Program Summary - Homework 5.sas

Execution Environment

Author:	chwang10
File:	/home/chwang10/Homework 5.sas
SAS Platform:	Linux LIN X64 3.10.0-1062.9.1.el7.x86_64
SAS Host:	ODAWS01-USW2.ODA.SAS.COM
SAS Version:	9.04.01M6P11072018
SAS Locale:	en_US
Submission Time:	11/3/2020, 12:15:24 AM
Browser Host:	ASTOUND-66-234-210-119.CA.ASTOUND.NET
User Agent:	Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_6) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/86.0.4240.111 Safari/537.36
Application Server:	ODAMID01-USW2.ODA.SAS.COM

Code: Homework 5.sas

```
* Programmed by Charles Hwang *
* Coded in SAS OnDemand       *
* Monday, November 2, 2020    *
* Course: STAT 403            *
* Title: Homework 5           *;

/* 1a */ Proc Import out=MLB datafile="/home/chwang10/BASEBALL2018.xlsx" dbms=xlsx;
Run;

/* 1b */ Proc Corr data=MLB plots=Matrix (nvar=ALL) nosimple; * Because the Proc Corr function only
allows a maximum of ten variables, two separate correlation matrices are needed. I chose to separate
the matrices into offensive and defensive variables. ;
Title "1b. Correlation Matrices of Offensive MLB Variables";
Var WINLOSSPER R H HR RBI SB BA OBP SLG;
Proc Corr data=MLB plots=Matrix nosimple;
Title "1b. Correlation Matrices of Defensive MLB Variables";
Var WINLOSSPER ERA WHIP;
Run;

/* 1c(i) */ * The Runs Scored (R) variable had the strongest positive correlation to win
percentage (WINLOSSPER) at r = 0.83789. This means that win percentage has the greatest direct
correlation with runs scored. ;
/* 1c(ii) */ * The Earned Run Average (ERA) variable had the strongest negative correlation to win
percentage (WINLOSSPER) at r = -0.87328. This means that win percentage has the greatest inverse
correlated with earned run average.;
/* 1c(iii) */ * The Earned Run Average (ERA) variable had the strongest overall correlation to win
percentage (WINLOSSPER) at r = -0.87328. ;

/* 1d */ Proc Sort data=MLB;
By League;
Proc Corr data=MLB plots=Matrix (nvar=ALL) nosimple; * Specifying that all variables be displayed in
the correlation matrix (default is nvar=5) ;
Title "1d. Correlation Matrices of Offensive MLB Variables by League";
By League;
Var WINLOSSPER R H HR RBI SB BA OBP SLG; * There is an error for each pair of matrices but they do not
appear to affect the data or output in any way. ;
Proc Corr data=MLB plots=Matrix nosimple;
Title "1d. Correlation Matrices of Defensive MLB Variables by League";
By League;
Var WINLOSSPER ERA WHIP;
Run; * The Earned Runs Average (ERA) variable had the strongest correlation to win
percentage (WINLOSSPER) in the American League at r = -0.92775, and The Runs Scored (R) variable had
the strongest correlation to win percentage (WINLOSSPER) in the National League at r = 0.85717. The
American League had the same variable with the strongest correlation, but the National League had a
different variable with the strongest correlation. This suggests that the American League may have a
slightly higher emphasis on pitching, while the National League have a slightly higher emphasis on
simply scoring runs. ;
```

```
/* 2a */ Proc Import out=BCH datafile="/home/chwang10/Bone Cracking Hypercarnivores Data.xlsx" dbms=xlsx;
Proc Reg data=BCH;
Title "2a. Linear Regression of Bone Cracking Hypercarnivores Data";
Model SEJ=MA; * Linear model: SEJ = -2.76054 + 31.81161*MA ;
Run;

/* 2b */ * Although r = 0.7486, the residual plot shows a lack of homoscedasticity, indicating that a
linear regression may not be the best model. Additionally, the studentized residual plot indicates some
outliers and both the studentized residual plot and Cook's D indicates some high leverage points. ;

/* 2c */ Data BCH2;
Set BCH;
MASQ=MA**2;
Proc Reg data=BCH2 plots=predictions (x=MA);
Title "2c. Quadratic Regression of Bone Cracking Hypercarnivores Data";
Model SEJ=MA MASQ; * Quadratic model: SEJ=8.60935-73.35032*MA+236.05951*MA^2, r=0.8006, TSS=64.76180 ;
Run; * There is a megaphone effect in the residual plot and studentized residual plot, indicating a
lack of homoscedasticity. Additionally, the studentized residual plot indicates some outliers and some
high leverage points. ;

/* 2d */ Data BCHL;
Set BCH;
lnSEJ=log(SEJ);
Proc Reg data=BCHL;
Title "2d. Exponential Regression of Bone Cracking Hypercarnivores Data";
Model lnSEJ=MA; * Exponential model: SEJ = e^(-0.16884 + 7.14161*MA), r = 0.8004, TSS = 3.06007 ;
Output out=BCHLO predicted=SEJP; * Both the residual plot and studentized residual plot appear to
indicate homoscedasticity. The studentized residual plot indicates some high leverage points. ;
Data BCHLU; * Untransforming model ;
Set BCHLO;
SEJU=exp(SEJP);
Proc Print data=BCHLU;
Title "2d. Bone Cracking Hypercarnivores Data with Untransformed Regression Output (SEJ vs. SEJU)";
Run;

/* 2e */ Proc Transreg data=BCH;
Title "2e. Box-Cox Transformation of Bone Cracking Hypercarnivores Data";
Model Boxcox(SEJ)=identity(MA);
Run; * λ = -0.75 ;
Data BCHBC;
Set BCH;
SEJλ=SEJ**-0.75;
Proc Reg data=BCHBC;
Title "2e. Power Regression of Bone Cracking Hypercarnivores Data";
Model SEJλ=MA; * Power model: SEJ = (0.75444 - 1.80577*MA)^4/3, r = 0.8207, TSS = 0.19097 ;
Run; * Looking at the residual plot and studentized residual plot, it appears there may be a lack of
homoscedasticity. Additionally, the studentized residual plot indicates some outliers and both the
studentized residual plot and Cook's D indicates some high leverage points. ;

/* 2f */ * I believe the exponential model has the best fit. The adjusted-r^2 is the highest of the
three nonlinear models and the total sum of squares (TSS) is by far the lowest. The Box-Cox
Transformation also assures we have the best value of λ for the power model. ;

/* 3a */ Proc Import out=Res datafile="/home/chwang10/Response.xlsx" dbms=xlsx;
Run;

/* 3b */ Symbol value=circle;
Proc Gplot data=Res;
Title "3b. Scatterplot of Response Data";
Plot y*x;
Run;

/* 3c */ Proc Nlin data=Res plots=all;
Title "3c. Nonlinear Model of Response Data (y = a*e^(bx))";
Parameters a=1 b=1; * Arbitrary median choice of parameters ;
Model y=a*exp(b*x);
Run; * The sum of squares when convergence is met (a = 111.9, b = -0.7352) is 1011.3. Additionally,
the residual histogram indicates the data may not be normal, and there is a megaphone effect in the
```

```
residual plot and studentized residual plot, indicating a lack of homoscedasticity. ;

/* 3d */ Proc Nlin data=Res plots=all;
Title "3d. Nonlinear Model of Response Data (y = e^(ax)/(b + cx))";
Parameters a=.1 b=.1 c=.1;
Model y=exp(a*x)/(b+c*x);
Run; * The sum of squares when convergence is met (a = -0.1665, b = 0.00516, c = 0.0122) is 515.1.
This is better than the model in problem 3c. Additionally, there is a megaphone effect in the residual
plot and studentized residual plot, indicating a lack of homoscedasticity. ;
```

