

Version 16.2 Enhancements

Several features have been added to Version 16.2 of Statgraphics at the request of users. These include:

- Additional **summary statistics**
- Additional **operators** for use in handling character data
- Calculation of **statistical tolerance limits** for data from eight additional distributions: Cauchy, exponential, 2-parameter exponential, gamma, Laplace, largest extreme value, Pareto, and smallest extreme value. These are in addition to the normal, lognormal, Weibull, power normal, and nonparametric limits already in Version 16.1.
- Display of confidence limits for percentiles on **normal probability plots**.
- The ability to add **passwords** and **user signatures** to StatFolios
- Automatic creation of an **audit trail** to record the date and time at which Statfolios are changed.
- Support of the **mouse wheel** to implement zooming and font size changing on graphs

These features are described below.

Summary Statistics

Four additional statistics have been added to procedures such as *Multiple Variable Analysis* which display statistics for columns of numeric data. The statistics are:

- **Harmonic Mean** (measure of central tendency) - estimates the center of the data according to:

$$\bar{x}_h = \left(\frac{1}{n} \sum_{i=1}^n x_i^{-1} \right)^{-1}$$

This statistic is often used when computing the average of rates. Note: this statistic is only defined for a sample of data in which all values are greater than 0.

- **Gini coefficient** (measure of dispersion) - measures the inequality in a population according to:

$$G = \left(\frac{n}{n-1} \right) \frac{\sum_{i=1}^n \sum_{j=1}^n |x_i - x_j|}{2n^2 \bar{x}}$$

This statistic is often used to measure inequality of income or wealth. It is only defined if $\bar{x} > 0$.

- **Mean absolute deviation** (measure of dispersion) – the average absolute deviation around the sample mean:

$$\frac{\sum_{i=1}^n |x_i - \bar{x}|}{n}$$

It is frequently used as a measure of forecast accuracy. Note: be careful not to confuse this with MAD, the *median* absolute deviation, which is already in Version 16.1.

- **Geometric standard deviation** (measure of dispersion) – used to calculate variability around the geometric mean according to:

$$s_g = \exp \left(\sqrt{\frac{\sum_{i=1}^n \left(\ln \frac{x_i}{\bar{x}_g} \right)^2}{n}} \right)$$

This statistic is related to the lognormal distribution in that it is the exponentiated value of the standard deviation of the logs of X.

New Operators

Several new operators have been added for use in Statgraphics expressions. The following operate on a column of character strings **x**:

LEFT(x,k)

Purpose: selects the leftmost *k* characters from each string in a character column.

Argument: data column, number of characters

Example: LEFT(*make*,10)

Result: column of strings with maximum of 10 characters

LEN(x)

Purpose: calculates the length of each string in a character column.

Argument: data column

Example: LEN(*make*)

Result: column of integers containing the length of each string

LOWER(x)

Purpose: converts each string in a character column to lowercase.
Argument: data column
Example: LOWER(*make*)
Result: column of strings

MID(x,start,k)

Purpose: selects *k* characters from each string in a character column, starting at the indicated location.
Argument: data column, starting position in each string, number of characters
Example: MID(*make*,5,10)
Result: column of strings with maximum of 10 characters

PROPER(x)

Purpose: converts each string in a character column to a proper name by capitalizing the first letter of each word in the string.
Argument: data column
Example: PROPER(*make*)
Result: column of strings

RIGHT(x,k)

Purpose: selects the rightmost *k* characters from each string in a character column.
Argument: data column, number of characters
Example: RIGHT(*make*,10)
Result: column of strings with maximum of 10 characters

TRIM(x)

Purpose: removes leading and trailing blanks from each string in a character column.
Argument: data column
Example: TRIM(*make*)
Result: column of strings

UPPER(x)

Purpose: converts each string in a character column to uppercase.
Argument: data column
Example: UPPER(*make*)
Result: column of strings

The following operate on a column of numeric values **x**:

GEOSD(x)

Purpose: geometric standard deviation
Argument: numeric data column
Example: GEOSD(1 2 4)
Result: 2

MEAN(x)

Purpose: arithmetic mean (synonym of AVG)

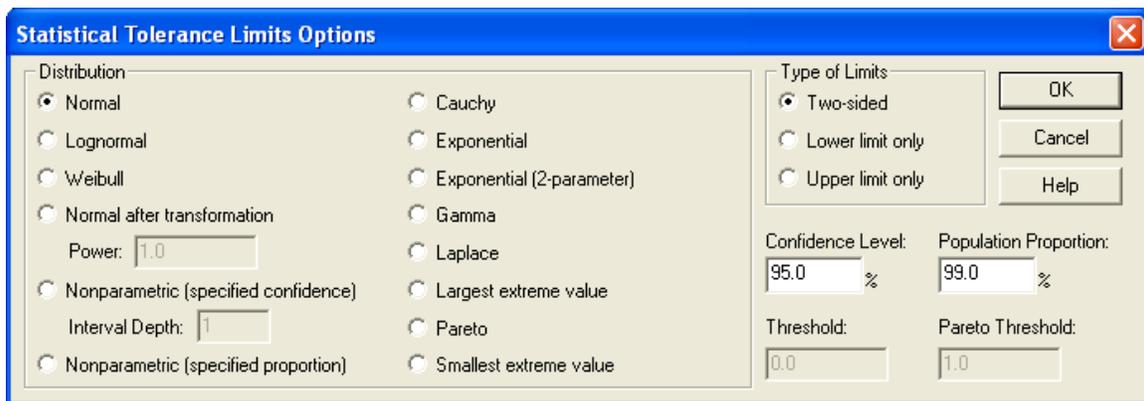
Argument: numeric data column

Example: MEAN(1 2 4)

