User Selected Options
Date/Time of Computation   ProUCL 5.18/23/2017 11:42:10 AM
From File   Input.xls
Full Precision   OFF
Confidence Coefficient   95%
Number of Bootstrap Operations   10000

final_numeric (radium-226)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	50
		Number of Missing Observations	0
Minimum	0.426	Mean	1.26
Maximum	2.46	Median	1.2
SD	0.44	Std. Error of Mean	0.0578
Coefficient of Variation	0.349	Skewness	0.852

Normal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0128	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.121	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.357	95% Adjusted-CLT UCL (Chen-1995)	1.362
		95% Modified-t UCL (Johnson-1978)	1.358

Gamma GOF Test

A-D Test Statistic	0.278	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0759	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.117	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.671	k star (bias corrected MLE)	8.234
Theta hat (MLE)	0.145	Theta star (bias corrected MLE)	0.153
nu hat (MLE)	1006	nu star (bias corrected)	955.1
MLE Mean (bias corrected)	1.26	MLE Sd (bias corrected)	0.439
		Approximate Chi Square Value (0.05)	884.4
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	882.7

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.361	95% Adjusted Gamma UCL (use when n<50)	1.364

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.794	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0544	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.116	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.853	Mean of logged Data	0.173
Maximum of Logged Data	0.9	SD of logged Data	0.35

Assuming Lognormal Distribution

95% H-UCL	1.369	90% Chebyshev (MVUE) UCL	1.44
95% Chebyshev (MVUE) UCL	1.521	97.5% Chebyshev (MVUE) UCL	1.633
99% Chebyshev (MVUE) UCL	1.854		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.355	95% Jackknife UCL	1.357
95% Standard Bootstrap UCL	1.356	95% Bootstrap-t UCL	1.363

95% Hall's Bootstrap UCL	1.364	95% Percentile Bootstrap UCL	1.358
95% BCA Bootstrap UCL	1.361		
90% Chebyshev(Mean, Sd) UCL	1.434	95% Chebyshev(Mean, Sd) UCL	1.512
97.5% Chebyshev(Mean, Sd) UCL	1.621	99% Chebyshev(Mean, Sd) UCL	1.835

Suggested UCL to Use

95% Approximate Gamma UCL	1.361

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (radium-228)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	42
		Number of Missing Observations	0
Minimum	0.875	Mean	1.604
Maximum	3.01	Median	1.565
SD	0.357	Std. Error of Mean	0.0469
Coefficient of Variation	0.223	Skewness	1.087

Normal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0212	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.119	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.683	95% Adjusted-CLT UCL (Chen-1995)	1.689
		95% Modified-t UCL (Johnson-1978)	1.684

Gamma GOF Test

A-D Test Statistic	0.414	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0915	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.117	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	21.84	k star (bias corrected MLE)	20.72
Theta hat (MLE)	0.0735	Theta star (bias corrected MLE)	0.0774
nu hat (MLE)	2533	nu star (bias corrected)	2403
MLE Mean (bias corrected)	1.604	MLE Sd (bias corrected)	0.352
		Approximate Chi Square Value (0.05)	2290
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	2288

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.683	95% Adjusted Gamma UCL (use when n<50)	1.685

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.988	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.941	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0873	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.116	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.134	Mean of logged Data	0.45
Maximum of Logged Data	1.102	SD of logged Data	0.216

Assuming Lognormal Distribution

95% H-UCL	1.685	90% Chebyshev (MVUE) UCL	1.741
95% Chebyshev (MVUE) UCL	1.804	97.5% Chebyshev (MVUE) UCL	1.89
99% Chebyshev (MVUE) UCL	2.06		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.681	95% Jackknife UCL	1.683
95% Standard Bootstrap UCL	1.682	95% Bootstrap-t UCL	1.692
95% Hall's Bootstrap UCL	1.697	95% Percentile Bootstrap UCL	1.682
95% BCA Bootstrap UCL	1.689		
90% Chebyshev(Mean, Sd) UCL	1.745	95% Chebyshev(Mean, Sd) UCL	1.809
97.5% Chebyshev(Mean, Sd) UCL	1.897	99% Chebyshev(Mean, Sd) UCL	2.071

Suggested UCL to Use

95% Approximate Gamma UCL	1.683

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (thorium-228)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	1.21	Mean	1.949
Maximum	3.04	Median	1.88
SD	0.387	Std. Error of Mean	0.0522
Coefficient of Variation	0.199	Skewness	0.796

Normal GOF Test

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0671	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.103	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.119	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	2.036	95% Adjusted-CLT UCL (Chen-1995)	2.041
		95% Modified-t UCL (Johnson-1978)	2.037

Gamma GOF Test

A-D Test Statistic	0.351	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.078	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.12	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	27.19	k star (bias corrected MLE)	25.71
Theta hat (MLE)	0.0717	Theta star (bias corrected MLE)	0.0758
nu hat (MLE)	2990	nu star (bias corrected)	2829
MLE Mean (bias corrected)	1.949	MLE Sd (bias corrected)	0.384
		Approximate Chi Square Value (0.05)	2706
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	2703

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	2.037	95% Adjusted Gamma UCL (use when n<50)	2.039

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.986	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.9	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0686	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.119	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.191	Mean of logged Data	0.649
Maximum of Logged Data	1.112	SD of logged Data	0.193

Assuming Lognormal Distribution

95% H-UCL	2.039	90% Chebyshev (MVUE) UCL	2.101
95% Chebyshev (MVUE) UCL	2.171	97.5% Chebyshev (MVUE) UCL	2.267

99% Chebyshev (MVUE) UCL   2.456

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	2.035	95% Jackknife UCL	2.036
95% Standard Bootstrap UCL	2.033	95% Bootstrap-t UCL	2.044
95% Hall's Bootstrap UCL	2.04	95% Percentile Bootstrap UCL	2.034
95% BCA Bootstrap UCL	2.043		
90% Chebyshev(Mean, Sd) UCL	2.105	95% Chebyshev(Mean, Sd) UCL	2.176
97.5% Chebyshev(Mean, Sd) UCL	2.275	99% Chebyshev(Mean, Sd) UCL	2.468