Log: Homework 5.sas

Errors (2)

Notes (51)

```
1          OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
70
71         * Programmed by Charles Hwang *
72         * Coded in SAS OnDemand       *
73         * Monday, November 2, 2020    *
74         * Course: STAT 403            *
75         * Title: Homework 5           *;
76
77         /* 1a */
77       !          Proc Import out=MLB datafile="/home/chwang10/BASEBALL2018.xlsx" dbms=xlsx;
78         Run;

NOTE: Import cancelled.  Output dataset WORK.MLB already exists.  Specify REPLACE option to overwrite it.
NOTE: The SAS System stopped processing this step because of errors.
NOTE: PROCEDURE IMPORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              799.31k
      OS Memory           40852.00k
      Timestamp           11/03/2020 08:15:17 AM
      Step Count                        707  Switch Count  0
      Page Faults                       0
      Page Reclaims                     138
      Page Swaps                        0
      Voluntary Context Switches        1
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           0

79
80         /* 1b */


80       !          Proc Corr data=MLB plots=Matrix (nvar=ALL) nosimple; * Because the Proc Corr function only
81         allows a maximum of ten variables, two separate correlation matrices are needed. I chose to separate
82         the matrices into offensive and defensive variables. ;
83         Title "1b. Correlation Matrices of Offensive MLB Variables";
84         Var WINLOSSPER R H HR RBI SB BA OBP SLG;

NOTE: PROCEDURE CORR used (Total process time):
      real time           0.81 seconds
      user cpu time       0.27 seconds
      system cpu time     0.01 seconds
      memory              18304.40k
      OS Memory           48552.00k
      Timestamp           11/03/2020 08:15:17 AM
      Step Count                        708  Switch Count  1
      Page Faults                       0
      Page Reclaims                     2667
      Page Swaps                        0
      Voluntary Context Switches        533
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           832


85         Proc Corr data=MLB plots=Matrix nosimple;
86         Title "1b. Correlation Matrices of Defensive MLB Variables";
87         Var WINLOSSPER ERA WHIP;
88         Run;
```

```
NOTE: PROCEDURE CORR used (Total process time):
      real time           0.27 seconds
      user cpu time       0.13 seconds
      system cpu time     0.00 seconds
      memory              3573.84k
      OS Memory           49756.00k
      Timestamp           11/03/2020 08:15:18 AM
      Step Count                        709  Switch Count  1
      Page Faults                       0
      Page Reclaims                     702
      Page Swaps                        0
      Voluntary Context Switches        303
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           768


89
90         /* 1c(i) */ * The Runs Scored (R) variable had the strongest positive correlation to win
91         percentage (WINLOSSPER) at r = 0.83789. This means that win percentage has the greatest direct
92         correlation with runs scored. ;
93         /* 1c(ii) */ * The Earned Run Average (ERA) variable had the strongest negative correlation to win
94         percentage (WINLOSSPER) at r = -0.87328. This means that win percentage has the greatest inverse
95         correlated with earned run average.;
96         /* 1c(iii) */ * The Earned Run Average (ERA) variable had the strongest overall correlation to win
97         percentage (WINLOSSPER) at r = -0.87328. ;
98
99         /* 1d */
99       !          Proc Sort data=MLB;
100        By League;

NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              427.12k
      OS Memory           48808.00k
      Timestamp           11/03/2020 08:15:18 AM
      Step Count                        710  Switch Count  0
      Page Faults                       0
      Page Reclaims                     49
      Page Swaps                        0
      Voluntary Context Switches        0
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           0


101        Proc Corr data=MLB plots=Matrix (nvar=ALL) nosimple; * Specifying that all variables be displayed in
102        the correlation matrix (default is nvar=5) ;
103        Title "1d. Correlation Matrices of Offensive MLB Variables by League";
104        By League;
105        Var WINLOSSPER R H HR RBI SB BA OBP SLG; * There is an error for each pair of matrices but they do not
106        appear to affect the data or output in any way. ;

ERROR: All variables have missing values for all observations in the input data set.
NOTE: The above message was for the following BY group:
      League=
NOTE: PROCEDURE CORR used (Total process time):
      real time           1.45 seconds
      user cpu time       0.44 seconds
      system cpu time     0.01 seconds
      memory              5418.15k
      OS Memory           51548.00k
      Timestamp           11/03/2020 08:15:19 AM
      Step Count                        711  Switch Count  1
      Page Faults                       0
      Page Reclaims                     1145
      Page Swaps                        0
      Voluntary Context Switches        996
      Involuntary Context Switches      3
      Block Input Operations            0
      Block Output Operations           1104


107        Proc Corr data=MLB plots=Matrix nosimple;
108        Title "1d. Correlation Matrices of Defensive MLB Variables by League";
109        By League;
110        Var WINLOSSPER ERA WHIP;
```

```
111        Run;

ERROR: All variables have missing values for all observations in the input data set.
NOTE: The above message was for the following BY group:
      League=
NOTE: PROCEDURE CORR used (Total process time):
      real time           0.44 seconds
      user cpu time       0.19 seconds
      system cpu time     0.00 seconds
      memory              4234.18k
      OS Memory           51548.00k
      Timestamp           11/03/2020 08:15:20 AM
      Step Count                        712  Switch Count  1
      Page Faults                       0
      Page Reclaims                     889
      Page Swaps                        0
      Voluntary Context Switches        561
      Involuntary Context Switches      4
      Block Input Operations            0
      Block Output Operations           792


111       !      * The Earned Runs Average (ERA) variable had the strongest correlation to win
112         percentage (WINLOSSPER) in the American League at r = -0.92775, and The Runs Scored (R) variable had
113         the strongest correlation to win percentage (WINLOSSPER) in the National League at r = 0.85717. The
114         American League had the same variable with the strongest correlation, but the National League had a
115         different variable with the strongest correlation. This suggests that the American League may have a
116         slightly higher emphasis on pitching, while the National League have a slightly higher emphasis on
117         simply scoring runs. ;
118
119         /* 2a */
119       !          Proc Import out=BCH datafile="/home/chwang10/Bone Cracking Hypercarnivores Data.xlsx" dbms=xlsx;

NOTE: Import cancelled.  Output dataset WORK.BCH already exists.  Specify REPLACE option to overwrite it.
