

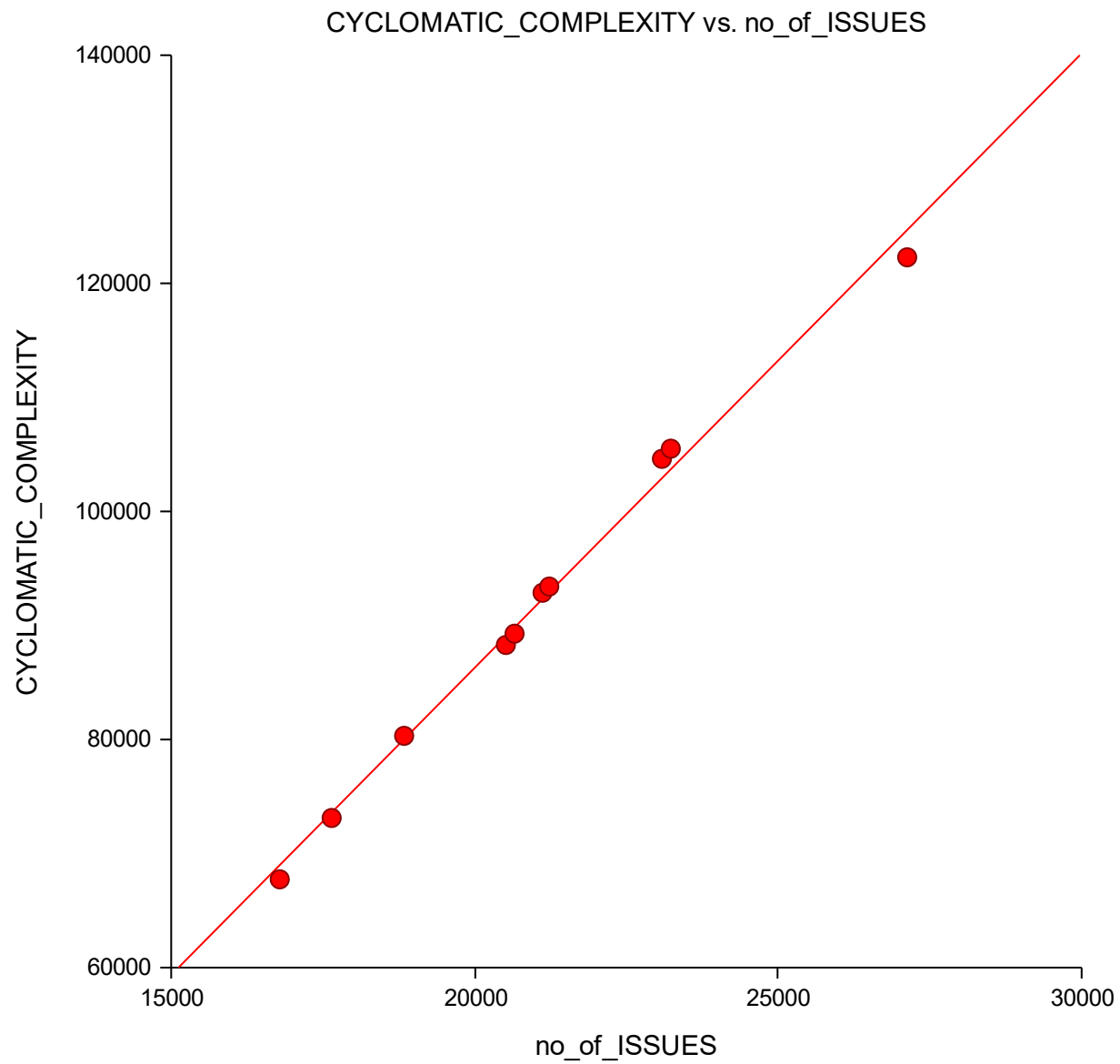
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### Linear Regression Report

Dataset                  Untitled  
Y = CYCLOMATIC\_COMPLEXITY   X = no\_of\_ISSUES

