Summary of SigmaXL Graphical Tools

Tool	What	Type of Data	When to Use	Location in SigmaXL
Pareto Chart	Plots a bar chart of the response in descending order with a cumulative sum line.	Y=Discrete (e.g., Defect Count) or Continuous (e.g., Cost; must be additive) X=Discrete (Category)	To separate the vital few from the trivial many, help specify a problem statement, and prioritize potential root causes. This chart is based on the Pareto principle, which states that typically 80% of the defects in a process or product are caused by only 20% of the possible causes.	➢ SigmaXL > Templates & Calculators > Basic Graphical Templates > Pareto Chart ➢ SigmaXL > Graphical Tools > Basic Pareto Chart (Single) ➢ SigmaXL > Graphical Tools > Advanced Pareto Charts (Multiple)
Pivot Chart	Plots a stacked (or clustered) bar chart from an Excel Pivot Table.	Y=Discrete or Continuous X=Discrete (Category)	To easily 'slice and dice' your data, quickly look at different X factors and their contribution to the total. It is similar to the Pareto Chart, but without the descending bar order.	➢ SigmaXL > Graphical Tools > EZ-Pivot/Pivot Charts
Heatmap	Display counts or summary statistics in tabular format with results gradient color coded: minimum is dark blue to maximum dark red.	Y=Discrete or Continuous X=Discrete (Category)	To easily 'slice and dice' your data, quickly look at different X factors and their contribution to the total or summary statistics (typically the mean), aided by the color coding.	➢ SigmaXL > Graphical Tools > Heatmap
Histogram	Visual display of one variable showing data center, spread, shape and outliers.	Y=Continuous X=Discrete (Category)	1. Summarize large amounts of data 2. To get a 'feel for the data' 3. To compare actual description to customer specifications	➢ SigmaXL > Templates & Calculators > Basic Graphical Templates > Histogram ➢ SigmaXL > Graphical Tools > Basic Histogram (Single) ➢ SigmaXL > Graphical Tools > Histograms & Descriptive Statistics ➢ SigmaXL > Graphical Tools > Histograms & Process Capability
Dotplots	Visual display of one variable showing data center, spread, shape and outliers.	Y=Continuous X=Discrete (Category)	1. Small sample size (n < 30) 2. To get a 'feel for the data'	➢ SigmaXL > Graphical Tools > Dotplots
Boxplots	Visual display of the summary of Y data grouped by category of X.	Y=Continuous X=Discrete (Category)	Summary display to visualize differences in data center, spread and outliers across categories.	➢ SigmaXL > Graphical Tools > Boxplots ➢ SigmaXL > Graphical Tools > Multiple X Boxplots
Interval Plots	Plots the data mean and confidence intervals for each category group.	Y=Continuous X=Discrete (Category)	Quickly compare group means and their confidence intervals.	➢ SigmaXL > Graphical Tools > Interval Plots ➢ SigmaXL > Graphical Tools > Multiple X Interval Plots
Normal Probability Plot	Plots data in a straight line if the data is normally distributed.	Y=Continuous X=Discrete (Category)	To check for Normality and Outliers.	➢ SigmaXL > Graphical Tools > Normal Probability Plots
Empirical/Normal CDF Plots	Plots data from lowest to highest against their percentiles; compare against the same for the fitted Normal Distribution.	Y=Continuous X=Discrete (Category)	To check for Normality using the Cumulative Distribution Function (CDF).	➢ SigmaXL > Graphical Tools > Empirical/Normal CDF Plots
Run Charts	Plots observations in time sequence	Y=Continuous or Discrete	To view process performance over time for trends, shifts or cycles. To test for Randomness using the Nonparametric Runs Test	➢ SigmaXL > Templates & Calculators > Basic Graphical Templates > Run Chart ➢ SigmaXL > Graphical Tools > Run Chart ➢ SigmaXL > Graphical Tools > Overlay Run Chart