Suggested UCL to Use

95% Student's-t UCL   2.036

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (thorium-230)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	0.782	Mean	1.427
Maximum	3.03	Median	1.29
SD	0.523	Std. Error of Mean	0.0705
Coefficient of Variation	0.366	Skewness	1.657

Normal GOF Test

Shapiro Wilk Test Statistic	0.826	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.7983E-8	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.193	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.119	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.544	95% Adjusted-CLT UCL (Chen-1995)	1.559
		95% Modified-t UCL (Johnson-1978)	1.547

Gamma GOF Test

A-D Test Statistic	1.475	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.144	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.12	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.434	k star (bias corrected MLE)	8.931
Theta hat (MLE)	0.151	Theta star (bias corrected MLE)	0.16
nu hat (MLE)	1038	nu star (bias corrected)	982.4
MLE Mean (bias corrected)	1.427	MLE Sd (bias corrected)	0.477
		Approximate Chi Square Value (0.05)	910.7
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	908.8

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.539	95% Adjusted Gamma UCL (use when n<50)	1.542

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.00816	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.12	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.119	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.246	Mean of logged Data	0.301
Maximum of Logged Data	1.109	SD of logged Data	0.318

Assuming Lognormal Distribution

95% H-UCL	1.532		90% Chebyshev (MVUE) UCL	1.607
95% Chebyshev (MVUE) UCL	1.692		97.5% Chebyshev (MVUE) UCL	1.81
99% Chebyshev (MVUE) UCL	2.04			

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	1.542		95% Jackknife UCL	1.544
95% Standard Bootstrap UCL	1.541		95% Bootstrap-t UCL	1.567
95% Hall's Bootstrap UCL	1.569		95% Percentile Bootstrap UCL	1.545
95% BCA Bootstrap UCL	1.559			
90% Chebyshev(Mean, Sd) UCL	1.638		95% Chebyshev(Mean, Sd) UCL	1.734
97.5% Chebyshev(Mean, Sd) UCL	1.867		99% Chebyshev(Mean, Sd) UCL	2.128

Suggested UCL to Use

95% Student's-t UCL	1.544		or 95% Modified-t UCL	1.547

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (thorium-232)

General Statistics

Total Number of Observations	55		Number of Distinct Observations	46
			Number of Missing Observations	0
Minimum	1.05		Mean	1.774
Maximum	2.74		Median	1.78
SD	0.367		Std. Error of Mean	0.0495
Coefficient of Variation	0.207		Skewness	0.189

Normal GOF Test

Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.721	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0597	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.119	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.857	95% Adjusted-CLT UCL (Chen-1995)	1.857
		95% Modified-t UCL (Johnson-1978)	1.857

Gamma GOF Test

A-D Test Statistic	0.333	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0761	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.12	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	23.17		k star (bias corrected MLE)	21.92
Theta hat (MLE)	0.0766		Theta star (bias corrected MLE)	0.0809
nu hat (MLE)	2549		nu star (bias corrected)	2411
MLE Mean (bias corrected)	1.774		MLE Sd (bias corrected)	0.379
			Approximate Chi Square Value (0.05)	2298
Adjusted Level of Significance	0.0456		Adjusted Chi Square Value	2295

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.861		95% Adjusted Gamma UCL (use when n<50)	1.863

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.434	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0903	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.119	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.0488	Mean of logged Data	0.551
Maximum of Logged Data	1.008	SD of logged Data	0.213

Assuming Lognormal Distribution

95% H-UCL	1.866	90% Chebyshev (MVUE) UCL	1.929
95% Chebyshev (MVUE) UCL	1.999	97.5% Chebyshev (MVUE) UCL	2.096
99% Chebyshev (MVUE) UCL	2.287		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.855	95% Jackknife UCL	1.857
95% Standard Bootstrap UCL	1.855	95% Bootstrap-t UCL	1.859
95% Hall's Bootstrap UCL	1.858	95% Percentile Bootstrap UCL	1.856
95% BCA Bootstrap UCL	1.853		
90% Chebyshev(Mean, Sd) UCL	1.922	95% Chebyshev(Mean, Sd) UCL	1.989
97.5% Chebyshev(Mean, Sd) UCL	2.083	99% Chebyshev(Mean, Sd) UCL	2.266

Suggested UCL to Use

95% Student's-t UCL	1.857

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (uranium-234)

General Statistics

Total Number of Observations	55	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	0.775	Mean	1.515
Maximum	3.52	Median	1.24
SD	0.69	Std. Error of Mean	0.093
Coefficient of Variation	0.455	Skewness	1.417

Normal GOF Test

Shapiro Wilk Test Statistic	0.814	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	5.2632E-9	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.21	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.119	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.671	95% Adjusted-CLT UCL (Chen-1995)	1.687
		95% Modified-t UCL (Johnson-1978)	1.674

Gamma GOF Test

A-D Test Statistic	2.26	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.182	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.12	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.172	k star (bias corrected MLE)	5.848
Theta hat (MLE)	0.245	Theta star (bias corrected MLE)	0.259
nu hat (MLE)	679	nu star (bias corrected)	643.3
MLE Mean (bias corrected)	1.515	MLE Sd (bias corrected)	0.627
		Approximate Chi Square Value (0.05)	585.4
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	584

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.665	95% Adjusted Gamma UCL (use when n<50)	1.669

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk Lognormal GOF Test**	

5% Shapiro Wilk P Value	2.3394E-4	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.16	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.119	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.255	Mean of logged Data	0.332
Maximum of Logged Data	1.258	SD of logged Data	0.393

Assuming Lognormal Distribution

95% H-UCL	1.659	90% Chebyshev (MVUE) UCL	1.751
95% Chebyshev (MVUE) UCL	1.863	97.5% Chebyshev (MVUE) UCL	2.019
99% Chebyshev (MVUE) UCL	2.324		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	1.668	95% Jackknife UCL	1.671
95% Standard Bootstrap UCL	1.667	95% Bootstrap-t UCL	1.695
95% Hall's Bootstrap UCL	1.691	95% Percentile Bootstrap UCL	1.668
95% BCA Bootstrap UCL	1.681		
90% Chebyshev(Mean, Sd) UCL	1.794	95% Chebyshev(Mean, Sd) UCL	1.921
97.5% Chebyshev(Mean, Sd) UCL	2.096	99% Chebyshev(Mean, Sd) UCL	2.441