#### Linear Regression Plot Section

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### Linear Regression Report

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#### Run Summary Section

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Parameter	Value	Parameter	Value
Dependent Variable	CYCLOMATIC_COMPLEXITY		Rows Processed
10			
Independent Variable	no_of_ISSUES	Rows Used in Estimation	10
Frequency Variable	None	Rows with X Missing	0
Weight Variable	None	Rows with Freq Missing	0
Intercept	-21459.5168	Rows Prediction Only	0
Slope	5.3850	Sum of Frequencies	10
R-Squared	0.9936	Sum of Weights	10.0000
Correlation	0.9968	Coefficient of Variation	0.0150
Mean Square Error	1893317	Square Root of MSE	1375.979

#### Summary Statement

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The equation of the straight line relating CYCLOMATIC\_COMPLEXITY and no\_of\_ISSUES is estimated as:  $\text{CYCLOMATIC\_COMPLEXITY} = (-21459.5168) + (5.3850) \text{ no\_of\_ISSUES}$  using the 10 observations in this dataset. The y-intercept, the estimated value of CYCLOMATIC\_COMPLEXITY when no\_of\_ISSUES is zero, is -21459.5168 with a standard error of 3244.3190. The slope, the estimated change in CYCLOMATIC\_COMPLEXITY per unit change in no\_of\_ISSUES, is 5.3850 with a standard error of 0.1529. The value of R-Squared, the proportion of the variation in CYCLOMATIC\_COMPLEXITY that can be accounted for by variation in no\_of\_ISSUES, is 0.9936. The correlation between CYCLOMATIC\_COMPLEXITY and no\_of\_ISSUES is 0.9968.

A significance test that the slope is zero resulted in a t-value of 35.2119. The significance level of this t-test is 0.0000. Since  $0.0000 < 0.0500$ , the hypothesis that the slope is zero is rejected.

The estimated slope is 5.3850. The lower limit of the 95% confidence interval for the slope is 5.0324 and the upper limit is 5.7377. The estimated intercept is -21459.5168. The lower limit of the 95% confidence interval for the intercept is -28940.9298 and the upper limit is -13978.1038.

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#### Regression Estimation Section

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Parameter	Intercept B(0)	Slope B(1)
Regression Coefficients	-21459.5168	5.3850
Lower 95% Confidence Limit	-28940.9298	5.0324
Upper 95% Confidence Limit	-13978.1038	5.7377
Standard Error	3244.3190	0.1529
Standardized Coefficient	0.0000	0.9968
T Value	-6.6145	35.2119
Prob Level (T Test)	0.0002	0.0000
Reject H0 (Alpha = 0.0500)	Yes	Yes
Power (Alpha = 0.0500)	0.9999	1.0000
Regression of Y on X	-21459.5168	5.3850
Inverse Regression from X on Y	-22189.9529	5.4198
Orthogonal Regression of Y and X	-22165.7499	5.4186

#### Notes:

The above report shows the least-squares estimates of the intercept and slope followed by the corresponding standard errors, confidence intervals, and hypothesis tests. Note that these results are based on several assumptions that should be validated before they are used.

#### Estimated Model

$(-21459.5168270823) + (5.38504722710456) * (\text{no\_of\_ISSUES})$

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#### Correlation and R-Squared Section

Parameter	Pearson Correlation Coefficient	R-Squared	Spearman Rank Correlation Coefficient
Estimated Value	0.9968	0.9936	1.0000
Lower 95% Conf. Limit (r dist'n)	0.9844		
Upper 95% Conf. Limit (r dist'n)	0.9991		
Lower 95% Conf. Limit (Fisher's z)	0.9860		1.0000
Upper 95% Conf. Limit (Fisher's z)	0.9993		1.0000
Adjusted (Rbar)		0.9928	
T-Value for H0: Rho = 0	35.2119	35.2119	
Prob Level for H0: Rho = 0	0.0000	0.0000	0.0000

#### Notes:

The confidence interval for the Pearson correlation assumes that X and Y follow the bivariate normal distribution. This is a different assumption from linear regression which assumes that X is fixed and Y is normally distributed.