NOTE: The SAS System stopped processing this step because of errors.
NOTE: PROCEDURE IMPORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              687.28k
      OS Memory           50580.00k
      Timestamp           11/03/2020 08:15:20 AM
      Step Count                        713  Switch Count  0
      Page Faults                       0
      Page Reclaims                     138
      Page Swaps                        0
      Voluntary Context Switches        3
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           0



120        Proc Reg data=BCH;
121        Title "2a. Linear Regression of Bone Cracking Hypercarnivores Data";
122        Model SEJ=MA; * Linear model: SEJ = -2.76054 + 31.81161*MA ;
123        Run;

124
125        /* 2b */ * Although r = 0.7486, the residual plot shows a lack of homoscedasticity, indicating that a
126        linear regression may not be the best model. Additionally, the studentized residual plot indicates some
127        outliers and both the studentized residual plot and Cook's D indicates some high leverage points. ;
128
129        /* 2c */

NOTE: PROCEDURE REG used (Total process time):
      real time           0.53 seconds
      user cpu time       0.25 seconds
      system cpu time     0.04 seconds
      memory              11323.96k
      OS Memory           58340.00k
      Timestamp           11/03/2020 08:15:20 AM
      Step Count                        714  Switch Count  23
      Page Faults                       0
      Page Reclaims                     12505
      Page Swaps                        0
      Voluntary Context Switches        991
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           1168
```

```
129      !          Data BCH2;
130        Set BCH;
131        MASQ=MA**2;

NOTE: There were 36 observations read from the data set WORK.BCH.
NOTE: The data set WORK.BCH2 has 36 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              961.18k
      OS Memory           52652.00k
      Timestamp           11/03/2020 08:15:20 AM
      Step Count                        715  Switch Count  2
      Page Faults                       0
      Page Reclaims                     124
      Page Swaps                        0
      Voluntary Context Switches        14
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


132        Proc Reg data=BCH2 plots=predictions (x=MA);
133        Title "2c. Quadratic Regression of Bone Cracking Hypercarnivores Data";
134        Model SEJ=MA MASQ; * Quadratic model: SEJ=8.60935-73.35032*MA+236.05951*MA^2, r=0.8006, TSS=64.76180 ;
135        Run;

135      !      * There is a megaphone effect in the residual plot and studentized residual plot, indicating a
136        lack of homoscedasticity. Additionally, the studentized residual plot indicates some outliers and some
137        high leverage points. ;
138
139        /* 2d */

NOTE: PROCEDURE REG used (Total process time):
      real time           0.61 seconds
      user cpu time       0.25 seconds
      system cpu time     0.03 seconds
      memory              11225.46k
      OS Memory           60132.00k
      Timestamp           11/03/2020 08:15:21 AM
      Step Count                        716  Switch Count  23
      Page Faults                       0
      Page Reclaims                     12235
      Page Swaps                        0
      Voluntary Context Switches        1026
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           1616


139      !          Data BCHL;
140        Set BCH;
141        lnSEJ=log(SEJ);

NOTE: There were 36 observations read from the data set WORK.BCH.
NOTE: The data set WORK.BCHL has 36 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              950.40k
      OS Memory           53164.00k
      Timestamp           11/03/2020 08:15:21 AM
      Step Count                        717  Switch Count  2
      Page Faults                       0
      Page Reclaims                     122
      Page Swaps                        0
      Voluntary Context Switches        12
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


142        Proc Reg data=BCHL;
143        Title "2d. Exponential Regression of Bone Cracking Hypercarnivores Data";
144        Model lnSEJ=MA; * Exponential model: SEJ = e^(-0.16884 + 7.14161*MA), r = 0.8004, TSS = 3.06007 ;
145        Output out=BCHLO predicted=SEJP; * Both the residual plot and studentized residual plot appear to
146        indicate homoscedasticity. The studentized residual plot indicates some high leverage points. ;
```

```
NOTE: The data set WORK.BCHLO has 36 observations and 11 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           0.49 seconds
      user cpu time       0.23 seconds
      system cpu time     0.04 seconds
      memory              11230.21k
      OS Memory           60644.00k
      Timestamp           11/03/2020 08:15:21 AM
      Step Count                        718  Switch Count  25
      Page Faults                       0
      Page Reclaims                     12141
      Page Swaps                        0
      Voluntary Context Switches        1003
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           1440


147        Data BCHLU; * Untransforming model ;
148        Set BCHLO;
149        SEJU=exp(SEJP);

NOTE: There were 36 observations read from the data set WORK.BCHLO.
NOTE: The data set WORK.BCHLU has 36 observations and 12 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              959.93k
      OS Memory           53676.00k
      Timestamp           11/03/2020 08:15:21 AM
      Step Count                        719  Switch Count  2
      Page Faults                       0
      Page Reclaims                     121
      Page Swaps                        0
      Voluntary Context Switches        13
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           272


150        Proc Print data=BCHLU;
151        Title "2d. Bone Cracking Hypercarnivores Data with Untransformed Regression Output (SEJ vs. SEJU)";
152        Run;

NOTE: There were 36 observations read from the data set WORK.BCHLU.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.09 seconds
      user cpu time       0.10 seconds
      system cpu time     0.00 seconds
      memory              1047.96k
      OS Memory           53672.00k
      Timestamp           11/03/2020 08:15:21 AM
      Step Count                        720  Switch Count  1
      Page Faults                       0
      Page Reclaims                     110
      Page Swaps                        0
      Voluntary Context Switches        7
      Involuntary Context Switches      4
      Block Input Operations            0
      Block Output Operations           40


153
154        /* 2e */
154      !          Proc Transreg data=BCH;
155        Title "2e. Box-Cox Transformation of Bone Cracking Hypercarnivores Data";
156        Model Boxcox(SEJ)=identity(MA);
157        Run;

NOTE: There were 36 observations read from the data set WORK.BCH.
NOTE: PROCEDURE TRANSREG used (Total process time):
      real time           0.14 seconds
      user cpu time       0.06 seconds
      system cpu time     0.01 seconds
      memory              2952.59k
      OS Memory           54836.00k