Multi-Vari Charts	Plots vertical lines with dots to allow comparison of subgroups on one variable.	Y=Continuous X=Discrete (Category)	To visually compare subgroups by individual data points and the mean. To identify major sources of variation (e.g., within a subgroup, between subgroups, or over time).	➢ SigmaXL > Graphical Tools > Multi-Vari Charts
Scatter Plot (Diagram)	Plots a response Y versus a predictor X.	Y=Continuous X=Continuous	To understand the possible relationships between two variables. To identify possible root causes which are related to Y.	➢ SigmaXL > Graphical Tools > Scatter Plot ➢ SigmaXL > Graphical Tools > Scatter Plot Matrix
XYZ Contour/Surface Plots	Plots a response Z versus two predictors Y and X.	Z=Continuous Y=Continuous X=Continuous	To understand the possible relationship between a response variable and two predictor variables without a regression model.	➢ SigmaXL > Graphical Tools > XYZ Contour/Surface Plot
Analysis of Means (ANOM)	Plots response Y mean for each level of X category with decision limits.	Y=Continuous X=Discrete (Category)	ANOM is a complement to ANOVA showing which group means are significantly different than the grand mean.	➢ SigmaXL > Graphical Tools > Analysis of Means (ANOM)

Summary of SigmaXL Statistical Tools

Tool	What	Type of Data	When to Use	Location in SigmaXL
t-Test	Determine if there is a significant difference between two group means or if the true mean of the data is equal to a standard value.	Y=Continuous X=Discrete (Category)	1. Test if mean = specified value 2. Test if 2 sample means are equal 3. Paired t: to reduce variation when comparing two sample means 4. Multiple pairwise comparisons	SigmaXL > Templates & Calculators > Basic Statistical Templates > 1 Sample t-Test and Confidence Interval for Mean 2 Sample t-Test and Confidence Interval (Compare 2 Means) SigmaXL > Statistical Tools > 1 Sample t-Test & Confidence Intervals / Paired t-Test 2 Sample t-Test / 2 Sample Comparison Tests One-Way ANOVA & Means Matrix
One-Way ANOVA (Analysis of Variance)	Determine if there is a difference in mean among many groups.	Y=Continuous X=Discrete (Category)	Determine if there is a statistically significant difference in means among the groups.	SigmaXL > Statistical Tools > One-Way ANOVA & Means Matrix (for equal variance) SigmaXL > Statistical Tools > Equal Variance Tests > Welch's ANOVA (for unequal variance)
Two-Way ANOVA (Analysis of Variance)	Determine if there is a difference in mean among many groups for two factors plus their interaction.	Y=Continuous X1=Discrete (Category) X2=Discrete (Category)	Determine if there is a statistically significant difference in means among the groups.	SigmaXL > Statistical Tools > Two-Way ANOVA
Nonparametric Tests	Determine if there is a difference between two or more group medians or if the median of the data is equal to a standard value.	Y=Continuous X=Discrete (Category)	1. Test if median = specified value: 1 Sample Sign Test or Wilcoxon 2. Test if 2 sample medians are equal: 2 Sample Mann-Whitney 3. Test if there is a difference in medians among the groups: Kruskal-Wallis or Mood's Median	SigmaXL > Statistical Tools > Nonparametric Tests SigmaXL > Statistical Tools > Nonparametric Tests – Exact (for small sample)
CI for Standard Deviation/ F-test / Bartlett's Test/ Levene's Test	Determine if there is a difference between two or more group variances or determine the confidence interval of a single standard deviation.	Y=Continuous X=Discrete (Category)	1. Determine the confidence interval for a single standard deviation. 2. Test if 2 sample variances (standard deviations) are equal. 3. Determine if there is a statistically significant difference for the variances among the groups. Use Bartlett's test for normal data. Use Levene's test for non-normal data.	SigmaXL > Templates & Calculators > Basic Statistical Templates > 1 Sample Chi-Square Test and CI for Standard Deviation 2 Sample F-Test and CI (Compare 2 Standard Deviations) SigmaXL > Statistical Tools > Two Sample Comparison Tests SigmaXL > Statistical Tools > Equal Variance Tests >Bartlett / Levene