Two confidence intervals are given. The first is based on the exact distribution of Pearson's correlation. The second is based on Fisher's z transformation which approximates the exact distribution using the normal distribution. Why are both provided? Because most books only mention Fisher's approximate method, it will often be needed to do homework. However, the exact methods should be used whenever possible.

The confidence limits can be used to test hypotheses about the correlation. To test the hypothesis that rho is a specific value, say  $r_0$ , check to see if  $r_0$  is between the confidence limits. If it is, the null hypothesis that  $\rho = r_0$  is not rejected. If  $r_0$  is outside the limits, the null hypothesis is rejected.

Spearman's Rank correlation is calculated by replacing the original data with their ranks. This correlation is used when some of the assumptions may be invalid.

#### Summary Matrices

Index	X'X 0	X'X 1	X'Y 2	X'X Inverse 0	X'X Inverse 1
0	10	210224	917471	5.559347	-0.0002596919
1	210224	4.500364E+09	1.972337E+10	-0.0002596919	1.23531E-08
2 (Y'Y)			8.653794E+10		
Determinant		8.095131E+08			1.23531E-09

#### Variance - Covariance Matrix of Regression Coefficients

Index	VC(b) 0	VC(b) 1
0	1.052561E+07	-491.6791
1	-491.6791	0.02338834

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#### Tests of Assumptions Section

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Assumption/Test	Test Value	Prob Level	Is the Assumption Reasonable at the 0.2000 Level of Significance?
<b>Residuals follow Normal Distribution?</b>			
Shapiro Wilk	0.9634	0.823831	Yes
Anderson Darling	0.2294	0.808741	Yes
D'Agostino Skewness	-0.2366	0.812971	Yes
D'Agostino Kurtosis	0.0268	0.978640	Yes
D'Agostino Omnibus	0.0567	0.972051	Yes
<b>Constant Residual Variance?</b>			
Modified Levene Test	1.6036	0.241014	Yes
<b>Relationship is a Straight Line?</b>			
Lack of Linear Fit F(0, 0) Test	0.0000	0.000000	No

#### No Serial Correlation?

Evaluate the Serial-Correlation report and the Durbin-Watson test if you have equal-spaced, time series data.

#### Notes:

A 'Yes' means there is not enough evidence to make this assumption seem unreasonable. This lack of evidence may be because the sample size is too small, the assumptions of the test itself are not met, or the assumption is valid.

A 'No' means the that the assumption is not reasonable. However, since these tests are related to sample size, you should assess the role of sample size in the tests by also evaluating the appropriate plots and graphs. A large dataset (say  $N > 500$ ) will often fail at least one of the normality tests because it is hard to find a large dataset that is perfectly normal.

#### Normality and Constant Residual Variance:

Possible remedies for the failure of these assumptions include using a transformation of Y such as the log or square root, correcting data-recording errors found by looking into outliers, adding additional independent variables, using robust regression, or using bootstrap methods.

#### Straight-Line:

Possible remedies for the failure of this assumption include using nonlinear regression or polynomial regression.

