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This copy of the Validation Protocol / Report

ZTC-6, for version 6x of ZCT's

"RELIABILITY STATISTICS BASICS"

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by

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*** ZCT is also known as "ZTC" and "ZTCP"

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VALIDATION PROTOCOL # ZTC-6

For version 6x of

"RELIABILITY STATISTICS BASICS"

For the name and signature of the author of this Protocol, see the cover-page of this combined Protocol + Report PDF file.

1.0 OBJECTIVE

This document outlines a validation protocol for version 6 of the file named by Zorich Consulting & Training (ZCT) as "Reliability Statistics Basics" (RSB). Note: ZCT is also known as "Zorich Technical Consultants" and "Zorich Technical Consulting & Publishing" (ZTCP).

2.0 SCOPE

This document applies to the MS Excel file named in the "Objective" section above, but which might be named differently by purchasers of this file. Even if the computer file name is changed by the purchaser, the "Instructions" worksheet inside the file will always have the original file name on its first row.

This document applies to all versions 6.XX of this program, starting with version 6.01. The XX refers to minor variations in the program that are designed to change the appearance of worksheets or to improve the clarity of error messages. The calculation cells remain unchanged in all 6.XX versions, and therefore re-validation is not required when changes are implemented in the 6.XX series. If a change is required to a calculation cell, the new revision will be given version number 7.01 and formally revalidated.

The file is password protected on all calculation cells (password retained by ZCT). The only cells changeable by user are the ones that allow input of options (e.g., alpha, sample size, etc.).

The output of RSB depends upon which of the several worksheets it contains are used. In some cases, different worksheets provided almost duplicate values as on other worksheets. The differences between "almost duplicate values" are due to differences between the equations or tables used as the basis for the worksheet. Each worksheet is based upon one or more published sources (see References section, below).

By using the word "validation" in this protocol, it is not meant to imply that RSB's program "code" is being validated. RSB is a relatively simple "application" based upon a

commercial program, MS Excel, which has been sold by Microsoft Corporation for many years. By saying that RSB is to be "validated" is to say that its functions and features will be critically and systematicly checked, to see if they meet their pre-determined design requirements and intended end-user purposes. RSB contains no "macros" or other code-based add-ons (such as VBA scripts); RSB does not even use any ActiveX controls. RSB contains only standard Excel mathematical and statistical equation functions and thus no additional code to validate.

This validation protocol is designed to ensure that the numerical results outputted by RSB are the same as those outputted by other well-established statistical software programs and/or are the same as those found in example calculations in published textbooks/articles (where "same" is defined by the validation criterion). Such a process duplicates the validation protocols used by other commercial statistical software programs -- for example:

1. The following text was found on April 26, 2013, at http://www.StatGraphics.com/validation.htm
   "*All StatGraphics analyses are validated by comparing the numerical results to one or more sources, including textbooks, journal articles, government benchmarks, hand calculations, and output from other well-established statistical programs.*"
2. The following text was found on April 26, 2013, in Minitab's "Validation Kit" available at http://www.minitab.com/en-US/support/documentation/software-validation.aspx
   "*All statistical and graphical output* [of Minitab] *is validated for market readiness using one or more of the following methods: Validated by hand or computed calculation, Validated by comparison to other software, Validated by comparison to textbook examples."*

3.0 POLICY and PURPOSE

Custom statistical software must be formally validated for its intended use.

The purpose of "Reliability Statistics Basics" is to facilitate determination of...

- sample sizes required in order to justify claims of product reliability/confidence
- product reliability for attribute and variables data
- Normal-distribution "K" factors, and of similar values for non-normal distributions
- % confidence in a reliability statement.

4.0 REFERENCES

StatGraphics Centurion, v. XV, User Manual, 2005 by StatPoint, Inc.

Editorial Style Manual, Section F: Determination of Tensile and Compressive Strength Properties for AMS Specifications, published by the Society for Automotive Engineers at http://www.sae.org/technicalcommittees/partf.pdf.

Excel 2002 Formulas, by J. Walkenbach, 2002 by M&T Books.

Excel 2007 Formulas, by J. Walkenbach, 2007 by John Wiley & Sons.

R...Reference Index (i.e., user manual), by "The R Core Team", "Version 2.13.1 (2012-06-22)

5.0 DEFINITIONS

RSB	The MSExcel file "RELIABILITY STATISTICS BASICS" being validated here.
R-Stat	The widely-used free-ware statistical software package maintained by the “R Foundation for Statistical Computing”; the program is most commonly referred to only as "R"; the version used for this validation was 2.15.1 (2012-06-22)
pbinom	R-Stat function used for calculating binomial confidence
phyper	R-Stat function used for calculating hypergeometric confidence
SGC	"StatGraphics Centurion". This is a high-end software program sold by StatPoint Inc. StatGraphics has been sold commercially since 1982. The version used for this validation was XV (the exact version used was 15.2.14, which includes all published updates).
Reliability	The % of a population that meets a specification.
K-factor	A K-factor is the multiple of sample standard-deviation units that is used to define a range on one or both sides of a sample mean. The range is then said, with a Confidence level determined by the choice of K-factors, to encompass a fraction of the population equal to the Reliability %.
Confidence	The probability (expressed here as a %) that the true (parameter) % Reliability is no smaller what was calculated by RSB, or that the true required K-factor or true required Sample Size is no larger than what was calculated by RSB. NOTE: 1 – Confidence, is the "alpha" significance level.

6.0 INSTALLATION VALIDATION

RSB is a standard Microsoft Excel File, without added macros, ActiveX controls, or VBA scripts. To function correctly, the file needs to be used on a computer running Microsoft Windows (v 95, NT4, or later); that is, running MSExcel version 8 or later (i.e., "Excel 97" or later).

Installation validation is performed by verifying that the file is installed on a computer running one of those versions of Excel (or their Apple-computer equivalents). Since the file cannot run on any other type of installation, this validation is self-evident and will not be documented as part of implementing this protocol.

7.0 DESIGN VALIDATION

RSB comprises 12 functional worksheets (also referred to as "Tabs" below) that have been assigned names alphabeticly from "A" thru "L". They are described below.

Design validation is first achieved by ensuring that no calculation cells (equation-containing cells) are user modifiable.

Design validation is secondarily achieved by checking that all the equations and tables on the (hidden) calculations worksheets have been accurately entered, when compared against the equations and tables in the original source references or against mathematical principles, and that they have been correctly referenced by the respective Tabs.

8.0 PERFORMANCE VALIDATION

NOTES:
For performance validation, a range of values will be tested. The goal will be to use the lowest and highest values allowed, as well as an intermediary value. However, some combinations of values are such that the extremes cannot be tested, because the resulting output is not allowed or not usable as input for companion tests in the validation.