      Timestamp           11/03/2020 08:15:22 AM
      Step Count                        721  Switch Count  1
      Page Faults                       0
      Page Reclaims                     334
```

```
      Page Swaps                         0
      Voluntary Context Switches         356
      Involuntary Context Switches       0
      Block Input Operations             0
      Block Output Operations            496


157       !      * λ = -0.75 ;
158         Data BCHBC;
159         Set BCH;
160         SEJλ=SEJ**-0.75;

NOTE: There were 36 observations read from the data set WORK.BCH.
NOTE: The data set WORK.BCHBC has 36 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              951.59k
      OS Memory           53932.00k
      Timestamp           11/03/2020 08:15:22 AM
      Step Count                         722  Switch Count  2
      Page Faults                        0
      Page Reclaims                      123
      Page Swaps                         0
      Voluntary Context Switches         14
      Involuntary Context Switches       0
      Block Input Operations             0
      Block Output Operations            264


161         Proc Reg data=BCHBC;
162         Title "2e. Power Regression of Bone Cracking Hypercarnivores Data";
163         Model SEJλ=MA; * Power model: SEJ = (0.75444 - 1.80577*MA)^4/3, r = 0.8207, TSS = 0.19097 ;
164         Run;

164       !      * Looking at the residual plot and studentized residual plot, it appears there may be a lack of
165         homoscedasticity. Additionally, the studentized residual plot indicates some outliers and both the
166         studentized residual plot and Cook's D indicates some high leverage points. ;
167
168         /* 2f */ * I believe the exponential model has the best fit. The adjusted-r^2 is the highest of the
169         three nonlinear models and the total sum of squares (TSS) is by far the lowest. The Box-Cox
170         Transformation also assures we have the best value of λ for the power model. ;
171
172         /* 3a */

NOTE: PROCEDURE REG used (Total process time):
      real time           0.49 seconds
      user cpu time       0.24 seconds
      system cpu time     0.04 seconds
      memory              11227.81k
      OS Memory           61668.00k
      Timestamp           11/03/2020 08:15:22 AM
      Step Count                         723  Switch Count  23
      Page Faults                        0
      Page Reclaims                      12031
      Page Swaps                         0
      Voluntary Context Switches         1000
      Involuntary Context Switches       1
      Block Input Operations             0
      Block Output Operations            1200


172       !          Proc Import out=Res datafile="/home/chwang10/Response.xlsx" dbms=xlsx;
173         Run;

NOTE: Import cancelled.  Output dataset WORK.RES already exists.  Specify REPLACE option to overwrite it.
NOTE: The SAS System stopped processing this step because of errors.
NOTE: PROCEDURE IMPORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              800.28k
      OS Memory           54164.00k
      Timestamp           11/03/2020 08:15:22 AM
      Step Count                         724  Switch Count  0
      Page Faults                        0
      Page Reclaims                      138
      Page Swaps                         0
      Voluntary Context Switches         1
      Involuntary Context Switches       0
```

```
      Block Input Operations            0
      Block Output Operations           0

174
175        /* 3b */ Symbol value=circle;


176        Proc Gplot data=Res;
177        Title "3b. Scatterplot of Response Data";
178        Plot y*x;
179        Run;

180
181        /* 3c */

NOTE: There were 54 observations read from the data set WORK.RES.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.16 seconds
      user cpu time       0.16 seconds
      system cpu time     0.01 seconds
      memory              7857.31k
      OS Memory           57368.00k
      Timestamp           11/03/2020 08:15:22 AM
      Step Count                        725  Switch Count  1
      Page Faults                       0
      Page Reclaims                     766
      Page Swaps                        0
      Voluntary Context Switches        8
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           296


181      !          Proc Nlin data=Res plots=all;
182        Title "3c. Nonlinear Model of Response Data (y = a*e^(bx))";
183        Parameters a=1 b=1; * Arbitrary median choice of parameters ;
184        Model y=a*exp(b*x);
185        Run;


NOTE: DER.a not initialized or missing. It will be computed automatically.
NOTE: DER.b not initialized or missing. It will be computed automatically.
NOTE: PROC NLIN grid search time was  0: 0: 0.
NOTE: Convergence criterion met.
NOTE: PROCEDURE NLIN used (Total process time):
      real time           0.62 seconds
      user cpu time       0.33 seconds
      system cpu time     0.03 seconds
      memory              5913.18k
      OS Memory           56880.00k
      Timestamp           11/03/2020 08:15:23 AM
      Step Count                        726  Switch Count  2
      Page Faults                       0
      Page Reclaims                     1946
      Page Swaps                        0
      Voluntary Context Switches        1303
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           1576


185      !      * The sum of squares when convergence is met (a = 111.9, b = -0.7352) is 1011.3. Additionally,
186        the residual histogram indicates the data may not be normal, and there is a megaphone effect in the
187        residual plot and studentized residual plot, indicating a lack of homoscedasticity. ;
188
189        /* 3d */
189      !          Proc Nlin data=Res plots=all;
190        Title "3d. Nonlinear Model of Response Data (y = e^(ax)/(b + cx))";
191        Parameters a=.1 b=.1 c=.1;
192        Model y=exp(a*x)/(b+c*x);
193        Run;


NOTE: DER.a not initialized or missing. It will be computed automatically.
NOTE: DER.b not initialized or missing. It will be computed automatically.
NOTE: DER.c not initialized or missing. It will be computed automatically.
NOTE: PROC NLIN grid search time was  0: 0: 0.
NOTE: Convergence criterion met.
NOTE: PROCEDURE NLIN used (Total process time):
      real time           0.63 seconds
      user cpu time       0.35 seconds
```

```
system cpu time          0.02 seconds
memory                   5289.46k
OS Memory                56924.00k
Timestamp                11/03/2020 08:15:24 AM
Step Count                        727  Switch Count  2
Page Faults                       0
Page Reclaims                     1696
Page Swaps                        0
Voluntary Context Switches        1312
Involuntary Context Switches      0
Block Input Operations            0
Block Output Operations           1608
```

```
193      !      * The sum of squares when convergence is met (a = -0.1665, b = 0.00516, c = 0.0122) is 515.1.
194        This is better than the model in problem 3c. Additionally, there is a megaphone effect in the residual
195        plot and studentized residual plot, indicating a lack of homoscedasticity. ;
196
197        OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
208
```