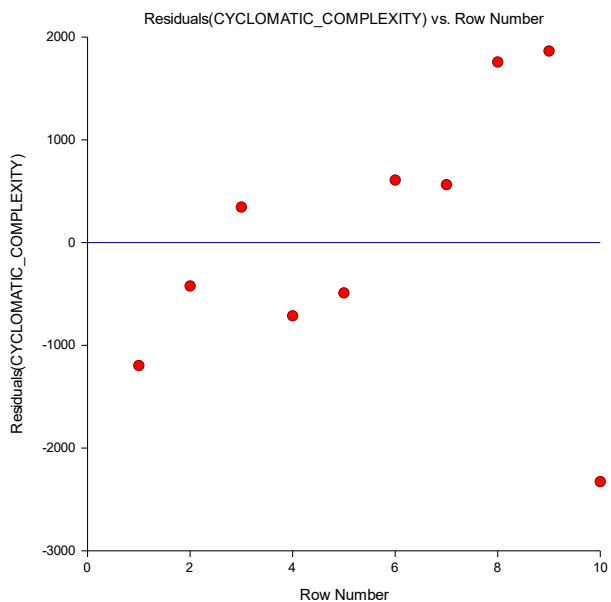
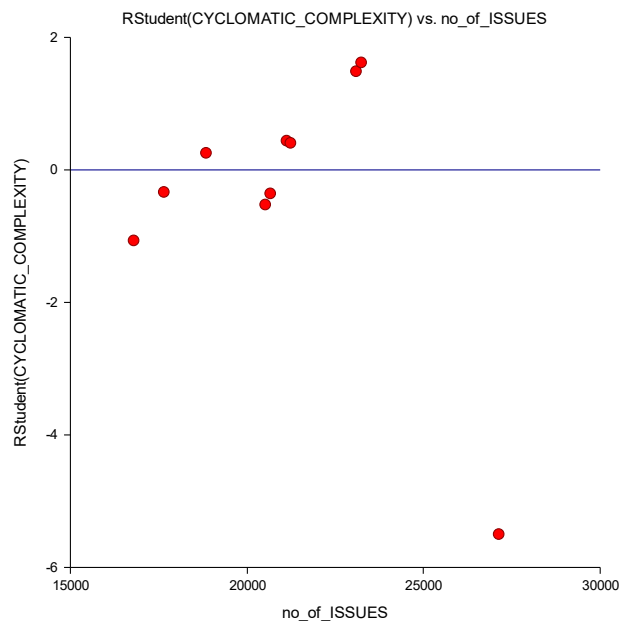
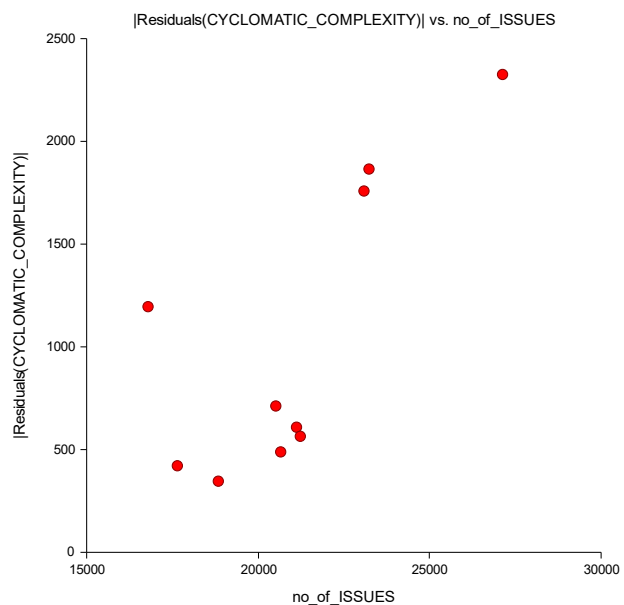
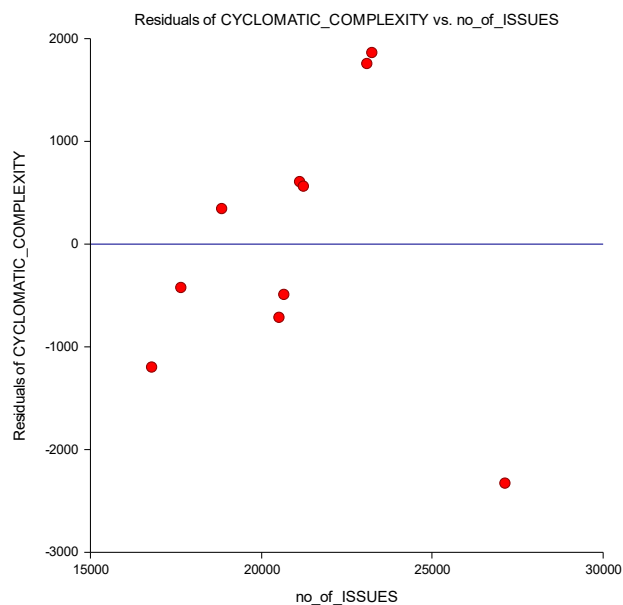
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### Residual Plots Section