- The range of allowed input values for Reliability from 75% to 99.9999% and for Confidence it is 75% to either 99% or 99.9999% depending upon the worksheet --- the validation test input values for a given worksheet are being chosen so that the output values also stay within the ranges allowed for that worksheet. RSB won't allow output of Confidence or Reliability less than 75%; and test input values will be avoided if they result in output of 100% Confidence or 100% Reliability, in order for the output of the first validation Test to be used as valid input to a subsequent Test (e.g., Test#2, below, uses Test#1's output).
- The range of allowed input values for Sample Size differs from worksheet to worksheet. The values tested here are chosen so that the resulting Confidence and Reliability stay within their allowed ranges (see above). It is important to note that when Sample Size is an output, this program always uses the "round up" feature of Excel. For example, if this program calculates that Sample Size is 20.01, then

the RSB output is 21 rather than 20. That can cause an apparent problem with validation, since if the "Reference" value is 20, the difference between the two values is 5% (21/20 = 105%) instead of the allowed 1% or 0.1%. During the validation below, any Sample Size result that "fails" to meet its acceptance criterion due to the "round up" feature will be not be considered a validation failure unless the non-rounded-up value also "fails" (in the example above, 20.01/20 = 100.05% represents a difference of 0.05% and so is acceptable because it does not exceed 0.1%).

VALIDATION TESTS	CRITERION FOR TEST SUCCESS
(Test#1) Compare the output of R-Stat's "pbinom" function to the output **Worksheet A** Table A2.	(Test#1) The output of Table A2 must be within 1% of the output of R-Stat's "pbinom" function.
(Test#2) In all combinations used in Test#1, compare the outputs of Tables A1 and A3 to the inputs of Table A2, when the sample size and confidence inputs to Tables A1 and A3 are made to be identical to the corresponding values in Table A2.	(Test#2) The output of Tables A1 and A3 must be within 0.1% of the corresponding values in Table A2.
(Test#3) Compare the output of R-Stat's "pbinom" function to the output of the Beta-distribution section of **Worksheet B** Table B2.	(Test#3) The output of the Beta-distribution section of Table B2 must be within 1% of the output of R-Stat's "pbinom" function.
(Test #4) In all combinations used in Test#3, compare Table B2's F-distribution output to the output of R-Stat's "pbinom" function.	(Test#4) The output of the F-distribution section of Table B2 must be within 1% of the output of R-Stat's "pbinom" function.
(Test#5) In all combinations used in Test#3, compare the Beta-distribution output of Table B1 (i.e., "reliability") to the input used in Table B2, when the sample size, failures, and confidence inputs to Table B1 are made to be identical to the corresponding values in Table B2.	(Test#5) Table B1's Beta-distribution output must be within 0.1% of the reliability input used in Table B2.

(Test#6) In all combinations used in Test#3, compare the F-distribution output of Table B1 (i.e., "reliability") to the input used in Table B2, when the sample size, failures, and confidence inputs to Table B1 are made to be identical to the corresponding values in Table B2.	(Test#6) Table B1's F-distribution output must be within 0.1% of the reliability input used in Table B2.
(Test#7) Compare the output of R-Stat's "phyper" function to **Worksheet C**'s output. NOTE: R-Stat outputs Alpha (i.e., 1 − Confidence) whereas Worksheet C outputs Confidence.	(Test#8) The output of Worksheet C must be within 1% of 1 − the output of R-Stat's "phyper" function.
(Test#8) Compare **Worksheet D** Table D1's "without confidence" reliability output to that found in examples from published textbooks and/or articles.	(Test#8) Table D1's output must be within 0.1% of the output of the textbooks and articles.
(Test#9) Compare Worksheet D Table D2's reliability output with that on Table D1, when (on the hidden calculation worksheet) the "upper 1-tailed...confidence limit" standard deviation used by Table D2 is manually changed to equal the standard deviation used by Table D1, when both tables use the same values for Mean of Stress, Mean of Strength, and Correlation Coefficient.	(Test#9) Table D2's output must be within 0.1% of Table D1's output.
(Test#10) (On the hidden calculation worksheet), compare Worksheet D Table D2's "upper 1-tailed...confidence limit" on the inputted standard deviation to that of StatGraphics).	(Test#10) Table's D2's calculate limits are within 1% of the limits outputted by StatGraphics.
(Test#11) Compare **Worksheet E**'s K-factor output to values found in the textbook from which came the table of values used in this worksheet.	(Test#11) Worksheet E's K-factor outputs must be literally identical to the K's found in the source-book table.

(Test#12) Compare **Worksheet F** Table F1's "K" output to the output of StatGraphics.	(Test#12) Table F1's output must be within 1% of StatGraphics' output.
(Test#13) Compare the output of Worksheet F Tables F2, F3, and F4 to the corresponding value in Table F1, when all other inputs to Tables F2, F3, and F4 are identical to the corresponding values in Table F1.	(Test#13) The output of Tables F2, F3, and F4 must be within 0.1% of the corresponding values in Table F1.
(Test#14) Compare **Worksheet G**'s K-factor output to values found in the textbook from which came the table of values used in this worksheet.	(Test#14) Worksheet G's K-factor outputs must be literally identical to the K's found in the source-book table.
(Test#15) Compare **Worksheet H** Table H1's "K" output to the output of StatGraphics.	(Test#15) Table H1's output must be within 1% of StatGraphics' output.
(Test#16) Compare the output of Worksheet H Tables H2, H3, and H4 to the corresponding value in Table H1, when all other inputs to Tables H2, H3, and H4 are identical to the corresponding values in Table H1.	(Test#16) The output of Tables H2, H3, and H4 must be within 0.1% of the corresponding values in Table H1.
(Test#17) Compare **Worksheet I** Table 1's "K" output to the output of StatGraphics.	(Test#17) Table 1's output must be within 1% of StatGraphics' output.
(Test#18) Compare the output of Worksheet I Tables 2, 3, and 4 to the corresponding value in Table 1, when all other inputs to the Tables 2, 3, and 4 are identical to the corresponding values in Table 1.	(Test#18) The output of Tables 2, 3, and 4 must be within 0.1% of the corresponding values in Table 1.
(Test#19) Compare **Worksheet J** Table J3's sample size output to the output of StatGraphics.	(Test#19) Table J3's output must be within 1% of StatGraphics' output.

