hypothesis comparing two population means. See the **Two Sample t-test and Confidence Interval** guide to learn how to perform a statistical test comparing two sample means.

Sample Size and Power - Two Sample Means

1. Select **DOE > Sample Size Explorers** and choose **Power > Power for Two Independent Sample Means**.
2. Choose the type of test: **One-Sided** or **Two-Sided** and choose **Alpha** (significance level for the test).
The null hypothesis is that the two means are equal. Here we chose a two-sided alternative which is used to test that the two means are not equal.
This null and alternative hypothesis can be written using notation as $H_0: \mu_1 = \mu_2$ vs. $H_A: \mu_1 \neq \mu_2$
3. Choose if standard deviation is known.
If "Yes" analysis will be based on the Z-Test. If "No" analysis will be based on the t-Test.
4. Enter **Assumed Standard Deviations**. Here we assume 2 for each.
5. Enter the **Difference to Detect**. This is the difference between the two population means under H_A considered to be true in order to perform the analysis. Here we consider a difference of 2.5, which is $2.5/2.0 = 1.25$ standard deviations apart.
6. Select parameter to solve for. Here we chose **Total Sample Size**.
7. Enter a value for the **Power**. Here we entered 0.80.
The solution of Total Sample Size of 23 ($n_1=11$ and $n_2=12$) is displayed.
8. Use the interactive cross-hair tool (or type in values) for **Power, Sample Sizes, Difference to Detect**, and **Std Devs** to study the relationship between these parameters solving for many different scenarios.

Total Sample Size

Total Sample Size

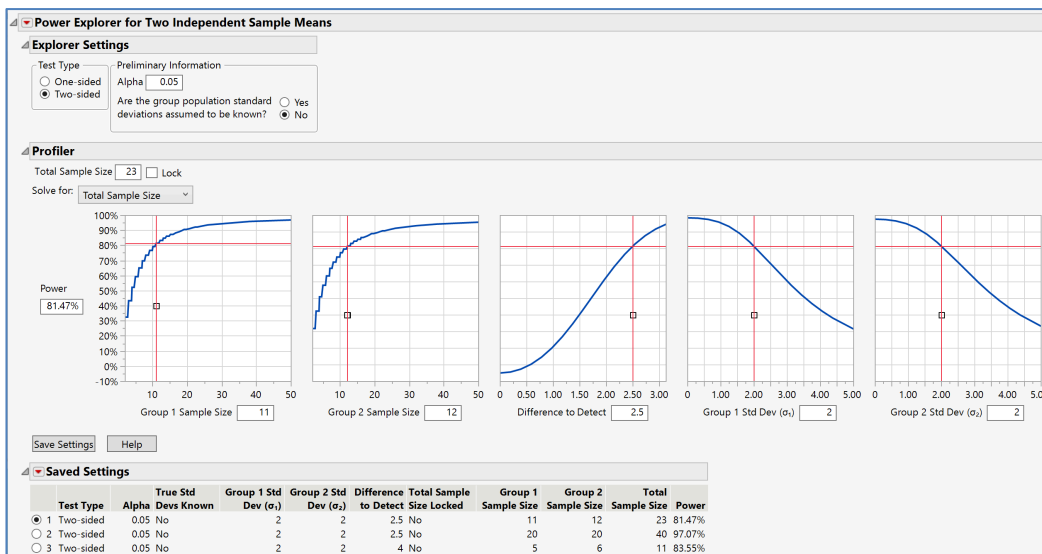
Group 1 Sample Size

Group 2 Sample Size

Difference to Detect

Group 1 Std Dev (σ_1)

Group 2 Std Dev (σ_2)



The settings and solution for each analysis performed can be saved. The table of saved settings shows the results of three different analyses performed when testing the hypothesis $H_0: \mu_1 = \mu_2$ vs. $H_A: \mu_1 \neq \mu_2$

1. What sample size is needed to achieve a power of 80% at detecting a difference of $2.5/2 = 1.25$ std dev?
Answer: 23 ($n_1 = 11$ and $n_2 = 12$)
2. What is the power with a sample size of 20 in each group? *Answer: Power = 97.1%*
3. What sample size is needed to achieve a power of 80% at detecting a difference of $4/2 = 2$ std dev?
Answer: 11 ($n_1 = 5$ and $n_2 = 6$)

Note: Determining sample size to achieve a desired margin of error in a Confidence Interval can be done using **DOE > Sample Size Explorers > Confidence Intervals > Margin of Error for Two Independent Sample Means**.

Visit **Design of Experiments Guide > Sample Size Explorers** in **JMP Help** to learn more.