Suggested UCL to Use

95% Student's-t UCL	1.671	or 95% Modified-t UCL	1.674

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (uranium-235)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	57
		Number of Missing Observations	0
Minimum	-0.00891	Mean	0.0627
Maximum	0.198	Median	0.0545
SD	0.0422	Std. Error of Mean	0.00554
Coefficient of Variation	0.674	Skewness	1.502

Normal GOF Test

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	7.1862E-7	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0719	95% Adjusted-CLT UCL (Chen-1995)	0.0729
		95% Modified-t UCL (Johnson-1978)	0.0721

Gamma Statistics Not Available
Lognormal Statistics Not Available

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0718	95% Jackknife UCL	0.0719
95% Standard Bootstrap UCL	0.0718	95% Bootstrap-t UCL	0.0734
95% Hall's Bootstrap UCL	0.0736	95% Percentile Bootstrap UCL	0.0721
95% BCA Bootstrap UCL	0.073		
90% Chebyshev(Mean, Sd) UCL	0.0793	95% Chebyshev(Mean, Sd) UCL	0.0868
97.5% Chebyshev(Mean, Sd) UCL	0.0973	99% Chebyshev(Mean, Sd) UCL	0.118

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0.0868

final_numeric (uranium-238)

General Statistics

Total Number of Observations	58	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	0	Mean	1.321
Maximum	2.6	Median	1.205
SD	0.489	Std. Error of Mean	0.0642
Coefficient of Variation	0.37	Skewness	1.011

Normal GOF Test

Shapiro Wilk Test Statistic	0.864	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	5.7877E-7	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.2	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.116	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.428	95% Adjusted-CLT UCL (Chen-1995)	1.436
		95% Modified-t UCL (Johnson-1978)	1.43

Gamma Statistics Not Available
Lognormal Statistics Not Available

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	1.427	95% Jackknife UCL	1.428
95% Standard Bootstrap UCL	1.425	95% Bootstrap-t UCL	1.44
95% Hall's Bootstrap UCL	1.438	95% Percentile Bootstrap UCL	1.43
95% BCA Bootstrap UCL	1.438		
90% Chebyshev(Mean, Sd) UCL	1.514	95% Chebyshev(Mean, Sd) UCL	1.601
97.5% Chebyshev(Mean, Sd) UCL	1.722	99% Chebyshev(Mean, Sd) UCL	1.96

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	1.601

UCL Statistics for Uncensored Full Data Sets

final_numeric (brc/timet_radium-226)

General Statistics

Total Number of Observations	104	Number of Distinct Observations	82
		Number of Missing Observations	0
Minimum	0.494	Mean	1.112
Maximum	2.36	Median	1.065
SD	0.347	Std. Error of Mean	0.0341
Coefficient of Variation	0.312	Skewness	0.987

Normal GOF Test

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	1.0574E-4	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0872	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.169	95% Adjusted-CLT UCL (Chen-1995)	1.172
		95% Modified-t UCL (Johnson-1978)	1.169

Gamma GOF Test

A-D Test Statistic	0.643	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.071	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0884	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	11.02	k star (bias corrected MLE)	10.71
Theta hat (MLE)	0.101	Theta star (bias corrected MLE)	0.104
nu hat (MLE)	2292	nu star (bias corrected)	2227
MLE Mean (bias corrected)	1.112	MLE Sd (bias corrected)	0.34
		Approximate Chi Square Value (0.05)	2118
Adjusted Level of Significance	0.0477	Adjusted Chi Square Value	2117

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.169	95% Adjusted Gamma UCL (use when n<50)	1.17

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.468	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0658	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.0872	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.705	Mean of logged Data	0.0603
Maximum of Logged Data	0.859	SD of logged Data	0.305

Assuming Lognormal Distribution

95% H-UCL	1.173	90% Chebyshev (MVUE) UCL	1.214
95% Chebyshev (MVUE) UCL	1.261	97.5% Chebyshev (MVUE) UCL	1.325
99% Chebyshev (MVUE) UCL	1.451		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.168	95% Jackknife UCL	1.169
95% Standard Bootstrap UCL	1.167	95% Bootstrap-t UCL	1.174

			95% Percentile Bootstrap UCL	1.168
95% Hall's Bootstrap UCL	1.173			
95% BCA Bootstrap UCL	1.172			
90% Chebyshev(Mean, Sd) UCL	1.214		95% Chebyshev(Mean, Sd) UCL	1.261
97.5% Chebyshev(Mean, Sd) UCL	1.325		99% Chebyshev(Mean, Sd) UCL	1.451

Suggested UCL to Use

95% Approximate Gamma UCL	1.169

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (brc/timet_radium-228)

General Statistics

Total Number of Observations	84		Number of Distinct Observations	66
			Number of Missing Observations	0
Minimum	0.946		Mean	1.916
Maximum	2.94		Median	1.96
SD	0.405		Std. Error of Mean	0.0441
Coefficient of Variation	0.211		Skewness	0.0338

Normal GOF Test

Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.677	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0658	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0968	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.989	95% Adjusted-CLT UCL (Chen-1995)	1.988
		95% Modified-t UCL (Johnson-1978)	1.989

Gamma GOF Test

A-D Test Statistic	0.652	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0947	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0972	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	21.49		k star (bias corrected MLE)	20.73
Theta hat (MLE)	0.0892		Theta star (bias corrected MLE)	0.0924
nu hat (MLE)	3610		nu star (bias corrected)	3482
MLE Mean (bias corrected)	1.916		MLE Sd (bias corrected)	0.421
			Approximate Chi Square Value (0.05)	3346
Adjusted Level of Significance	0.0471		Adjusted Chi Square Value	3344

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.994	95% Adjusted Gamma UCL (use when n<50)	1.995

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.11	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.108	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0968	Data Not Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.0555	Mean of logged Data	0.627
Maximum of Logged Data	1.078	SD of logged Data	0.222