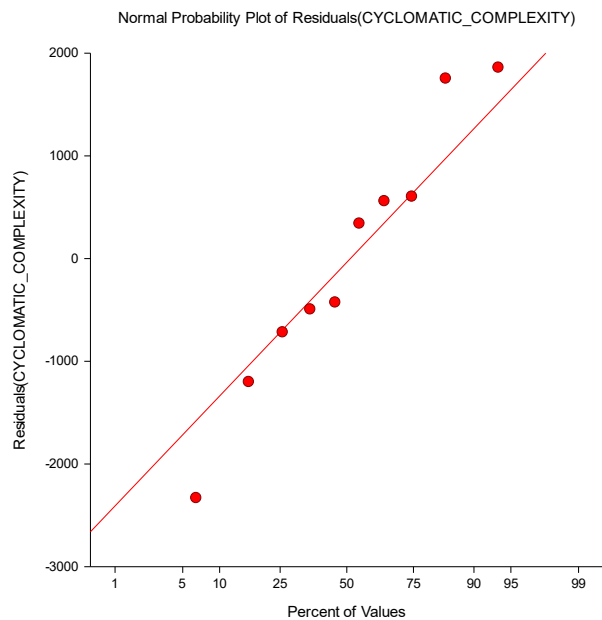
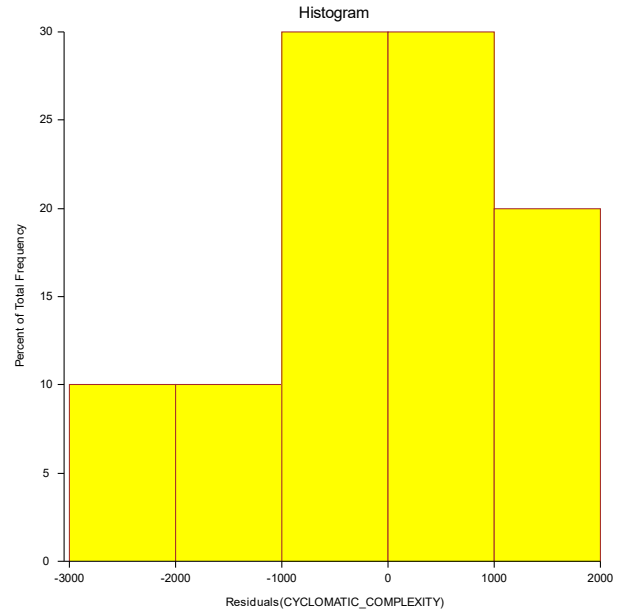
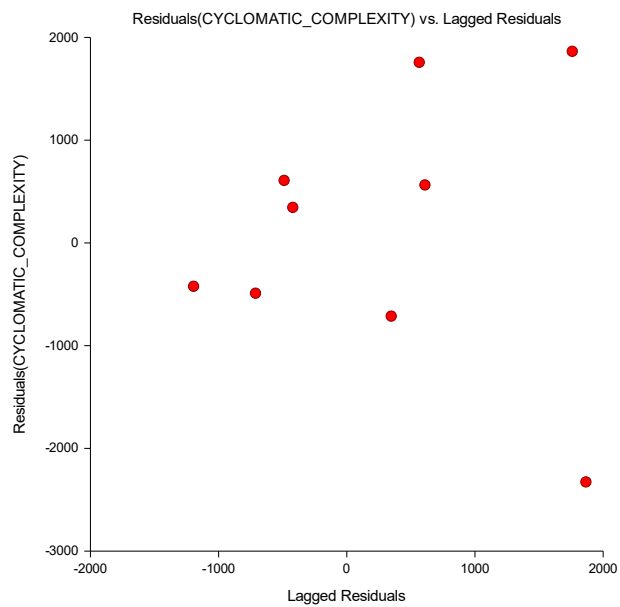
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## Linear Regression Report