Results: Homework 5.sas

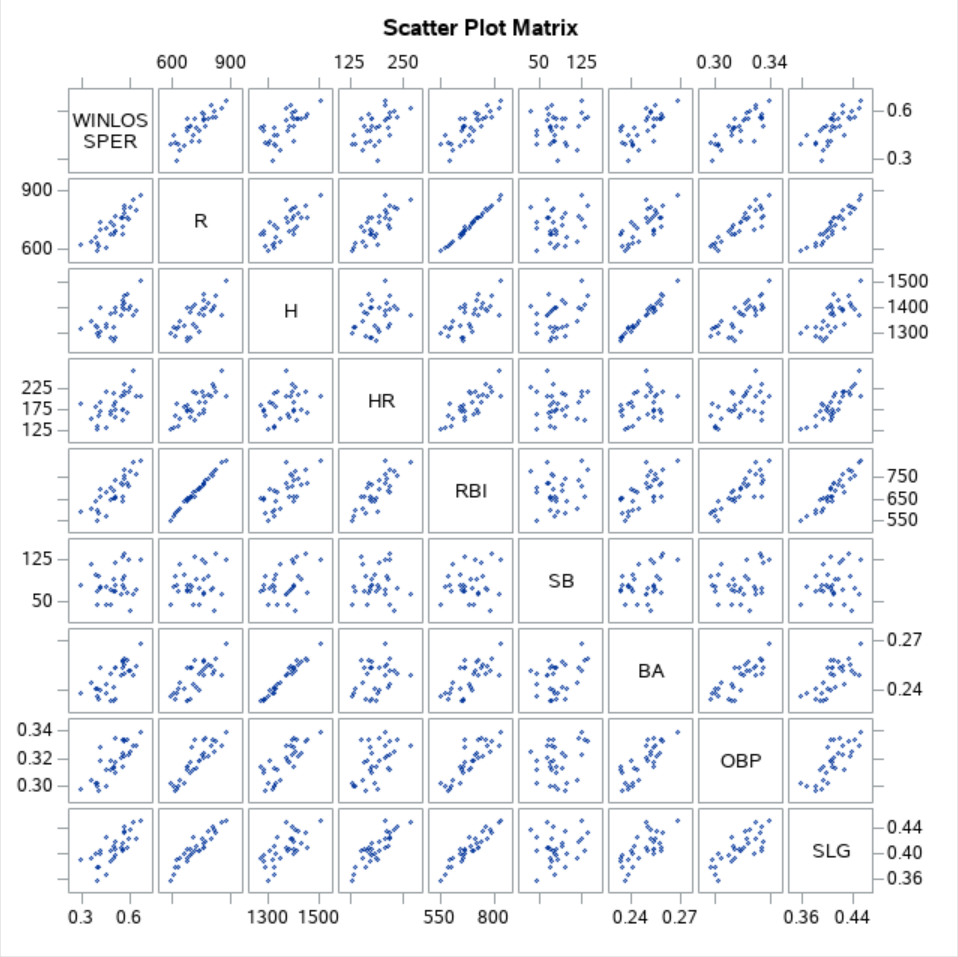
1b. Correlation Matrices of Offensive MLB Variables

The CORR Procedure

9 Variables:	WINLOSSPER R H HR RBI SB BA OBP SLG

Pearson Correlation Coefficients, N = 30
Prob > |r| under H0: Rho=0

	WINLOSSPER	R	H	HR	RBI	SB	BA	OBP	SLG
WINLOSSPER	1.00000	0.83789 <.0001	0.67245 <.0001	0.53724 0.0022	0.82353 <.0001	0.12400 0.5139	0.68859 <.0001	0.79834 <.0001	0.74983 <.0001
R	0.83789 <.0001	1.00000	0.71663 <.0001	0.77367 <.0001	0.99588 <.0001	0.16094 0.3956	0.72054 <.0001	0.87978 <.0001	0.93532 <.0001
H	0.67245 <.0001	0.71663 <.0001	1.00000	0.29945 0.1079	0.69289 <.0001	0.36757 0.0457	0.98345 <.0001	0.79259 <.0001	0.68697 <.0001
HR	0.53724 0.0022	0.77367 <.0001	0.29945 0.1079	1.00000	0.79485 <.0001	0.02118 0.9116	0.29698 0.1110	0.51680 0.0035	0.85806 <.0001