Proportions Test	Determine if there is a difference between two proportions or determine the confidence interval of a single proportion.	Y=Discrete (Proportion) X=Discrete (Category)	1. Determine the confidence interval for a single proportion. 2. Determine if there is a statistically significant difference for two proportions.	SigmaXL > Templates & Calculators > Basic Statistical Templates > 1 Proportion Test & Confidence Interval 2 Proportions Test & Confidence Interval
Poisson Rate Test	Determine if there is a difference between two rates or determine the confidence interval of a single rate.	Y=Discrete (Count) X=Discrete (Category)	1. Determine the confidence interval for a single rate. 2. Determine if there is a statistically significant difference for two rates.	SigmaXL > Templates & Calculators > Basic Statistical Templates > 1 Poisson Rate Test and Confidence Interval 2 Poisson Rates Test and Confidence Interval
One-Way Chi-Square Goodness-of-Fit	Determine if the observed frequencies for one discrete variable are distributed equally	Y=Discrete (Count)	Test the distribution of observed frequency counts against expected (typically uniform discrete).	SigmaXL > Templates & Calculators > Basic Statistical Templates > One-Way Chi-Square Goodness-of-Fit Test One-Way Chi-Square Goodness-of-Fit Test Exact (for small sample)
X^2 Chi Square	Determine if there is a difference for observed frequencies of two discrete variables.	Y=Discrete (Count) X=Discrete (Category)	Determine if there is a relationship between two discrete variables.	SigmaXL > Statistical Tools > Chi-Square Tests > Chi-Square Test (for raw discrete data in stacked column format) Chi-Square Test – Two Way Table Data (for pivot or contingency table) SigmaXL > Statistical Tools > Chi-Square Tests – Exact (for small sample)
Anderson-Darling Normality Test	Determine if the data is normally distributed.	Y=Continuous	Test if the sample data is normally distributed.	SigmaXL > Graphical Tools > Histograms & Descriptive Statistics SigmaXL > Statistical Tools > Descriptive Statistics
Correlation	Quantify strength of relationships.	Y=Continuous X=Continuous	Determine if there is evidence of a relationship between Xs and Ys, quantify the relationship, identify root causes.	SigmaXL > Statistical Tools > Correlation Matrix
Regression (Simple Linear & Multiple)	Summarizes, describes, predicts and quantifies relationships.	Y=Continuous X=Continuous or Discrete (Category)	1. Determine if there is evidence of a relationship between Xs and Ys. 2. Model data to develop a mathematical equation to quantify the relationship. 3. Identify root causes. 4. Make predictions using the model.	SigmaXL > Graphical Tools > Scatter Plots (for simple linear regression) SigmaXL > Statistical Tools > Regression > Multiple Regression SigmaXL > Statistical Tools > Advanced Multiple Regression
Logistic Regression	Summarizes, describes, predicts and quantifies relationships.	Y=Discrete (Binary or Ordinal) X=Continuous or Discrete		SigmaXL > Statistical Tools > Regression > Binary Logistic Regression Ordinal Logistic Regression
General Linear Model	Summarizes, describes, predicts and quantifies relationships.	Y=Continuous X=Discrete (Category - Fixed or Random) or Continuous (Covariate)	1. Model nested data to develop a mathematical equation to quantify the relationship. 2. Determine Variance Components (Sources of Variation)	SigmaXL > Statistical Tools > General Linear Model
Design of Experiments (DOE)	Systematic and efficient proactive approach to testing relationships.	Y=Continuous or Discrete X=Continuous or Discrete	To establish cause and effect relationship between Ys and Xs. To identify 'vital few' Xs.	SigmaXL > Design of Experiments