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### Procedure Input Settings

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#### Autosaved Template File

C:\Users\KASATLA\Documents\NCSS 12\Procedure Templates\Autosave\Linear Regression and Correlation - Autosaved 2018\_3\_30-0\_52\_52.t153

#### Variables Tab

-- Variables -----  
 Y: Dependent Variable(s):                      CYCLOMATIC\_COMPLEXITY  
 X: Independent Variable:                      no\_of\_ISSUES  
 Frequency Variable:                      <Empty>  
 Weight Variable:                      <Empty>

-- Model Specification -----  
 Remove Intercept                      Unchecked

-- Resampling (Increases computation time) -----  
 Calculate Bootstrap C.I.'s                      Unchecked  
 Run Randomization Tests                      Unchecked

-- Alpha Levels -----  
 Alpha for C.I.'s and Tests:                      0.050  
 Alpha for Assumptions:                      0.20

#### Reports Tab

-- Select Report / Plot Group -----  
 Select a Group of Reports and Plots:                      Display only those items that are CHECKED BELOW  
 Show Notes                      Checked  
 Show All Rows                      Checked

-- Select Reports -----  
 .. Summaries ..  
 Run Summary                      Checked  
 Summary Statement                      Checked  
 Descriptive Statistics                      Unchecked  
 Correlation and R-Squared                      Checked  
 Summary Matrices                      Checked

.. Estimation ..  
 Regression Estimation                      Checked

.. ANOVA ..  
 ANOVA                      Unchecked

.. Assumptions ..  
 Assumptions                      Checked  
     Levene Groups:                      2  
 Durbin-Watson                      Unchecked  
 PRESS                      Unchecked



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#### Procedure Input Settings (Continued)

##### Reports Tab (Continued)

-- Prediction -----

Predict Y at these X values:	<Empty>
Predicted Y - C.L.	Unchecked
Predicted Y - P.L.	Unchecked

-- Row-by-Row Lists -----

Original Data	Unchecked
Predicted Y Means	Unchecked
Predicted Y Individuals	Unchecked
Simultaneous Bands	Unchecked
Predicted X Means	Unchecked
Predicted X Individuals	Unchecked

-- Regression Diagnostics -----

Residuals	Unchecked
Residual Diagnostics	Unchecked
Leave One Row Out	Unchecked
Outlier Detection Chart	Unchecked
Influence Detection Chart	Unchecked
Outlier-Influence Chart	Unchecked

##### Report Options Tab

-- Report Options -----

Precision:	Single
Variable Names:	Names

-- Decimal Places -----

Probability:	4
Beta (Coefficients):	4
SE:	4
T:	4
R2:	4
X:	4
Y:	4
Residuals:	4
Std Residuals:	4
Sum Squares:	All
Matrix:	All

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### Procedure Input Settings (Continued)

#### Plots Tab

-- Select Plots -----	
Y vs X	Checked
RStudent vs X	Checked
Histogram	Checked
Residuals vs X	Checked
Residuals vs Row	Checked
Probability Plot	Checked
Residuals  vs X	Checked
Serial Correlation	Checked
-- Plot Options -----	
Y vs X Plot Size:	Medium
All Other Plot Sizes:	Small

#### Resampling Tab

-- Bootstrap Calculation Options -----	
.. Sampling .....	
Samples (N):	3000
Sampling Method:	Observations
Retries:	50
.. Estimation .....	
Percentile Type:	Ave X(p[n+1])
C.I. Method:	Reflection
Bootstrap Confidence Coefficients:	0.90 0.95 0.99
-- Randomization Test Options -----	
Monte Carlo Samples:	1000

#### Storage Tab

-- Data Storage Options -----	
Storage Option:	Do not store data