(Test#20) Compare the output of Worksheet J Tables J2 and J3 to the corresponding value in J1, when all other inputs to Tables J2 and J3 are identical to the corresponding values in Table J1.	(Test#20) The output of Tables J2 and J3 must be within 0.1% of the corresponding values in Table J1.
(Test#21) Compare **Worksheet K** Table K3's sample size output to the output of StatGraphics.	(Test#21) Table K3's output must be within 1% of StatGraphics' output.
(Test#22) Compare the output of Worksheet K Tables K2 and K3 to the corresponding value in Table K1, when all other inputs to Tables K2 and K2 are identical to the corresponding values in Table K1.	(Test#22) The output of Tables K2 and K3 must be within 0.1% of the corresponding values in Table K1.
(Test#23) Compare **Worksheet L** Table L1's "without confidence" output to results calculated with an electronic hand-held calculator.	(Test#23) Table L1's output must be within 0.001% of the output of the hand-held calculator.
(Test#24) Compare Worksheet L Table L2's "with confidence" upper and lower limit outputs to those of "without confidence" Table L1, when (on the hidden calculation worksheet) all of the following are true: • the sample standard deviation used by the "with confidence" formula is manually changed into the same standard deviation that the "without...confidence" formula uses • the sample mean used by the "with confidence" formula is manually changed into that used by the "without confidence" one • all other inputs are identical, on Worksheet L's "with" and "without" input tables	(Test#24) Table L2's output must be within 0.001% of those in Table L1.

(Test#25) In the L2 "with confidence" formula section of the hidden calculation worksheet, compare the RSB-calculated upper 1-tailed confidence limit on the inputted std deviation to output of StatGraphics.	(Test#25) The hidden worksheet's output must be within 1% of the output of StatGraphics.
(Test#26) In the L2-formula section of the hidden calculation worksheet, compare (in "part 1") the upper and lower confidence limits of the mean, and (in "part 2") the width of the confidence interval defined by those limits, to that outputted by StatGraphics (both using the "modified" std deviation that is outputted by RSB, on its hidden calculation worksheet).	(Test#26) On the hidden worksheet, the upper and lower confidence limits and the width of the interval defined by those limits must be within 1% of the output of StatGraphics.

VALIDATION REPORT for Protocol # ZTC-6

For version 6x of ZCT's

"RELIABILITY STATISTICS BASICS"

For the name+signature of the author of this Protocol, see cover-page of this combined Protocol+Report PDF file.

1.0 INSTALLATION VALIDATION

Self-evident -- see Protocol for discussion.

2.0 DESIGN VALIDATION

All the equations on the hidd
in the source articles.

All the table-values on the or
tables in the source articles.

All the references on all worl
hidden calculation worksheet

The only user-modifiable cel
(e.g., sample size, number of
the ones for inputting user's d

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3.0 PERFORMANCE VALIDATION

The text of the leftmost and center columns in the table below have been copied here from Protocol # ZTC-6.

VALIDATION PLAN	SUCCESS CRITE	RESULTS
(Test#1) Compare the output of R-Stat's "pbinom" function to the output **Worksheet A** Table A2.	(Test#1) The output must be wit the output c "pbinom" fu	
(Test#2) In all combinations used in Test#1, compare the outputs of Tables A1 and A3 to the inputs of Table A2, when the sample size and confidence inputs to Tables A1 and A3 are made to be identical to the corresponding values in Table A2.	(Test#2) The output A1 and A3 within 0.1% correspond in Table A2	
(Test#3) Compare the output of R-Stat's "pbinom" function to the output of the Beta-distribution section of **Worksheet B** Table B2.	(Test#3) The output distribution Table B2 m within 1% o of R-Stat's ' function.	
(Test #4) In all combinations used in Test#3, compare Table B2's F-distribution output to the output of R-Stat's "pbinom" function.	(Test#4) The output distribution Table B2 m within 1% o of R-Stat's ' function.	
(Test#5) In all combinations used in Test#3, compare the Beta-distribution output of Table B1 (i.e., "reliability") to the input used in Table B2, when the sample size, failures, and confidence inputs to Table B1 are made to be identical to the corresponding values in Table B2.	(Test#5) Table B1's distribution be within 0. reliability in Table B2.	

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(Test#6) In all combinations used in Test#3, compare the F-distribution output of Table B1 (i.e., "reliability") to the input used in Table B2, when the sample size, failures, and confidence inputs to Table B1 are made to be identical to the corresponding values in Table B2.	(Test#6) Table B1's distributio be within reliability i Table B2.
(Test#7) Compare the output of R-Stat's "phyper" function to **Worksheet C**'s output. NOTE: R-Stat outputs Alpha (i.e., 1 – Confidence) whereas Worksheet C outputs Confidence.	(Test#8) The outpu Worshee within 1% output of "phyper" f
(Test#8) Compare **Worksheet D** Table D1's "without confidence" reliability output to that found in examples from published textbooks and/or articles.	(Test#8) Table D1' be within output of t and article
(Test#9) Compare Worksheet D Table D2's reliability output with that on Table D1, when (on the hidden calculation worksheet) the "upper 1-tailed...confidence limit" standard deviation used by Table D2 is manually changed to equal the standard deviation used by Table D1, when both tables use the same values for Mean of Stress, Mean of Strength, and Correlation Coefficient.	(Test#9) Table D2' be within Table D1'
(Test#10) (On the hidden calculation worksheet), compare Worksheet D Table D2's "upper 1-tailed...confidence limit" on the inputted standard deviation to that of StatGraphics).	(Test#10) Table's D2 limits are the limits StatGraph

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(Test#11) Compare **Worksheet E**'s K-factor output to values found in the textbook from which came the table of values used in this worksheet.	(Test#11) Workshee outputs m literally ide K's found source-bo
(Test#12) Compare **Worksheet F** Table F1's "K" output to the output of StatGraphics.	(Test#12) Table F1's be within StatGraph
(Test#13) Compare the output of Worksheet F Tables F2, F3, and F4 to the corresponding value in Table F1, when all other inputs to Tables F2, F3, and F4 are identical to the corresponding values in Table F1.	(Test#13) The outpu F2, F3, an be within correspon in Table F
(Test#14) Compare **Worksheet G**'s K-factor output to values found in the textbook from which came the table of values used in this worksheet.	(Test#14) Workshee outputs m literally ide K's found source-bo
(Test#15) Compare **Worksheet H** Table H1's "K" output to the output of StatGraphics.	(Test#15) Table H1' be within StatGraph
(Test#16) Compare the output of Worksheet H Tables H2, H3, and H4 to the corresponding value in Table H1, when all other inputs to Tables H2, H3, and H4 are identical to the corresponding values in Table H1.	(Test#16) The outpu H2, H3, a be within correspon in Table H
(Test#17) Compare **Worksheet I** Table 1's "K" output to the output of StatGraphics.	(Test#17) Table 1's be within StatGraph