RBI	0.82353 <.0001	0.99588 <.0001	0.69289 <.0001	0.79485 <.0001	1.00000	0.13758 0.4685	0.69814 <.0001	0.85792 <.0001	0.93899 <.0001
SB	0.12400 0.5139	0.16094 0.3956	0.36757 0.0457	0.02118 0.9116	0.13758 0.4685	1.00000	0.36838 0.0452	0.25749 0.1695	0.19081 0.3125
BA	0.68859 <.0001	0.72054 <.0001	0.98345 <.0001	0.29698 0.1110	0.69814 <.0001	0.36838 0.0452	1.00000	0.81488 <.0001	0.69425 <.0001
OBP	0.79834 <.0001	0.87978 <.0001	0.79259 <.0001	0.51680 0.0035	0.85792 <.0001	0.25749 0.1695	0.81488 <.0001	1.00000	0.77304 <.0001
SLG	0.74983 <.0001	0.93532 <.0001	0.68697 <.0001	0.85806 <.0001	0.93899 <.0001	0.19081 0.3125	0.69425 <.0001	0.77304 <.0001	1.00000



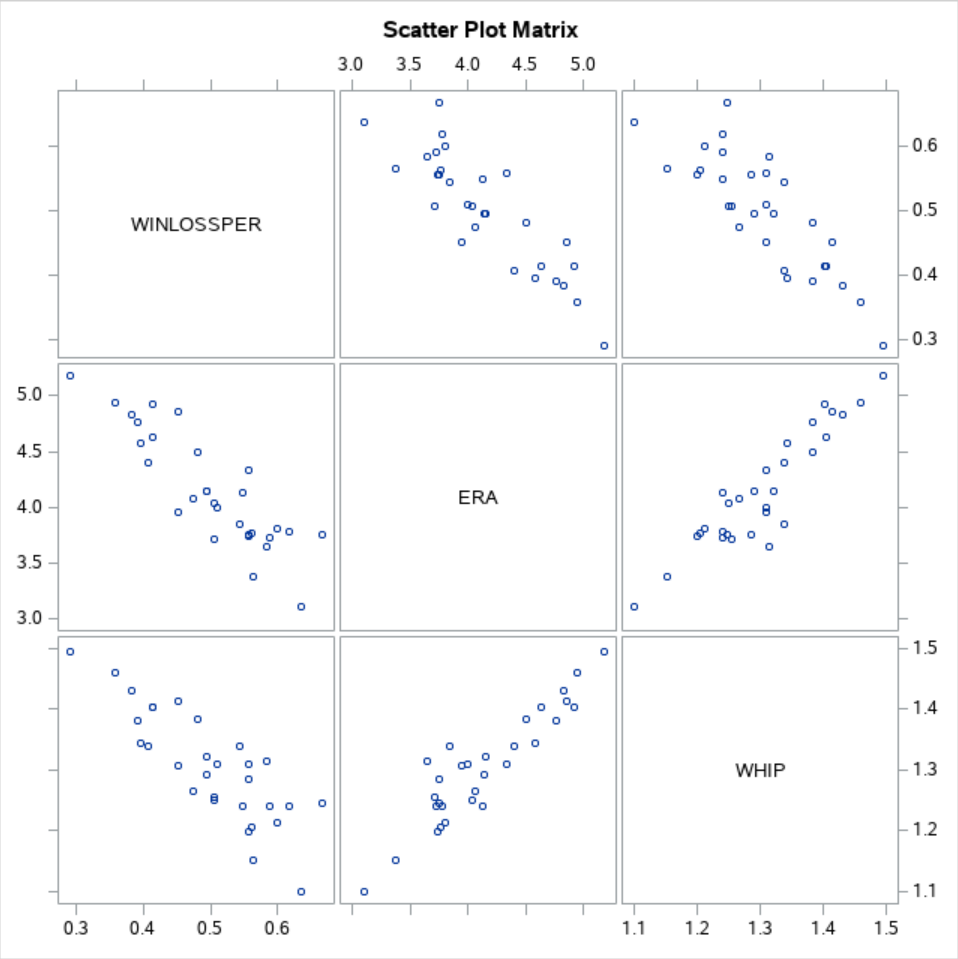
1b. Correlation Matrices of Defensive MLB Variables