Assuming Lognormal Distribution

95% H-UCL	2	90% Chebyshev (MVUE) UCL	2.059
95% Chebyshev (MVUE) UCL	2.123	97.5% Chebyshev (MVUE) UCL	2.212
99% Chebyshev (MVUE) UCL	2.386		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.988		95% Jackknife UCL	1.989
95% Standard Bootstrap UCL	1.988		95% Bootstrap-t UCL	1.988
95% Hall's Bootstrap UCL	1.989		95% Percentile Bootstrap UCL	1.988
95% BCA Bootstrap UCL	1.989			
90% Chebyshev(Mean, Sd) UCL	2.048		95% Chebyshev(Mean, Sd) UCL	2.108
97.5% Chebyshev(Mean, Sd) UCL	2.191		99% Chebyshev(Mean, Sd) UCL	2.355

Suggested UCL to Use

95% Student's-t UCL	1.989

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (brc/timet_thorium-228)

General Statistics

Total Number of Observations	120		Number of Distinct Observations	76
			Number of Missing Observations	0
Minimum	1.07		Mean	1.687
Maximum	2.28		Median	1.705
SD	0.278		Std. Error of Mean	0.0253
Coefficient of Variation	0.165		Skewness	-0.136

Normal GOF Test

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.0107	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.0762	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0812	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL			95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.729		95% Adjusted-CLT UCL (Chen-1995)	1.728
			95% Modified-t UCL (Johnson-1978)	1.729

Gamma GOF Test

A-D Test Statistic	1.132	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0899	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0841	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	35.8		k star (bias corrected MLE)	34.91
Theta hat (MLE)	0.0471		Theta star (bias corrected MLE)	0.0483
nu hat (MLE)	8591		nu star (bias corrected)	8378
MLE Mean (bias corrected)	1.687		MLE Sd (bias corrected)	0.285
			Approximate Chi Square Value (0.05)	8166
Adjusted Level of Significance	0.048		Adjusted Chi Square Value	8164

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.73		95% Adjusted Gamma UCL (use when n<50)	1.731

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	9.1661E-4	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0966	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.0812	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.0677		Mean of logged Data	0.509
Maximum of Logged Data	0.824		SD of logged Data	0.17

Assuming Lognormal Distribution

95% H-UCL	1.733		90% Chebyshev (MVUE) UCL	1.767
95% Chebyshev (MVUE) UCL	1.802		97.5% Chebyshev (MVUE) UCL	1.852

99% Chebyshev (MVUE) UCL   1.95

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.728		95% Jackknife UCL	1.729
95% Standard Bootstrap UCL	1.728		95% Bootstrap-t UCL	1.728
95% Hall's Bootstrap UCL	1.728		95% Percentile Bootstrap UCL	1.728
95% BCA Bootstrap UCL	1.728			
90% Chebyshev(Mean, Sd) UCL	1.763		95% Chebyshev(Mean, Sd) UCL	1.797
97.5% Chebyshev(Mean, Sd) UCL	1.845		99% Chebyshev(Mean, Sd) UCL	1.939

Suggested UCL to Use
95% Student's-t UCL   1.729

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be
reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.

final_numeric (brc/timet_thorium-230)

General Statistics

Total Number of Observations	120		Number of Distinct Observations	82
			Number of Missing Observations	0
Minimum	0.66		Mean	1.246
Maximum	3.01		Median	1.19
SD	0.383		Std. Error of Mean	0.0349
Coefficient of Variation	0.307		Skewness	1.606

Normal GOF Test

Shapiro Wilk Test Statistic	0.89	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	1.103E-12	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.131	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0812	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.304	95% Adjusted-CLT UCL (Chen-1995)	1.309
		95% Modified-t UCL (Johnson-1978)	1.305

Gamma GOF Test

A-D Test Statistic	1.051	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0944	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0842	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.57	k star (bias corrected MLE)	12.27
Theta hat (MLE)	0.0991	Theta star (bias corrected MLE)	0.102
nu hat (MLE)	3018	nu star (bias corrected)	2944
MLE Mean (bias corrected)	1.246	MLE Sd (bias corrected)	0.356
		Approximate Chi Square Value (0.05)	2819
Adjusted Level of Significance	0.048	Adjusted Chi Square Value	2817

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.301	95% Adjusted Gamma UCL (use when n<50)	1.302

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.207	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0743	**Lilliefors Lognormal GOF Test**	

5% Lilliefors Critical Value	0.0812	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.416	Mean of logged Data	0.18
Maximum of Logged Data	1.102	SD of logged Data	0.278

Assuming Lognormal Distribution

95% H-UCL	1.3	90% Chebyshev (MVUE) UCL	1.34
95% Chebyshev (MVUE) UCL	1.383	97.5% Chebyshev (MVUE) UCL	1.444
99% Chebyshev (MVUE) UCL	1.563		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.304	95% Jackknife UCL	1.304
95% Standard Bootstrap UCL	1.303	95% Bootstrap-t UCL	1.311
95% Hall's Bootstrap UCL	1.311	95% Percentile Bootstrap UCL	1.306
95% BCA Bootstrap UCL	1.307		
90% Chebyshev(Mean, Sd) UCL	1.351	95% Chebyshev(Mean, Sd) UCL	1.398
97.5% Chebyshev(Mean, Sd) UCL	1.464	99% Chebyshev(Mean, Sd) UCL	1.594

Suggested UCL to Use

95% Student's-t UCL	1.304	or 95% Modified-t UCL	1.305
or 95% H-UCL	1.3		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

final_numeric (brc/timet_thorium-232)

General Statistics

Total Number of Observations	120	Number of Distinct Observations	73
		Number of Missing Observations	0
Minimum	1.05	Mean	1.614
Maximum	2.23	Median	1.57
SD	0.266	Std. Error of Mean	0.0243
Coefficient of Variation	0.165	Skewness	0.178

Normal GOF Test

Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0129	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0827	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0812	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.654	95% Adjusted-CLT UCL (Chen-1995)	1.655
		95% Modified-t UCL (Johnson-1978)	1.655

Gamma GOF Test

A-D Test Statistic	0.773	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0752	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0841	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	37.02	k star (bias corrected MLE)	36.1
Theta hat (MLE)	0.0436	Theta star (bias corrected MLE)	0.0447
nu hat (MLE)	8885	nu star (bias corrected)	8664
MLE Mean (bias corrected)	1.614	MLE Sd (bias corrected)	0.269

		Approximate Chi Square Value (0.05)	8449
Adjusted Level of Significance	0.048	Adjusted Chi Square Value	8446