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(Test#18) Compare the output of Worksheet I Tables 2, 3, and 4 to the corresponding value in Table 1, when all other inputs to the Tables 2, 3, and 4 are identical to the corresponding values in Table 1.	(Test#18) The output o 3, and 4 mus 0.1% of the correspondin in Table 1.
(Test#19) Compare **Worksheet J** Table J3's sample size output to the output of StatGraphics.	(Test#19) Table J3's ou be within 1% StatGraphics
(Test#20) Compare the output of Worksheet J Tables J2 and J3 to the corresponding value in J1, when all other inputs to Tables J2 and J3 are identical to the corresponding values in Table J1.	(Test#20) The output o J2 and J3 mu within 0.1% c correspondin in Table J1.
(Test#21) Compare **Worksheet K** Table K3's sample size output to the output of StatGraphics.	(Test#21) Table K3's o be within 1% StatGraphics
(Test#22) Compare the output of Worksheet K Tables K2 and K3 to the corresponding value in Table K1, when all other inputs to Tables K2 and K2 are identical to the corresponding values in Table K1.	(Test#22) The output o K2 and K3 m within 0.1% c correspondin in Table K1.
(Test#23) Compare **Worksheet L** Table L1's "without confidence" output to results calculated with an electronic hand-held calculator.	(Test#23) Table L1's ou be within 0.0 the output of held calculat

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(Test#24) Compare Worksheet L Table L2's "with confidence" upper and lower limit outputs to those of "without confidence" Table L1, when (on the hidden calculation worksheet) all of the following are true: • the sample standard deviation used by the "with confidence" formula is manually changed into the same standard deviation that the "without...confidence" formula uses • the sample mean used by the "with confidence" formula is manually changed into that used by the "without confidence" one • all other inputs are identical, on Worksheet L's "with" and "without" input tables	(Test#2 Table L be withi those in
(Test#25) In the L2 "with confidence" formula section of the hidden calculation worksheet, compare the RSB-calculated upper 1-tailed confidence limit on the inputted std deviation to output of StatGraphics.	(Test#2 The hid workshe must be the outp StatGra
(Test#26) In the L2-formula section of the hidden calculation worksheet, compare (in "part 1") the upper and lower confidence limits of the mean, and (in "part 2") the width of the confidence interval defined by those limits, to that outputted by StatGraphics (both using the "modified" std deviation that is outputted by RSB, on its hidden calculation worksheet).	(Test#2 On the workshe and low limits ar the inter those li within 1 of StatG

Exceptions to the Validation Protocol: There were no

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4.0 CONCLUSION

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5.0 ATTACHMENT: Data from Validation Tests #1 thru #26

ATTACHMENT for Protocol Report #ZTC-6, for RSB v6x

Test # 1	INPUT TO RSB AND TO REFERENCE			RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	Confidence	Reliability	Confidence	Output of R-Stat "pbinom"	Output as % of Reference	Validation criterion	Criterion met ?
Table A2	5	To be calculated	75%	76.2695%	76.26953%	100%		
	28		95%	76.2173%	76.21731%	100%		
	50		97%	78.1935%	78.19346%	100%		
	65		80%	99.9998%	99.99995%	100%		
	100		95%					
	100		98.5%					
	86		85%					
	275		95%					
	1,000,000		99.9998%					
	NOTES: --- The Input to the reference program for Test # 1 will be that --- The format for "pbinom" for this test is: pbinom(SampleSiz							

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Test # 2	INPUT TO RSB AND TO REFERENCE							
	Sample Size	Confidence	Reliability					
Table A1	Same as Input to Test # 1	Same as RSB output from Test # 1	To be calculated					
	Sample Size	Confidence	Reliability					
Table A3	To be calculated	Same as RSB output from Test # 1	Same as Input to Test # 1					
				86	86	100.0%		
				275	275	100.0%		
				1,000,000	1,000,000	100.0%		

Test # 3	INPUT TO RSB AND TO REFERENCE				RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	Number of Failures	Confidence	Reliability	Confidence (Beta Distribution)	Output of R-Stat "pbinom"	Output as % of Reference	Validation criterion	Criterion met ?
Table B2 Beta Distribution	5	0	To be calculated	75%	76.2695%	76.26953%	100%		
	28	0		95%	76.2173%	76.21731%	100%		
	50	0		97%	78.1935%	78.19346%	100%		
	100	0		88%					
	100	0		95%					
	100	0		98.5%					
	250	0		95%					
	1,000	0		99%					
	1,000,000	0		99.9998%					
	10	1		75.0000%					
	53	1		95.0000%					
	270	1		99.0000%					
	57	1		75.0000%					
	150	1		95.0000%					
	300	1		99.0000%					
	90	1		85.0000%					
	300	1		95.0000%					
	1,000,000	1		99.9990%					
	29	5		75.0000%					
	150	5		95.0000%					
	750	5		99.0000%					
	120	10		75.0000%					
	500	10		95.0000%					
	40,000	10		99.9500%					
	450	100		75.0000%					
	2,500	100		95.0000%					
	1,000,000	1000		99.8900%					
	NOTE: The format for "pbinom" for this test is: pbinom(SampleSize – Failures – 1, Sampl								

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Test # 4	INPUT TO RSB AND TO REFERENCE								
	Sample Size	Number of Failures	Confidence	Reliability					
Table B2 F Distribution	Same as Input to Test # 3	Same as Input to Test # 3	To be calculated	Same as Input to Test # 3					
					98.9556%	98.95559%	100%		
					99.8831%	99.88311%	100%		
	NOTE: The format for "pbinom" for this test is: pbinom(SampleSize – Failures – 1, SampleSize, Reliability)								

Test # 5	INPUT TO RSB AND TO REFERENCE				RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	Number of Failures	Confidence	Reliability	Reliability (Beta Distribution)	Same as Reliability Input to Test # 3	Output as % of Reference	Validation criterion	Criterion met ?
					75.000000%	75%	100.0%		
					94.999999%	95%	100.0%		
Table B1 Beta Distribution	Same as Input to Test # 3	Same as Input to Test # 3	Same as Beta Distribution RSB output from Test # 3	**To be calculated**					

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Test # 6	INPUT TO RSB AND TO REFERENCE				
	Sample Size	Number of Failures	Confidence	Reliability	
Table B1 F Distribution	Same as Input to Test # 3	Same as Input to Test # 3	Same as F-Distribution RSB output from Test # 4	**To be calculated**	

99.950000%	99.9500%	100.0%		**conditions**
74.999999%	75.0000%	100.0%		
95.000001%	95.0000%	100.0%		
99.890000%	99.8900%	100.0%		