The CORR Procedure

3 Variables:	WINLOSSPER ERA WHIP

Pearson Correlation Coefficients, N = 30
Prob > |r| under H0: Rho=0

	WINLOSSPER	ERA	WHIP
WINLOSSPER	1.00000	-0.87328	-0.83325
WINLOSSPER		<.0001	<.0001
ERA	-0.87328	1.00000	0.91950
ERA	<.0001		<.0001
WHIP	-0.83325	0.91950	1.00000
WHIP	<.0001	<.0001	



1d. Correlation Matrices of Offensive MLB Variables by League

The CORR Procedure

League=' '

9 Variables:	WINLOSSPER R H HR RBI SB BA OBP SLG

1d. Correlation Matrices of Offensive MLB Variables by League

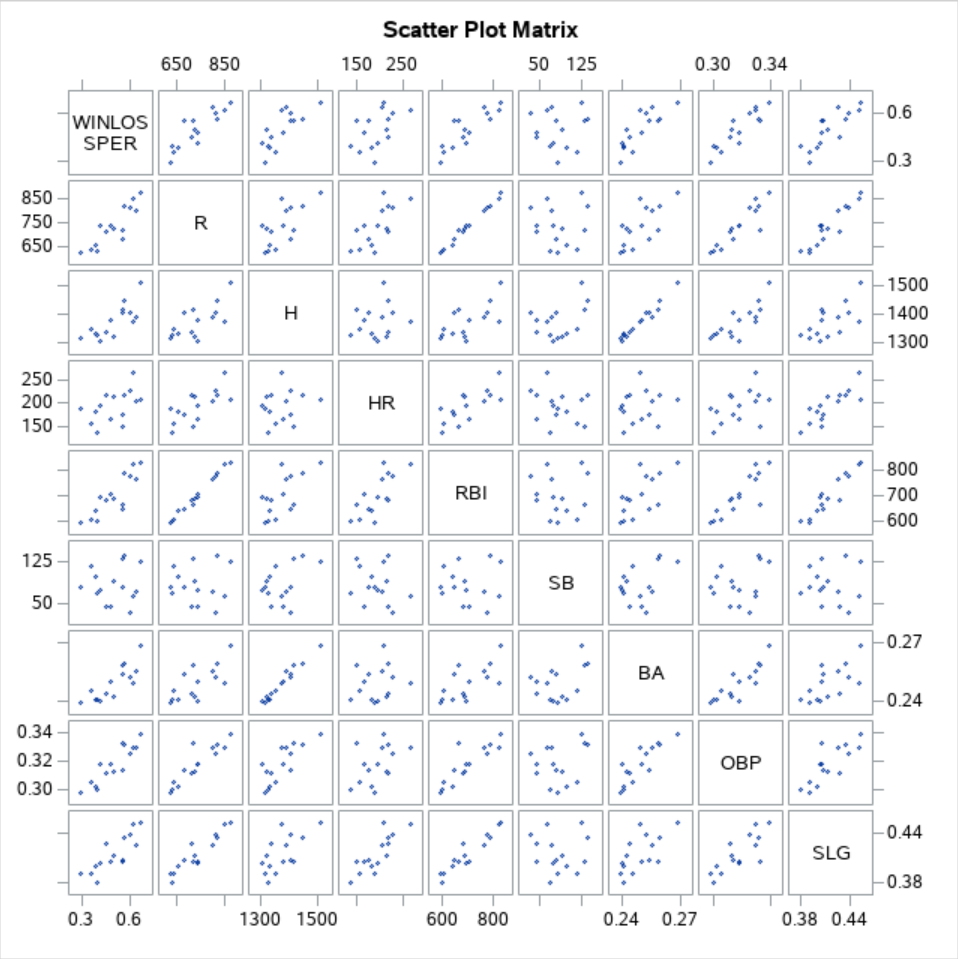
The CORR Procedure

League=AL

9 Variables:	WINLOSSPER R H HR RBI SB BA OBP SLG

Pearson Correlation Coefficients, N = 15
Prob > |r| under H0: Rho=0

	WINLOSSPER	R	H	HR	RBI	SB	BA	OBP	SLG
WINLOSSPER	1.00000	0.87471 <.0001	0.78507 0.0005	0.50558 0.0545	0.85765 <.0001	0.04611 0.8704	0.83003 0.0001	0.90413 <.0001	0.82759 0.0001
R	0.87471 <.0001	1.00000	0.70131 0.0036	0.71396 0.0028	0.99549 <.0001	0.01859 0.9476	0.70288 0.0035	0.90008 <.0001	0.93159 <.0001
H	0.78507 0.0005	0.70131 0.0036	1.00000	0.18836 0.5014	0.67061 0.0062	0.41782 0.1212	0.98232 <.0001	0.80832 0.0003	0.66215 0.0072