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.655	95% Adjusted Gamma UCL (use when n<50)	1.656

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.0349	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0794	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.0812	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

| Minimum of Logged Data | 0.0488 | Mean of logged Data | 0.465 |
| Maximum of Logged Data | 0.802 | SD of logged Data | 0.166 |

Assuming Lognormal Distribution

95% H-UCL	1.657	90% Chebyshev (MVUE) UCL	1.688
95% Chebyshev (MVUE) UCL	1.722	97.5% Chebyshev (MVUE) UCL	1.768
99% Chebyshev (MVUE) UCL	1.859		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.654	95% Jackknife UCL	1.654
95% Standard Bootstrap UCL	1.654	95% Bootstrap-t UCL	1.655
95% Hall's Bootstrap UCL	1.655	95% Percentile Bootstrap UCL	1.654
95% BCA Bootstrap UCL	1.653		
90% Chebyshev(Mean, Sd) UCL	1.687	95% Chebyshev(Mean, Sd) UCL	1.72
97.5% Chebyshev(Mean, Sd) UCL	1.766	99% Chebyshev(Mean, Sd) UCL	1.856

Suggested UCL to Use

95% Approximate Gamma UCL	1.655

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (brc/timet_uranium-234)

General Statistics

Total Number of Observations	120	Number of Distinct Observations	74
		Number of Missing Observations	0
Minimum	0.47	Mean	1.109
Maximum	2.84	Median	0.99
SD	0.457	Std. Error of Mean	0.0417
Coefficient of Variation	0.412	Skewness	1.792

Normal GOF Test

Shapiro Wilk Test Statistic	0.819	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0812	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.178	95% Adjusted-CLT UCL (Chen-1995)	1.185
		95% Modified-t UCL (Johnson-1978)	1.179

Gamma GOF Test

A-D Test Statistic	3.149	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.14	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0843	Data Not Gamma Distributed at 5% Significance Level

<p style="color:red; text-align:center">Data Not Gamma Distributed at 5% Significance Level</p>

Gamma Statistics

k hat (MLE)	7.606	k star (bias corrected MLE)	7.422
Theta hat (MLE)	0.146	Theta star (bias corrected MLE)	0.149
nu hat (MLE)	1825	nu star (bias corrected)	1781
MLE Mean (bias corrected)	1.109	MLE Sd (bias corrected)	0.407
		Approximate Chi Square Value (0.05)	1684
Adjusted Level of Significance	0.048	Adjusted Chi Square Value	1683

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.173	95% Adjusted Gamma UCL (use when n<50)	1.174

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	2.4870E-4	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0812	Data Not Lognormal at 5% Significance Level	

<p style="color:red; text-align:center">Data Not Lognormal at 5% Significance Level</p>

Lognormal Statistics

Minimum of Logged Data	-0.755	Mean of logged Data	0.0362
Maximum of Logged Data	1.044	SD of logged Data	0.353

Assuming Lognormal Distribution

95% H-UCL	1.168	90% Chebyshev (MVUE) UCL	1.212
95% Chebyshev (MVUE) UCL	1.262	97.5% Chebyshev (MVUE) UCL	1.331
99% Chebyshev (MVUE) UCL	1.466		

Nonparametric Distribution Free UCL Statistics

<p style="color:blue; text-align:center">Data do not follow a Discernible Distribution (0.05)</p>

Nonparametric Distribution Free UCLs

95% CLT UCL	1.178	95% Jackknife UCL	1.178
95% Standard Bootstrap UCL	1.177	95% Bootstrap-t UCL	1.187
95% Hall's Bootstrap UCL	1.188	95% Percentile Bootstrap UCL	1.179
95% BCA Bootstrap UCL	1.186		
90% Chebyshev(Mean, Sd) UCL	1.234	95% Chebyshev(Mean, Sd) UCL	1.291
97.5% Chebyshev(Mean, Sd) UCL	1.37	99% Chebyshev(Mean, Sd) UCL	1.524

Suggested UCL to Use

95% Student's-t UCL	1.178	or 95% Modified-t UCL	1.179

<p style="color:blue; text-align:center">Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.</p>

final_numeric (brc/timet_uranium-235)

General Statistics

Total Number of Observations	120	Number of Distinct Observations	76
		Number of Missing Observations	0
Minimum	0	Mean	0.0659
Maximum	0.21	Median	0.059
SD	0.0382	Std. Error of Mean	0.00349
Coefficient of Variation	0.579	Skewness	0.82

Normal GOF Test

Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.00163	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.109	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0812	Data Not Normal at 5% Significance Level	

<p style="color:red; text-align:center">Data Not Normal at 5% Significance Level</p>

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0717	95% Adjusted-CLT UCL (Chen-1995)	0.0719
		95% Modified-t UCL (Johnson-1978)	0.0717

<p style="color:red; text-align:center">Gamma Statistics Not Available
Lognormal Statistics Not Available</p>

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0716		95% Jackknife UCL	0.0717
95% Standard Bootstrap UCL	0.0717		95% Bootstrap-t UCL	0.072
95% Hall's Bootstrap UCL	0.0719		95% Percentile Bootstrap UCL	0.0716
95% BCA Bootstrap UCL	0.0719			
90% Chebyshev(Mean, Sd) UCL	0.0764		95% Chebyshev(Mean, Sd) UCL	0.0811
97.5% Chebyshev(Mean, Sd) UCL	0.0877		99% Chebyshev(Mean, Sd) UCL	0.101

Suggested UCL to Use
95% Chebyshev (Mean, Sd) UCL   0.0811

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (brc/timet_uranium-238)

General Statistics

Total Number of Observations	120		Number of Distinct Observations	75
			Number of Missing Observations	0
Minimum	0.45		Mean	1.085
Maximum	2.37		Median	1.015
SD	0.373		Std. Error of Mean	0.0341
Coefficient of Variation	0.344		Skewness	1.298

Normal GOF Test

Shapiro Wilk Test Statistic	0.895	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	5.103E-12	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0812	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.141	95% Adjusted-CLT UCL (Chen-1995)	1.145
		95% Modified-t UCL (Johnson-1978)	1.142