Test # 7	INPUT TO RSB AND TO REFERENCE					RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Lot Size	Sample Size	Number of Failures	Confidence	Reliability	Confidence	100% minus Output of R-Stat "phyper"	Output as % of Reference	Validation criterion	Criterion met ?
Work Sheet C	200	5	0	To be calculated	75.0000%	76.6687%	76.6687%	100%		
	200	26	0		95.0000%	76.0076%	76.0076%	100%		
	200	100	0		99.0000%	75.1256%	75.1256%	100%		
	200	10	1		75.0000%	76.3177%	76.3177%	100%		
	200	60	1		95.0000%	85.7418%	85.7418%	100%		
	200	90	1		97.0000%	84.0343%	84.0343%	100%		
	200	20	2		75.0000%	[illegible]	[illegible]	[illegible]		
	200	100	2		95.0000%					
	200	180	2		98.0000%					
	200	50	10		75.0000%					
	200	120	10		90.0000%					
	200	180	10		93.0000%					
	1,000	5	0		75.0000%					
	1,000	100	0		95.0000%					
	1,000	500	0		99.8000%					
	1,000	10	1		75.0000%					
	1,000	70	1		95.0000%					
	1,000	970	1		99.5000%					
	1,000	15	2		75.0000%					
	1,000	100	2		95.0000%					
	1,000	400	2		97.0000%					
	1,000	60	10		75.0000%					
	1,000	280	10		95.0000%					
	1,000	600	10		96.0000%					
	1,000,000	5	0		75.0000%					
	1,000,000	30	0		95.0000%					
	1,000,000	67	0		97.5000%					
	1,000,000	10	1		75.0000%					
	1,000,000	65	1		95.0000%					
	1,000,000	67	1		96.0000%					
	1,000,000	15	2		75.0000%					
	1,000,000	67	2		85.0000%					
	1,000,000	67	2		94.0000%					
	1,000,000	51	10		75.0000%					
	1,000,000	67	10		81.0000%					

NOTE:
The format for "phyper" for this test is: phyper(Failures in Sample, Failures in Population, Successes in Population, S
(where "Failures in Population" = LotSize – Reliability x LotSize, and where "Successes in Population" = Reliability x L

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Test # 8	INPUT TO RSB AND TO REFERENCE				
	Mean of Stress	Mean of Strength	Std Dev of Stress	Std Dev of Strength	Corr. Coef. of Stress vs. Strength
Table D1	100,000	130,000	10,000	11,000	blank (none specified)
	40	60	5	4	blank (none specified)
	30,000	50,000	3,000	5,000	blank (none specified)
	250	160,000	50	17,660	blank (none specified)

Dovich = Reliability Statistics, by Dovich, 1990 by ASQC Quality Press, page 59

Shigley = Mechanical Engineering Design, 5th ed., by Shigley and Mischke, 1989 by McGraw-Hill, page 258

"Pyzdek" = Quality Engineering Bible, by Pyzdek, 1996 by Quality Publishing, page 510

PSI = Probablistic Software Inc., publication # RADC-TR-85-194 (October 1985), "Stress/Strength Interference Method for the Mopropellant Tank", "Example No. 1", page 2

Test # 9	INPUT TO RSB Table D2, AND TO REFERENCE (Table D1)					RELIABILITY OUTPUT		RESULTS and CONCLUSIONS		
Table D2	Mean of Stress	Mean of Strength	Std Dev of Stress	Std Dev of Strength	Corr. Coef. of Stress vs. Strength	Table D2	Table D1	D2 Output as % of Reference (D1)	Validation criterion	Criterion met ?
	100	110	8	10	0	78.256024%	78.256024%	100.0%		
	100	110	8	10	0.75	93.416597%	93.416597%	100.0%		
	100	110	8	10	0.999999	[illegible]	[illegible]	[illegible]		
	100,000	100,001	0.1	1.2	0					
	100,000	100,001	0.1	1.2	0.75					
	100,000	100,001	0.1	1.2	0.999999					
	10,000	11,000	1,000	1,000	0					
	10,000	11,000	1,000	1,000	0.75					
	10,000	11,000	1,000	1,000	0.981000					
	NOTE: Sample Size and Confidence are not inputted in this test, because they are used to adjust the Standard Deviatio									

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Test # 10	INPUT TO RSB + TO REFERENCE				RSB OUTPUT (on hidden c Upper-1-tailed Confide
Table D2	Std Dev of Stress	Std Dev of Strength	Sample Size	Confidence (= 1 – Alpha)	on StdDev of Stress
	1.0000	2.0000	5	0.75	1.44242
			5	0.95	2.37236
			5	0.9999	11.86396
			100	0.75	1.05361
			100	0.95	1.13355
			100	0.9999	1.34180
			800	0.75	1.01754
			800	0.95	1.04305
			800	0.9999	1.10127
	The STATGRAPHICS Menu Sequence used in this test is: Describe / NumericData / HypothesisTests / Normal Sigma				

Test # 11	INPUT TO RSB AND TO REFERENCE			RSB OUTPUT	REFERENCE
Work Sheet E	Sample Size	Confidence	Reliability	K	Bowker
	3	75.0%	75.0%	1.464	1.464
	13	75.0%	90.0%	1.606	1.606
	23	75.0%	95.0%	1.907	1.907
	30	75.0%	99.0%	2.613	2.613
	50	75.0%	99.9%	3.358	3.358
	45	90.0%	75.0%	0.908	0.908
	35	90.0%	90.0%	1.623	1.623
	24	90.0%	95.0%	2.145	2.145
	14	90.0%	99.0%	3.257	3.257
	4	90.0%	99.9%	7.128	7.128
	7	95.0%	75.0%	1.732	1.732
	16	95.0%	90.0%	2.032	2.032
	22	95.0%	95.0%	2.350	2.350
	40	95.0%	99.0%	2.941	2.941
	50	95.0%	99.9%	3.766	3.766
	18	99.0%	75.0%	1.481	1.481
	17	99.0%	90.0%	2.405	2.405
	12	99.0%	95.0%	3.410	3.410
	9	99.0%	99.0%	5.389	5.389
	6	99.0%	99.9%	9.540	9.540
	"Bowker" = *Engineering Statistics* , by A. H. Bowker & G. J. Lieberman (2nd edition, 1972 by Prentice-Hall Inc.), table 8.4, pages 314+415.				

100.0000%			
100.0000%			
100.0000%			
100.0000%			
100.0000%			
100.0000%			

Test # 12	INPUT TO RSB AND TO REFERENCE			RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	Confidence	Reliability	K	Statgraphics	Output as % of Reference	Validation criterion	Criterion met ?
Table F1	30	75%	75.0%	0.817334	0.824938	99%		
	30	75%	95.0%	1.849802	1.868610	99%		
	30	75%	99.9999%	5.233233	5.289950	99%		
	30	95%	75.0%	1.050926	1.058450	99%		
	30	95%	95.0%	2.208509	2.219840	99%		
	30	95%	99.9999%	6.106261	6.128180	100%		
	30	99%	75.0%					
	30	99%	95.0%					
	30	99%	99.9999%					
	1,000	75%	75.0%					
	1,000	75%	95.0%					
	1,000	75%	99.9999%					
	1,000	95%	75.0%					
	1,000	95%	95.0%					
	1,000	95%	99.9999%					
	1,000	99%	75.0%					
	1,000	99%	95.0%					
	1,000	99%	99.9999%					
	999,999	75%	75.0%					
	999,999	75%	95.0%					
	999,999	75%	99.9999%					
	999,999	95%	75.0%					
	999,999	95%	95.0%					
	999,999	95%	99.9999%					
	999,999	99%	75.0%					
	999,999	99%	95.0%					
	999,999	99%	99.9999%					
	The STATGRAPHIC Menu Sequence used in this test is: Describe Statgraphics' output is a multiplication factor to be applied to the star							

