SIGNIFICANCE TESTING TOOLS



15300 N. 90th Street • Suite #500 • Scottsdale, AZ 85260 +1.480.483.2700 • www.analyticalgroup.com

When dealing with other than unweighted data based on independent simple random samples WinCross uses sophisticated methodology when testing significance of mean or percentages (proportions). Details can be found in the <u>Statistical Reference Guide</u> available from the WinCross **Help** menu . Statistical testing becomes much more complicated when dealing with weighted data.

The **Significance Testing** tool shown below, will be accessible from the **Tools** menu in WinCross V20 and only applies to significance testing for <u>unweighted</u> statistics based on independent simple random samples. The tool can also be downloaded by going to <u>www.AnalyticalGroup.com/support_free_tools.htm</u>. Our significance testing tool, as well as others like it available on the web, should only be used for statistical tests based on <u>unweighted</u> data from independent samples.

Some users might want to use this tool for statistical testing with weighted data. There are two approaches to the treatment of weighted data in statistical tests, the one employed by WinCross and the one employed by some other statistical programs, notably SPSS. The WinCross approach is the more accurate approach; documentation of this claim can be found on The Analytical Group website www.analyticalgroup.com/support_wc_faqs.htm under the HELPFUL DOCUMENTS heading.

The following describes ways to use this tool with weighted data.

Averages:

WinCross Quick Tools
Image: Copyright © 2015 by The Analytical Group, Inc. All Rights Reserved Worldwide TAG Analytical Group Inc.
Statistics and Frequency Significance Testing Sample Size Calculator Calculator
Percentages Averages
Two Independent Samples Average vs. Theoretical Two Matched Samples
Mean #1 (x1) Here we test whether an observed mean x1 based on a random sample of size n1 is significantly different from an observed mean x2 based on an independent sample of size n2. To perform this test one needs additionally the standard deviations s1 and s2 from samples 1 and 2. Sample size #1 (n1) The z statistic for testing this hypothesis is given by
$z = \frac{x_1 - x_2}{\sqrt{\frac{(s_1)^2}{n_1} + \frac{(s_2)^2}{n_2}}}$ Standard deviation #2 (s2)
Sample size #2 (n2) This tool reports the significance level and confidence level for both the two-tailed and one-tailed tests of significance of p1 from p2.
z score
Significance level Confidence level

<u>WinCross approach</u>: For each of the samples, fill in the mean box with the weighted mean, fill in the standard deviation box with the <u>unweighted</u> standard deviation, and fill in the sample size box with the effective sample size, calculated as

$$f = \frac{\left(\sum_{i=1}^{n} w_{i}\right)^{2}}{\sum_{i=1}^{n} w_{i}^{2}}$$

<u>SPSS approach</u>: For each of the samples, fill in the mean box with the weighted mean, fill in the standard deviation box with the <u>weighted</u> standard deviation, and fill in the sample size box with the sum of the weights.

Percentages:

VinCross	Quick Tools
f 🔰 in 💦 c	Copyright © 2015 by The Analytical Group, Inc. All Rights Reserved Worldwide
tatistics and Freque	ncy Significance Testing Sample Size Calculator Calculator
Percentages Averages	
Two Independent Samp	Iles Two Categories in One Sample Proportion vs. Theoretical Two Matched Samples
Percent #1 (p1) Percent #2 (p2)	% Here we test whether an observed proportion p1 based on a random sample of size n1 is significantly different from an observed proportion p2 based on an independent sample of size n2. The z statistic for testing this hypothesis is given by
Sample size #1 (n1)	$z = \frac{p_1 - p_2}{\sqrt{\frac{p_1(1 - p_1)}{n_1} + \frac{p_2(1 - p_2)}{n_2}}}$
Sample size #2 (n2)	ų ··· ··· ··· ··· ··· ··· ····
	This tool reports the significance level and confidence level for both the two-tailed and one-tailed tests of significance of p1 from p2.
z score	
	Two tail One tail
Significance level	
Confidence level	

<u>WinCross approach</u>: This **Quick Tool** *cannot* replicate the WinCross computation. That computation requires use of both the weighted percent (the quantity required for the percent box), the effective sample size, calculated as

$$f = \frac{(\sum_{i=1}^{n} w_i)^2}{\sum_{i=1}^{n} w_i^2}$$

for the sample size box, and an additional quantity, namely the UNWEIGHTED PERCENTAGE (which is used in the variance computation for weighted significance testing). Since this spreadsheet does not make provisions for introduction of the unweighted percentage, use of the weighted percentage throughout the internal computations of this spread sheet will <u>not</u> reproduce the (correct) WinCross computation.

<u>SPSS approach</u>: For each of the samples, fill in the percent box with the weighted percent and fill in the sample size box with the sum of the weights.