Gamma GOF Test

A-D Test Statistic	1.449	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.106	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0842	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.691		k star (bias corrected MLE)	9.454
Theta hat (MLE)	0.112		Theta star (bias corrected MLE)	0.115
nu hat (MLE)	2326		nu star (bias corrected)	2269
MLE Mean (bias corrected)	1.085		MLE Sd (bias corrected)	0.353
			Approximate Chi Square Value (0.05)	2159
Adjusted Level of Significance	0.048		Adjusted Chi Square Value	2158

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.14	95% Adjusted Gamma UCL (use when n<50)	1.14

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.158	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0861	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.0812	Data Not Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.799		Mean of logged Data	0.0286
Maximum of Logged Data	0.863		SD of logged Data	0.321

Assuming Lognormal Distribution

95% H-UCL	1.14		90% Chebyshev (MVUE) UCL	1.18
95% Chebyshev (MVUE) UCL	1.224		97.5% Chebyshev (MVUE) UCL	1.286
99% Chebyshev (MVUE) UCL	1.406			

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.141		95% Jackknife UCL	1.141
95% Standard Bootstrap UCL	1.141		95% Bootstrap-t UCL	1.146
95% Hall's Bootstrap UCL	1.146		95% Percentile Bootstrap UCL	1.141
95% BCA Bootstrap UCL	1.144			
90% Chebyshev(Mean, Sd) UCL	1.187		95% Chebyshev(Mean, Sd) UCL	1.233
97.5% Chebyshev(Mean, Sd) UCL	1.297		99% Chebyshev(Mean, Sd) UCL	1.424

Suggested UCL to Use

95% Student's-t UCL	1.141		or 95% Modified-t UCL	1.142
or 95% H-UCL	1.14			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

final_numeric (rz-a_radium-226)

General Statistics

Total Number of Observations	31		Number of Distinct Observations	29
			Number of Missing Observations	0
Minimum	0.0472		Mean	0.952
Maximum	1.72		Median	0.891
SD	0.354		Std. Error of Mean	0.0636
Coefficient of Variation	0.372		Skewness	0.101

Normal GOF Test

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.114	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.156	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.06	95% Adjusted-CLT UCL (Chen-1995)	1.058
		95% Modified-t UCL (Johnson-1978)	1.06

Gamma GOF Test

A-D Test Statistic	1.162	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.179	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.158	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.548		k star (bias corrected MLE)	4.129
Theta hat (MLE)	0.209		Theta star (bias corrected MLE)	0.231
nu hat (MLE)	282		nu star (bias corrected)	256
MLE Mean (bias corrected)	0.952		MLE Sd (bias corrected)	0.469
			Approximate Chi Square Value (0.05)	220
Adjusted Level of Significance	0.0413		Adjusted Chi Square Value	218.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.108	95% Adjusted Gamma UCL (use when n<50)	1.118

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.669	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.233	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.156	Data Not Lognormal at 5% Significance Level	

<p style="color:red;text-align:center">Data Not Lognormal at 5% Significance Level</p>

Lognormal Statistics

Minimum of Logged Data	-3.053	Mean of logged Data	-0.163
Maximum of Logged Data	0.542	SD of logged Data	0.62

Assuming Lognormal Distribution

95% H-UCL	1.296	90% Chebyshev (MVUE) UCL	1.387
95% Chebyshev (MVUE) UCL	1.552	97.5% Chebyshev (MVUE) UCL	1.781
99% Chebyshev (MVUE) UCL	2.231		

Nonparametric Distribution Free UCL Statistics

<p style="color:red;text-align:center">Data appear to follow a Discernible Distribution at 5% Significance Level</p>

Nonparametric Distribution Free UCLs

95% CLT UCL	1.057	95% Jackknife UCL	1.06
95% Standard Bootstrap UCL	1.056	95% Bootstrap-t UCL	1.063
95% Hall's Bootstrap UCL	1.061	95% Percentile Bootstrap UCL	1.057
95% BCA Bootstrap UCL	1.06		
90% Chebyshev(Mean, Sd) UCL	1.143	95% Chebyshev(Mean, Sd) UCL	1.23
97.5% Chebyshev(Mean, Sd) UCL	1.35	99% Chebyshev(Mean, Sd) UCL	1.585

Suggested UCL to Use

<p style="color:blue">95% Student's-t UCL   1.06</p>

<p style="color:blue;text-align:center">Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.</p>

final_numeric (rz-a_radium-228)

General Statistics

Total Number of Observations	31	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	0.46	Mean	1.279
Maximum	2.46	Median	1.18
SD	0.542	Std. Error of Mean	0.0974
Coefficient of Variation	0.424	Skewness	0.51

Normal GOF Test

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0888	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.156	Data appear Normal at 5% Significance Level	

<p style="color:blue;text-align:center">Data appear Normal at 5% Significance Level</p>

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.445	95% Adjusted-CLT UCL (Chen-1995)	1.449
		95% Modified-t UCL (Johnson-1978)	1.446

Gamma GOF Test

A-D Test Statistic	0.13	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0688	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.158	Detected data appear Gamma Distributed at 5% Significance Level	

<p style="color:blue;text-align:center">Detected data appear Gamma Distributed at 5% Significance Level</p>

Gamma Statistics

k hat (MLE)	5.597	k star (bias corrected MLE)	5.076
Theta hat (MLE)	0.229	Theta star (bias corrected MLE)	0.252
nu hat (MLE)	347	nu star (bias corrected)	314.7
MLE Mean (bias corrected)	1.279	MLE Sd (bias corrected)	0.568
		Approximate Chi Square Value (0.05)	274.6
Adjusted Level of Significance	0.0413	Adjusted Chi Square Value	272.6

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.466	95% Adjusted Gamma UCL (use when n<50)	1.477

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.929	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0712	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.156	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.777	Mean of logged Data	0.154
Maximum of Logged Data	0.9	SD of logged Data	0.447

Assuming Lognormal Distribution

95% H-UCL	1.504	90% Chebyshev (MVUE) UCL	1.606
95% Chebyshev (MVUE) UCL	1.751	97.5% Chebyshev (MVUE) UCL	1.952
99% Chebyshev (MVUE) UCL	2.348		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.44	95% Jackknife UCL	1.445
95% Standard Bootstrap UCL	1.438	95% Bootstrap-t UCL	1.453
95% Hall's Bootstrap UCL	1.446	95% Percentile Bootstrap UCL	1.444
95% BCA Bootstrap UCL	1.444		
90% Chebyshev(Mean, Sd) UCL	1.572	95% Chebyshev(Mean, Sd) UCL	1.704
97.5% Chebyshev(Mean, Sd) UCL	1.888	99% Chebyshev(Mean, Sd) UCL	2.248