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Test # 13	INPUT TO RSB AND TO REFERENCE								
	Sample Size	Confidence	Reliability						
Table F2	Same as Sample Size input to Test # 12	Same as Confidence input to Test # 12	**To be calculated**	fro	75.0000%	75.0000%	100.0%		
					95.0000%	95.0000%	100.0%		
					99.9999%	99.9999%	100.0%		
					75.0000%	75.0000%	100.0%		
					95.0000%	95.0000%	100.0%		
					99.9999%	99.9999%	100.0%		
					75.0000%	75.0000%	100.0%		
					95.0000%	95.0000%	100.0%		
					99.9999%	99.9999%	100.0%		
					75.0000%	75.0000%	100.0%		
					95.0000%	95.0000%	100.0%		
					99.9999%	99.9999%	100.0%		

Test # 13 con-tinued	INPUT TO RSB AND TO REFERENCE				RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	**Confidence**	**Reliability**	**K**	**Confidence**	**Same as Confidence input to Test # 12**	**Output as % of Reference**	**Validation criterion**	**Criterion met ?**
Table F3	Same as Sample Size input to Test # 12	**To be calculated**	Same as Reliability input to Test # 12	Same as K output from Test # 12	75.0000% 75.0000% 75.0000% 95.0000% 95.0000% 95.0000%	75.0000% 75.0000% 75.0000% 95.0000% 95.0000% 95.0000%	100.0% 100.0% 100.0% 100.0% 100.0% 100.0%		
Table F4	**Sample Size**	**Confidence**	**Reliability**	**K**	**S**				
	To be calculated	Same as Confidence input to Test # 12	Same as Reliability input to Test # 12	Same as K output from Test # 12	1,000,000 1,000,000 1,000,000 1,000,000 1,000,000 1,000,000 1,000,000	999,999 999,999 999,999 999,999 999,999 999,999 999,999	100.0% 100.0% 100.0% 100.0% 100.0% 100.0% 100.0%		
	NOTE: The Sample Sizes that equal 31 in Table F4's output (above) were rounded up from values of approximately 30.0000000000004, and therefore have Output % within the required 01%., as allowed by the introductory "note" to the Performance Validation section of the Validation Protocol.								

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Test # 14	INPUT TO RSB AND TO REFERENCE			RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	Confidence	Reliability	K	Eisenhart	Output as % of Reference	Validation criterion	Criterion met ?
Work Sheet G	2	75%	75.0%	4.498	4.498	100.0000%		
	12	75%	90.0%	2.062	2.062	100.0000%		
	22	75%	95.0%	2.271	2.271	100.0000%		
	220	75%	99.0%	2.671	2.671	100.0000%		
	1000	75%	99.9%					
	900	90%	75.0%					
	500	90%	90.0%					
	50	90%	95.0%					
	30	90%	99.0%					
	10	90%	99.9%					
	3	95%	75.0%					
	13	95%	90.0%					
	33	95%	95.0%					
	330	95%	99.0%					
	725	95%	99.9%					
	650	99%	75.0%					
	425	99%	90.0%					
	185	99%	95.0%					
	104	99%	99.0%					
	5	99%	99.9%	1				

"Eisenhart" = *Selected Techniques of Statistical Analysis for Scientific*
Wallis (1947 by McGraw-Hill Book Co. Inc.) , Table # 2.1, pages 102-

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Test # 15	INPUT TO RSB AND TO REFERENCE			O				
	Sample Size	Confidence	Reliability					
Table H1	30	75%	75%	1.				
	30	75%	95%	2.				
	30	75%	99.9829%	4.				
	30	95%	75%	1.				
	30	95%	95%	2.				
	30	95%	99.9956%	5.				
	30	99%	75%	1.				
	30	99%	95%	2.				
	30	99%	99.9989%	6.				
	100	75%	75%	1.				
	100	75%	95%	2.				
	100	75%	99.9829%	3.				
	100	95%	75%	1.				
	100	95%	95%	2.				
	100	95%	99.9956%	4.				
	100	99%	75%	1.				
	100	99%	95%	2.				
	100	99%	99.9989%	5.				
	900	75%	75%	1.169982	1.16995	100%		
	900	75%	95%	1.993413	1.99335	100%		
	900	75%	99.9829%	3.822628	3.82262	100%		
	900	95%	75%	1.197581	1.19746	100%		
	900	95%	95%	2.040435	2.04022	100%		
	900	95%	99.9956%	4.253273	4.25327	100%		
	900	99%	75%	1.217615	1.21738	100%		
	900	99%	95%	2.074570	2.07416	100%		
	900	99%	99.9989%	4.653789	4.6538	100%		

The STATGRAPHICS Menu Sequence used in this test is: Describe / NumericData / StatisticalToleranceLimits / AnalysisOptions / TwoSided (with Mean = 10, Std Deviation = 2).
Statgraphics' output is a multiplication factor to be applied to the standard deviation [which Statgraphics calls "sigma"]; such a factor is identical to a "K".

Test # 16	INPUT TO RSB AND TO REFERENCE				RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	Confidence	Reliability	K	Reliability	Same as Reliability input to Test # 15	Output as % of Reference	Validation criterion	Criterion met ?
Table H2	Same as Sample Size input to Test # 15	Same as Confidence input to Test # 15	**To be calculated**	Same as K output from Test # 15	75.000000% 95.000000% 99.982900% 75.000000% 95.000000% 99.995600%	75% 95% 99.9829% 75% 95% 99.9956%	100.0% 100.0% 100.0% 100.0% 100.0% 100.0%		
Table H3	Same as Sample Size input to Test # 15	**To be calculated**	Same as Reliability input to Test # 15	Same as K output from Test # 15	95.000026% 95.000026% 95.000026% 98.999972% 98.999972% 98.999972%	95% 95% 95% 99% 99% 99%	100.0% 100.0% 100.0% 100.0% 100.0% 100.0%		

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Test # 16 con-tinued	INPUT TO RSB AND TO REFERENCE				RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	Confidence	Reliability	K	Sample Size	Same as Sample Size input to Test # 15	Output as % of Reference	Validation criterion	Criterion met ?
Table H4	To be calculated	Same as Confidence input to Test # 15	Same as Reliability input to Test # 15	Same as K output from Test # 15	30	30	100.0%		
					30	30	100.0%		
					30	30	100.0%		
					30	30	100.0%		
					30	30	100.0%		
					30	30	100.0%		