Result: 2.33333

Statistical Tolerance Limits

The *Statistical Tolerance Limits* analysis has been expanded to calculate one-sided and two-sided limits from additional distributions. The new *Analysis Options* dialog box is shown below:



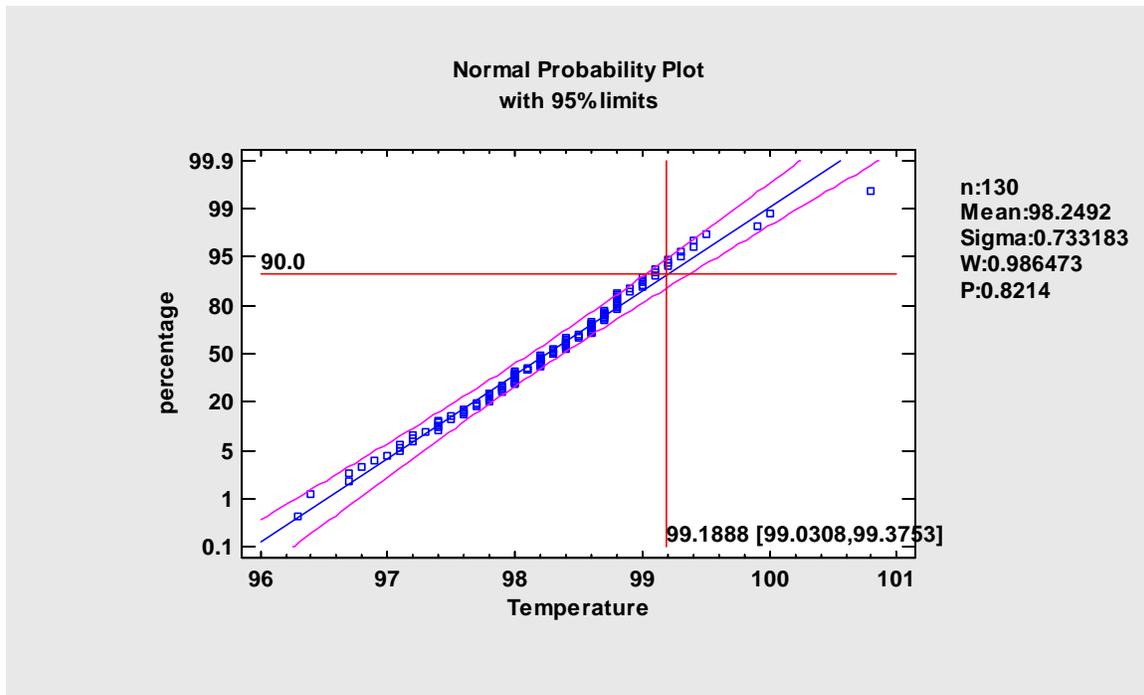
The dialog box titled "Statistical Tolerance Limits Options" contains the following settings:

- Distribution:**
 - Normal
 - Lognormal
 - Weibull
 - Normal after transformation
 - Power:
 - Nonparametric (specified confidence)
 - Interval Depth:
 - Nonparametric (specified proportion)
 - Cauchy
 - Exponential
 - Exponential (2-parameter)
 - Gamma
 - Laplace
 - Largest extreme value
 - Pareto
 - Smallest extreme value
- Type of Limits:**
 - Two-sided
 - Lower limit only
 - Upper limit only
- Confidence Level:** %
- Population Proportion:** %
- Threshold:**
- Pareto Threshold:**

Buttons: OK, Cancel, Help

Normal Probability Plots

The normal probability plot under *Exploratory Plots* and in the *One Variable Analysis* and *Paired Samples Comparison* has been enhanced as displayed below:



Crosshairs may be drawn at a selected percentile. If the reference line is estimated using the least squares method, two-sided confidence limits and one-sided confidence bounds may also be displayed. The right margin of the graph shows calculated statistics, including the P-value for the Shapiro-Wilk test.

StatFolio Passwords

Version 16.2 allows passwords to be associated with StatFolios. It also allows users to enter their name, which will be saved with the StatFolio as part of the new audit trail.

Attaching a password to a StatFolio

1. Load the StatFolio.
2. Select *Edit – StatFolio Password* from the main Statgraphics Centurion menu.
3. Enter the desired password twice on the following dialog box:



The dialog box titled "StatFolio Password" has a blue header bar with a red close button. It contains three input fields: "Owner password:" with a masked password "*****", "Retype password:" with a masked password "*****", and "User signature:" with the text "My name". Below the signature field is a checkbox labeled "Always prompt for signature" which is unchecked. At the bottom are "OK" and "Cancel" buttons.