Suggested UCL to Use

95% Student's-t UCL	1.445

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (rz-a_thorium-228)

General Statistics

Total Number of Observations	31	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	1.16	Mean	1.696
Maximum	2.88	Median	1.69
SD	0.361	Std. Error of Mean	0.0648
Coefficient of Variation	0.213	Skewness	1.023

Normal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.929	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.0999	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.156	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.806	95% Adjusted-CLT UCL (Chen-1995)	1.816
		95% Modified-t UCL (Johnson-1978)	1.808

Gamma GOF Test

A-D Test Statistic	0.324	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0823	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.157	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	24.47	k star (bias corrected MLE)	22.12
Theta hat (MLE)	0.0693	Theta star (bias corrected MLE)	0.0767
nu hat (MLE)	1517	nu star (bias corrected)	1372

MLE Mean (bias corrected)	1.696	MLE Sd (bias corrected)	0.361
		Approximate Chi Square Value (0.05)	1287
Adjusted Level of Significance	0.0413	Adjusted Chi Square Value	1282

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.809	95% Adjusted Gamma UCL (use when n<50)	1.815

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0781	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.156	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.148	Mean of logged Data	0.508
Maximum of Logged Data	1.058	SD of logged Data	0.204

Assuming Lognormal Distribution

95% H-UCL	1.811	90% Chebyshev (MVUE) UCL	1.884
95% Chebyshev (MVUE) UCL	1.969	97.5% Chebyshev (MVUE) UCL	2.087
99% Chebyshev (MVUE) UCL	2.319		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.803	95% Jackknife UCL	1.806
95% Standard Bootstrap UCL	1.801	95% Bootstrap-t UCL	1.821
95% Hall's Bootstrap UCL	1.836	95% Percentile Bootstrap UCL	1.802
95% BCA Bootstrap UCL	1.813		
90% Chebyshev(Mean, Sd) UCL	1.891	95% Chebyshev(Mean, Sd) UCL	1.979
97.5% Chebyshev(Mean, Sd) UCL	2.101	99% Chebyshev(Mean, Sd) UCL	2.341

Suggested UCL to Use

95% Student's-t UCL	1.806

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (rz-a_thorium-230)

General Statistics

Total Number of Observations	31	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	0.509	Mean	1.079
Maximum	1.71	Median	1.07
SD	0.283	Std. Error of Mean	0.0507
Coefficient of Variation	0.262	Skewness	0.392

Normal GOF Test

Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.156	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.165	95% Adjusted-CLT UCL (Chen-1995)	1.166
		95% Modified-t UCL (Johnson-1978)	1.166

Gamma GOF Test

A-D Test Statistic	0.186	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0809	**Kolmogorov-Smirnov Gamma GOF Test**

5% K-S Critical Value   0.158   Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	14.73	k star (bias corrected MLE)	13.32
Theta hat (MLE)	0.0733	Theta star (bias corrected MLE)	0.081
nu hat (MLE)	913.1	nu star (bias corrected)	826.1
MLE Mean (bias corrected)	1.079	MLE Sd (bias corrected)	0.296
		Approximate Chi Square Value (0.05)	760.4
Adjusted Level of Significance	0.0413	Adjusted Chi Square Value	756.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.172	95% Adjusted Gamma UCL (use when n<50)	1.178

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.977	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.929	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0776	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.156	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.675	Mean of logged Data	0.0418
Maximum of Logged Data	0.536	SD of logged Data	0.271

Assuming Lognormal Distribution

95% H-UCL	1.181	90% Chebyshev (MVUE) UCL	1.24
95% Chebyshev (MVUE) UCL	1.313	97.5% Chebyshev (MVUE) UCL	1.413
99% Chebyshev (MVUE) UCL	1.611		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.163	95% Jackknife UCL	1.165
95% Standard Bootstrap UCL	1.161	95% Bootstrap-t UCL	1.171
95% Hall's Bootstrap UCL	1.171	95% Percentile Bootstrap UCL	1.161
95% BCA Bootstrap UCL	1.165		
90% Chebyshev(Mean, Sd) UCL	1.231	95% Chebyshev(Mean, Sd) UCL	1.3
97.5% Chebyshev(Mean, Sd) UCL	1.396	99% Chebyshev(Mean, Sd) UCL	1.584

Suggested UCL to Use

95% Student's-t UCL	1.165

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (rz-a_thorium-232)

General Statistics

Total Number of Observations	31	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	1.02	Mean	1.503
Maximum	2.07	Median	1.51
SD	0.238	Std. Error of Mean	0.0428
Coefficient of Variation	0.159	Skewness	0.137

Normal GOF Test

Shapiro Wilk Test Statistic	0.99	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.929	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.059	Lilliefors GOF Test
5% Lilliefors Critical Value	0.156	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.576	95% Adjusted-CLT UCL (Chen-1995)	1.574
		95% Modified-t UCL (Johnson-1978)	1.576

Gamma GOF Test

A-D Test Statistic	0.161	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0797	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.157	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	40.43		k star (bias corrected MLE)	36.54
Theta hat (MLE)	0.0372		Theta star (bias corrected MLE)	0.0411
nu hat (MLE)	2507		nu star (bias corrected)	2265
MLE Mean (bias corrected)	1.503		MLE Sd (bias corrected)	0.249
			Approximate Chi Square Value (0.05)	2156
Adjusted Level of Significance	0.0413		Adjusted Chi Square Value	2150

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.579		95% Adjusted Gamma UCL (use when n<50)	1.584

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.929	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.09	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.156	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.0198		Mean of logged Data	0.395
Maximum of Logged Data	0.728		SD of logged Data	0.161

Assuming Lognormal Distribution

95% H-UCL	1.582		90% Chebyshev (MVUE) UCL	1.635
95% Chebyshev (MVUE) UCL	1.694		97.5% Chebyshev (MVUE) UCL	1.777
99% Chebyshev (MVUE) UCL	1.939			