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Test # 17	INPUT TO RSB AND TO REFERENCE			RSB OUTPUT	R			
	Sample Size	Confidence	Reliability	K	S			
Work Sheet I Table 1	900	75%	75%	1.169945				
	900	75%	95%	1.993350				
	900	75%	99.9829%	3.822507				
	900	95%	75%	1.197454				
	900	95%	95%	2.040219				
	900	95%	99.9956%	4.252823				
	900	99%	75%	1.217374				
	900	99%	95%	2.074158				
	900	99%	99.9989%	4.652865				
	10,000	75%	75%	1.155954				
	10,000	75%	95%	1.969511				
	10,000	75%	99.9826%	3.772417				
	10,000	95%	75%	1.163955				
	10,000	95%	95%	1.983143				
	10,000	95%	99.9955%	4.128564				
	10,000	99%	75%	1.169628				
	10,000	99%	95%	1.992809				
	10,000	99%	99.9989%	4.470379	4.47038	100.0%		
	999,999	75%	75%	1.150899	1.1509	100.0%		
	999,999	75%	95%	1.960900	1.9609	100.0%		
	999,999	75%	99.9826%	3.755922	3.75592	100.0%		
	999,999	95%	75%	1.151690	1.15169	100.0%		
	999,999	95%	95%	1.962246	1.96225	100.0%		
	999,999	95%	99.9956%	4.090288	4.08504	100.1%		
	999,999	99%	75%	1.152245	1.15225	100.0%		
	999,999	99%	95%	1.963193	1.9632	100.0%		
	999,999	99%	99.9989%	4.403943	4.40392	100.0%		

The STATGRAPHICS Menu Sequence used in this test is: Describe / NumericalData / StatisticalToleranceLimits / AnalysisOptions / UpperOnly" (with Mean = 10, Std Deviation = 2).
Statgraphics' output is a multiplication factor to be applied to the standard deviation [which Statgraphics calls "sigma"]; such a factor is identical to a "K".

Test # 18	INPUT TO RSB AND TO REFERENCE				RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	Confidence	Reliability	K	Reliability	Same as Reliability input to Test # 17	Output as % of Reference	Validation criterion	Criterion met ?
Work Sheet I Table 2	Same as Sample Size input to Test # 17	Same as Confidence input to Test # 17	To be calculated	Same as K output from Test # 17	75.000000% 95.000000% 99.982900% 75.000000% 95.000000% 99.995600% 75.000000%	75.0000% 95.0000% 99.9829% 75.0000% 95.0000% 99.9956% 75.0000%	100.0% 100.0% 100.0% 100.0% 100.0% 100.0% 100.0%		
Work Sheet I Table 3	Same as Sample Size input to Test # 17	To be calculated	Same as Reliability input to Test # 17	Same as K output from Test # 17	95.000000% 95.000000% 99.000000% 99.000000% 99.000000%	95% 95% 99% 99% 99%	100.0% 100.0% 100.0% 100.0% 100.0%		

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Test # 18 con-tinued	INPUT TO RSB AND TO REFERENCE				RSB OUTPUT	REFERENCE	RESULTS and CONCLUSIONS		
	Sample Size	Confidence	Reliability	K	Sample Size	Same as Sample Size input to Test # 17	Output as % of Reference	Validation criterion	Criterion met ?
Work Sheet I Table 4	To be calculated	Same as Confidence input to Test # 17	Same as Reliability input to Test # 17	Same as K output from Test # 17	900	900	100.0%		
					900	900	100.0%		
					900	900	100.0%		
					900	900	100.0%		
					901	900	100.1%		
					900	900	100.0%		

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Test # 19	INPUT TO RSB AND TO REFERENCE			RSB OUTPUT	R			
	Sample Size	Confidence	Proportion	Sample Size	S			
Table J3	To be calculated	75.0%	75.0000%	5				
		75.0%	95.0000%	28				
		75.0%	99.9998%	693,147				
		95.0%	75.0000%	11				
		95.0%	95.0000%	59				
		95.0%	99.9997%	998,576				
		99.9999%	75.0000%	49	49	100%		
		99.9999%	95.0000%	270	270	100%		
		99.9999%	99.9986%	986,816	986,816	100%		
	The STATGRAPHICS Menu Sequence used in this test is: Describe / NumericData / StatisticalToleranceLimits / Tables=Nonparametric Limits / AnalysisOptions = UpperOnly							

Test # 20	TABLE J1			TABLE J2			RESULTS and CONCLUSIONS		
	INPUT		OUTPUT	INPUT	OUTPUT	INPUT			
	Sample Size	Confidence	Proportion	Sample Size	Confidence	Proportion	Table J2 Output as % of Table J1 Input	Validation criterion	Criterion met ?
Table J2 vs. J1	5	75.0%	75.785828%	Same as Input to J1	75.0000%		100.0%		
	28	75.0%	95.169515%		75.0000%		100.0%		
	693147	75.0%	99.999800%						
	11	95.0%	76.159581%						
	59	95.0%	95.049239%						
	998576	95.0%	99.999700%						
	49	99.9999%	75.431201%						
	270	99.9999%	95.011851%						
	986,816	99.9999%	99.998600%						
Table J3 vs. J1	TABLE J1								
	INPUT		OUTPUT	OUTPUT					
	Sample Size	Confidence	Proportion	Sample Size					
	5	75.0%	75.785828%	5					
	28	75.0%	95.169515%	28					
	693147	75.0%	99.999800%	693147					
	11	95.0%	76.159581%	11					
	59	95.0%	95.049239%	59					
	998576	95.0%	99.999700%	998577					
	49	99.9999%	75.431201%	49					
	270	99.9999%	95.011851%	270					
	986,816	99.9999%	99.998600%	986816					

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Test # 21	INPUT TO RSB AND TO REFERENCE			RSB OUTPUT				
	Sample Size	Confidence	Proportion	Sample Size				
Table K3	To be calculated	75.0%	75.0000%	10				
		75.0%	95.0000%	54				
		75.0%	99.9997%	897,544				
		95.0%	75.0000%	18				
		95.0%	95.0000%	94				
		95.0%	99.9995%	948,771				
		99.9999%	75.0000%	59	59	100%		
		99.9999%	95.0000%	326	326	100%		
		99.9999%	99.9980%	834,458	834,414	100%		
	The STATGRAPHICS Menu Sequence used in this test is: Describe / NumericData / StatisticalToleranceLimits / Tables=Nonparametric Limits / AnalysisOptions = TwoSided)							