You may also enter your name, which will be saved with the StatFolio and displayed later if you examine the StatFolio's audit trail.

4. Press *OK* to close the dialog box.
5. Resave the StatFolio.

Opening a Password Protected StatFolio

When opening a StatFolio that has been saved with a password, the password must be entered when the following dialog box appears:



The dialog box titled "StatFolio Password" has a blue header bar with a red close button. It contains two input fields: "Enter password:" which is empty, and "User signature:" which is empty. At the bottom are "OK" and "Cancel" buttons.

You may also enter your name, which will be saved with the StatFolio in the audit trail if you resave the StatFolio.

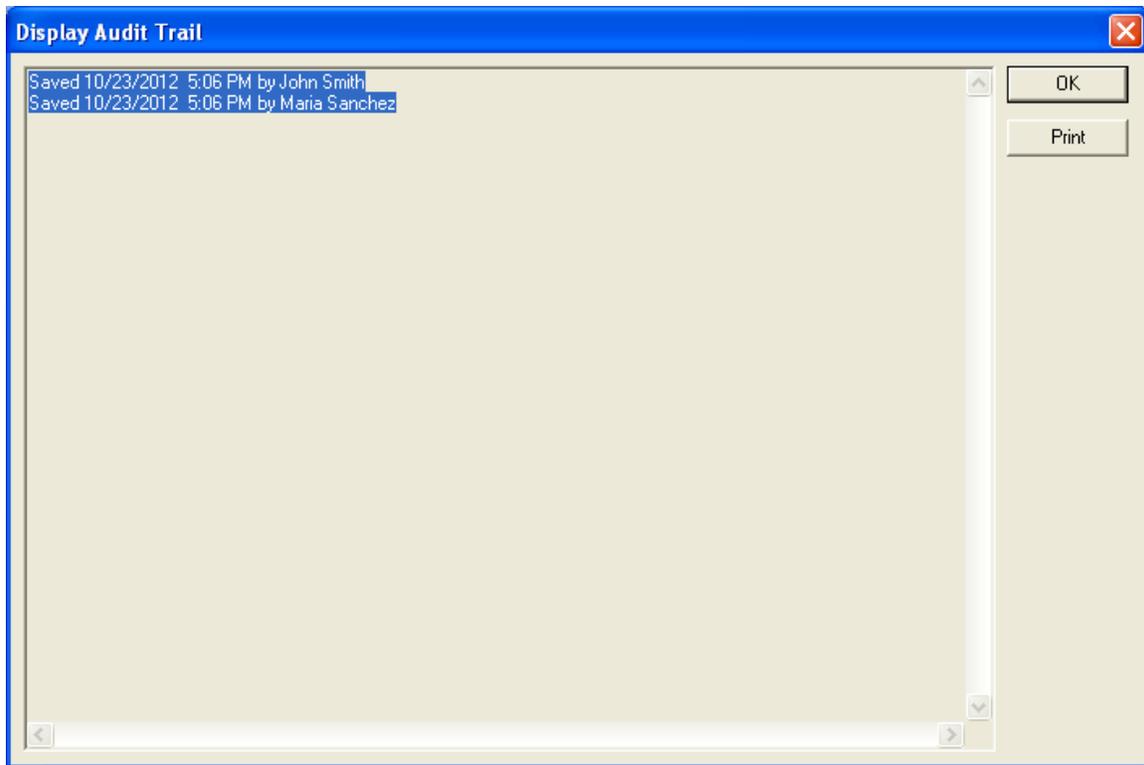
Prompting for a User Signature without Requiring a Password

If you wish to have Statgraphics prompt for a user signature without requiring a password, select *Edit – StatFolio Password* from the main Statgraphics Centurion menu. Check the box labeled *Always prompt for signature* on the dialog box as shown below:



Audit Trails

Version 16.2 of Statgraphics saves a record of each time a StatFolio is saved, together with the user signature if one has been entered. The audit trail may be displayed by loading the StatFolio and selecting *File – Display Audit Trail* from the main Statgraphics Centurion menu. A list of every time the StatFolio was saved will be shown, including the date, time and user signature:



It will also display information about analyses, data files, the StatReporter, and the StatGallery. You may use the *Print* button to send the output to your printer.

Mouse Wheel on Graphs

The mouse wheel is now supported for use on graphs.

1. To zoom in or out on a graph, first double-click on a graphics pane to maximize it. Then position the mouse cursor at a given location and turn the mouse wheel to zoom in or back out around that location. Note: on three-dimensional plots, the center of the cube is used as the point about which the graph is expanded or contracted rather than the location of the mouse cursor.
2. To change the size of the text on a graph, first double-click on a graphics pane to maximize it. Then hold the Ctrl key down and turn the mouse wheel to increase or decrease the font size of all text.

Note: the mouse wheel is already supported for use on text panes in version 16.1.