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.573		95% Jackknife UCL	1.576
95% Standard Bootstrap UCL	1.572		95% Bootstrap-t UCL	1.576
95% Hall's Bootstrap UCL	1.576		95% Percentile Bootstrap UCL	1.572
95% BCA Bootstrap UCL	1.575			
90% Chebyshev(Mean, Sd) UCL	1.631		95% Chebyshev(Mean, Sd) UCL	1.689
97.5% Chebyshev(Mean, Sd) UCL	1.77		99% Chebyshev(Mean, Sd) UCL	1.929

Suggested UCL to Use

95% Student's-t UCL	1.576

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (rz-a_uranium-234)

General Statistics

Total Number of Observations	31		Number of Distinct Observations	27
			Number of Missing Observations	0
Minimum	0.391		Mean	1.062
Maximum	1.74		Median	1.02
SD	0.297		Std. Error of Mean	0.0534
Coefficient of Variation	0.28		Skewness	0.571

Normal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.929	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.135	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.156	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

	95% Normal UCL			95% UCLs (Adjusted for Skewness)	
	95% Student's-t UCL	1.153		95% Adjusted-CLT UCL (Chen-1995)	1.156
				95% Modified-t UCL (Johnson-1978)	1.154

Gamma GOF Test

A-D Test Statistic	0.518	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.102	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.158	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.85	k star (bias corrected MLE)	11.62
Theta hat (MLE)	0.0827	Theta star (bias corrected MLE)	0.0914
nu hat (MLE)	796.5	nu star (bias corrected)	720.7
MLE Mean (bias corrected)	1.062	MLE Sd (bias corrected)	0.312
		Approximate Chi Square Value (0.05)	659.4
Adjusted Level of Significance	0.0413	Adjusted Chi Square Value	656.2

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.161	95% Adjusted Gamma UCL (use when n<50)	1.167

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.929	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.156	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.939	Mean of logged Data	0.0212
Maximum of Logged Data	0.554	SD of logged Data	0.293

Assuming Lognormal Distribution

95% H-UCL	1.174	90% Chebyshev (MVUE) UCL	1.236
95% Chebyshev (MVUE) UCL	1.313	97.5% Chebyshev (MVUE) UCL	1.421
99% Chebyshev (MVUE) UCL	1.632		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.15	95% Jackknife UCL	1.153
95% Standard Bootstrap UCL	1.149	95% Bootstrap-t UCL	1.161
95% Hall's Bootstrap UCL	1.161	95% Percentile Bootstrap UCL	1.15
95% BCA Bootstrap UCL	1.154		
90% Chebyshev(Mean, Sd) UCL	1.223	95% Chebyshev(Mean, Sd) UCL	1.295
97.5% Chebyshev(Mean, Sd) UCL	1.396	99% Chebyshev(Mean, Sd) UCL	1.594

Suggested UCL to Use

95% Student's-t UCL	1.153

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (rz-a_uranium-235)

General Statistics

Total Number of Observations	31	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	-0.0766	Mean	0.0513
Maximum	0.203	Median	0.0486
SD	0.0442	Std. Error of Mean	0.00794
Coefficient of Variation	0.862	Skewness	0.549

Normal GOF Test

Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.929	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0648	95% Adjusted-CLT UCL (Chen-1995)	0.0652
		95% Modified-t UCL (Johnson-1978)	0.0649

Gamma Statistics Not Available
Lognormal Statistics Not Available

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0644	95% Jackknife UCL	0.0648
95% Standard Bootstrap UCL	0.0642	95% Bootstrap-t UCL	0.0658
95% Hall's Bootstrap UCL	0.0689	95% Percentile Bootstrap UCL	0.0643
95% BCA Bootstrap UCL	0.0648		
90% Chebyshev(Mean, Sd) UCL	0.0751	95% Chebyshev(Mean, Sd) UCL	0.0859
97.5% Chebyshev(Mean, Sd) UCL	0.101	99% Chebyshev(Mean, Sd) UCL	0.13

Suggested UCL to Use
95% Student's-t UCL   0.0648

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

final_numeric (rz-a_uranium-238)

General Statistics

Total Number of Observations	31	Number of Distinct Observations	26
		Number of Missing Observations	0
Minimum	0.361	Mean	1.034
Maximum	1.59	Median	1.01
SD	0.214	Std. Error of Mean	0.0384
Coefficient of Variation	0.207	Skewness	-0.157

Normal GOF Test

Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.156	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1.099	95% Adjusted-CLT UCL (Chen-1995)	1.096
		95% Modified-t UCL (Johnson-1978)	1.099

Gamma GOF Test

A-D Test Statistic	1.524	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.218	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.157	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	20.22	k star (bias corrected MLE)	18.29
Theta hat (MLE)	0.0511	Theta star (bias corrected MLE)	0.0565
nu hat (MLE)	1254	nu star (bias corrected)	1134
MLE Mean (bias corrected)	1.034	MLE Sd (bias corrected)	0.242
		Approximate Chi Square Value (0.05)	1057
Adjusted Level of Significance	0.0413	Adjusted Chi Square Value	1053

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.109	95% Adjusted Gamma UCL (use when n<50)	1.113

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.776	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.929	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.242	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.156	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.019	Mean of logged Data	0.00813
Maximum of Logged Data	0.464	SD of logged Data	0.244

Assuming Lognormal Distribution

95% H-UCL	1.123	90% Chebyshev (MVUE) UCL	1.175
95% Chebyshev (MVUE) UCL	1.238	97.5% Chebyshev (MVUE) UCL	1.325
99% Chebyshev (MVUE) UCL	1.495		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	1.097	95% Jackknife UCL	1.099
95% Standard Bootstrap UCL	1.096	95% Bootstrap-t UCL	1.099
95% Hall's Bootstrap UCL	1.104	95% Percentile Bootstrap UCL	1.095
95% BCA Bootstrap UCL	1.093		
90% Chebyshev(Mean, Sd) UCL	1.149	95% Chebyshev(Mean, Sd) UCL	1.201
97.5% Chebyshev(Mean, Sd) UCL	1.273	99% Chebyshev(Mean, Sd) UCL	1.415

Suggested UCL to Use

95% Student's-t UCL	1.099	or 95% Modified-t UCL	1.099

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.