Test # 22	TABLE K1			TABLE K2			RESULTS and CONCLUSIONS		
	INPUT		OUTPUT	INPUT	OUTPUT	INPUT			
	Sample Size	Confidence	Proportion	Sample Size	Confidence	Proportion	Table K2 Output as % of Table K1 Input	Validation criterion	Criterion met ?
Table K2 vs. K1	10	75.0%	75.174678%	Same as Input to K1	75.0000%		100.0%		
	54	75.0%	95.090585%		75.0000%		100.0%		
	897544	75.0%	99.999700%		[illegible]		[illegible]		
	18	95.0%	76.127816%						
	94	95.0%	95.051874%						
	948771	95.0%	99.999500%						
	59	99.9999%	75.032706%						
	326	99.9999%	95.000878%						
	834,458	99.9999%	99.998000%						

	TABLE K1				
	INPUT		OUTPUT	OUTPUT	
	Sample Size	Confidence	Proportion	Sample Size	
Table K3 vs. K1	10	75.0%	75.174678%	10	
	54	75.0%	95.090585%	54	
	897544	75.0%	99.999700%	897545	
	18	95.0%	76.127816%	18	
	94	95.0%	95.051874%	94	
	948771	95.0%	99.999500%	948772	
	59	99.9999%	75.032706%	59	
	326	99.9999%	95.000878%	326	
	834,458	99.9999%	99.998000%	834458	

Test # 23	HAND-HELD CALCULATOR INPUT & OUTPUT (using Avg = Sample Avg = 10,000, and S = SampleStdDeviation = 1)				
	K	1 – 1 / (KxK) = "reliability"	Lower Tolerance Limit = Avg – (KxS)	Upper Tolerance Limit = Avg + (KxS)	Des
Table L1	2	75%	9,998	10,002	
	5	96%	9,995	10,005	
	10	99%	9,990	10,010	
	100	99.99%	9,900	10,100	
	1,000	99.9999%	9,000	11,000	

Chebychev's theorem states that no more than 1/(KxK) of a population will lie outside the ran
referred to as the "Desired Reliability". In this validation Test, the Sample Average and Samp

Test # 24	INPUT TO RSB TABLES L1 and L2			TABLE L2 OU	
	Sample Avg	Sample Std Deviation	Desired Reliability	Lower Tolerance Limit	To
Table L2	10,000	1	75%	9,998	
	10,000	1	96%	9,995	
	10,000	1	99%	9,990	
	10,000	1	99.99%	9,900	
	10,000	1	99.9999%	9,000	

NOTE: Sample Size and Confidence are not inputted in this test, because they are used to adjust the Standard Deviation and Mean, which adjustments are irrelevant because this test involves manually changing the Standard Deviation and Means used by L2 (see protocol). The specific values of Sample Avg and Std Deviation are irrelevant in this test, but the values being used here were chosen to simplify seeing the differences between the results of L2 an L1.

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Test # 25	INPUT TO RSB + TO STATGRAPHICS			OUTPUT: 1-tailed upper conf. limit on the inputted Sample Std Deviation		RESULTS and CONCLUSIONS		
	Sample Size	Desired Confidence (= 1 – Alpha)	Sample Std Deviation	Table L2 (on hidden calculation worksheet)	Statgraphics	Table L2 as % of Statgraphics	Validation criterion	Criterion met ?
Table L2	30	75%	1	1.109304162	1.1093	100%		
	30	95%	10	[illegible]				
	30	99%	100	[illegible]				
	30	99.99%	1000	[illegible]				
	100	75%	1000	[illegible]				
	100	95%	100	[illegible]				
	100	99%	10	[illegible]				
	100	99.99%	1	[illegible]				
	800	75%	100	[illegible]				
	800	95%	1	[illegible]				
	800	99%	1000	[illegible]				
	800	99.99%	10	[illegible]				

The STATGRAPHICS Menu Sequence used in this test is: Describe / NumericData / HypothesisTests / Normal Sigma / AnalysisOptions = LessThan
NOTE: Statgraphics does not allow alpha's smaller than 0.01%, thus the largest Confidence that can be entered here is 99.99%.

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Test # 26	INPUT TO RSB + TO REFERENCE					RSB TABLE L2's 2-SIDED OUTPUT		STATGRAPHICS' OUTPUT		Test Row # (for use in comparing to results, below)
	Sample Size	Desired Confidence (= 1 – Alpha)	Sample Average	Sample Std Deviation	RSB's Modified Sample Std Deviation = Output on hidden calculation worksheet = Input to Statgraphics	Lower Conf. Limit of Sample Avg (on hidden calculation worksheet)	Upper Conf. Limit of Sample Avg (on hidden calculation worksheet)	Lower Conf. Limit of Sample Avg	Upper Conf. Limit of Sample Avg	
	30	75%	10	0.1	0.110930	9.97622569	10.02377431	9.97623	10.0238	1
	100	75%	10	0.1	0.105361	9.98780824	10.01219176	9.98781	10.0122	2
	300	75%	10	0.1	0.102940					
	800	75%	10	0.1	0.101754					
	30	95%	1,000	100	127.970411					
	100	95%	1,000	100	113.355258					
	300	95%	1,000	100	107.249330					
	800	95%	1,000	100	104.305214					
	30	99%	0.1	0.01	0.014262					
	100	99%	0.1	0.01	0.011958					
	300	99%	0.1	0.01	0.011046					
	800	99%	0.1	0.01	0.010616					
	30	99.99%	10,000	1000	1822.566237					
	100	99.99%	10,000	1000	1341.763452					
	300	99.99%	10,000	1000	1175.229332	9732.38187	10267.61813	9732.41	10267.6	15
	800	99.99%	10,000	1000	1101.284478	9847.74391	10152.25609	9848.51	10151.5	16

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Table L2

The STATGRAPHICS Menu Sequence used in this test is: Describe / NumericData / HypothesisTests / Normal Mean / AnalysisOptions = Not_Equal
NOTE: Statgraphics does not allow alpha's smaller than 0.01%, thus the largest Confidence that can be entered here is 99.99%.

RESULTS (part 1)				RESULTS (part 2)					Test Row # (for use in comparing to output, above)
Table L2's Lower Conf. Limit as % of Statgraphics	Table L2's Upper Conf. Limit as % of Statgraphics	Validation criterion	Criterion met for Upper & Lower Limits?	Width of RSB conf. interval of Sample Avg (Upper – Lower limit)	Width of Statgraphics conf. interval of Sample Avg (Upper – Lower limit)	RSB width as % of Statgraphics'	Validation criterion	Criterion met for Upper & Lower Limits?	
100%	100%			0.04755	0.04757	100%			1
100%	100%			0.02438	0.02439	100%			2
100%	100%			0.01370	0.01375	100%			3
1									4
1									5
1									6
1									7
1									8
1									9
1									10
1									11
1									12
100%	100%			2998.2911	2998.4	100%			13
100%	100%			1088.1019	1088.2	100%			14
100%	100%			535.2363	535.2	100%			15
100%	100%			304.5122	302.99	101%			16

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