HR	0.50558 0.0545	0.71396 0.0028	0.18836 0.5014	1.00000	0.75567 0.0011	-0.25260 0.3637	0.16399 0.5592	0.45038 0.0921	0.83358 0.0001
RBI	0.85765 <.0001	0.99549 <.0001	0.67061 0.0062	0.75567 0.0011	1.00000	-0.01219 0.9656	0.66529 0.0068	0.86440 <.0001	0.94204 <.0001
SB	0.04611 0.8704	0.01859 0.9476	0.41782 0.1212	-0.25260 0.3637	-0.01219 0.9656	1.00000	0.41401 0.1250	0.24501 0.3788	-0.02731 0.9230
BA	0.83003 0.0001	0.70288 0.0035	0.98232 <.0001	0.16399 0.5592	0.66529 0.0068	0.41401 0.1250	1.00000	0.85764 <.0001	0.64598 0.0093
OBP	0.90413 <.0001	0.90008 <.0001	0.80832 0.0003	0.45038 0.0921	0.86440 <.0001	0.24501 0.3788	0.85764 <.0001	1.00000	0.79635 0.0004
SLG	0.82759 0.0001	0.93159 <.0001	0.66215 0.0072	0.83358 0.0001	0.94204 <.0001	-0.02731 0.9230	0.64598 0.0093	0.79635 0.0004	1.00000



1d. Correlation Matrices of Offensive MLB Variables by League

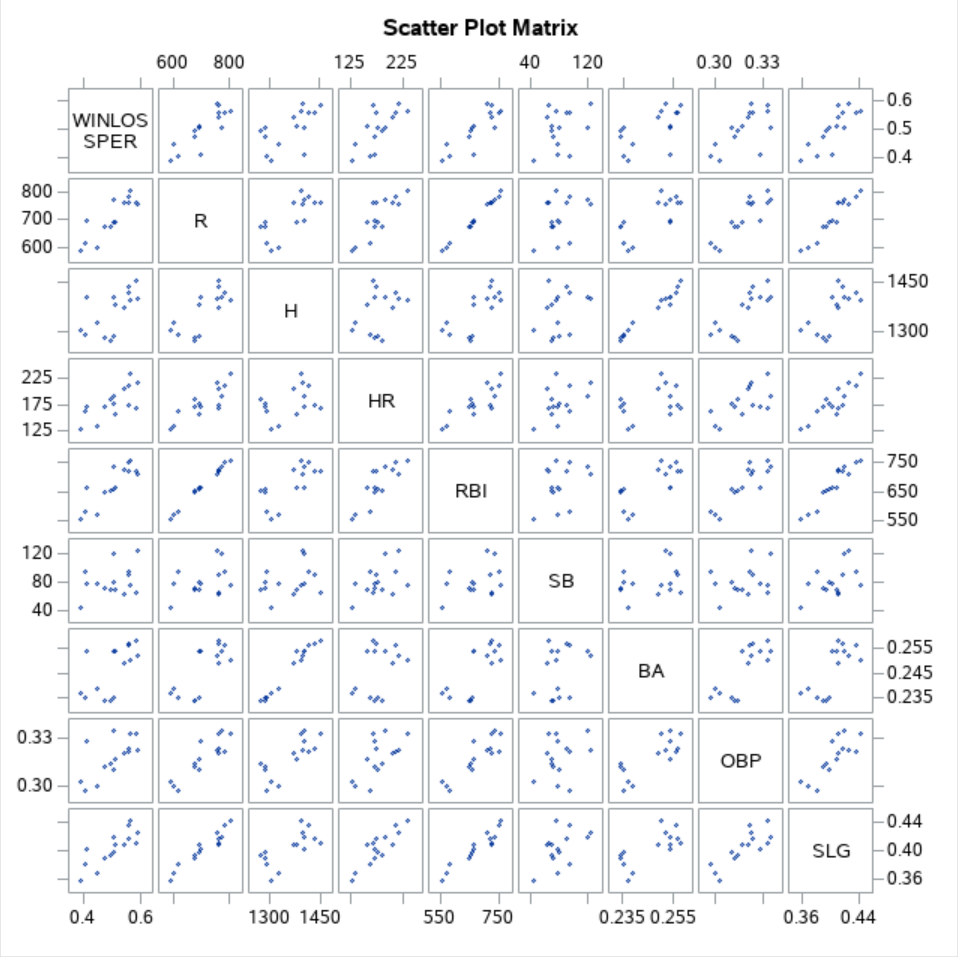
The CORR Procedure

League=NL

9 Variables:	WINLOSSPER R H HR RBI SB BA OBP SLG

Pearson Correlation Coefficients, N = 15
Prob > |r| under H0: Rho=0

	WINLOSSPER	R	H	HR	RBI	SB	BA	OBP	SLG
WINLOSSPER	1.00000	0.85717 <.0001	0.61361 0.0150	0.70249 0.0035	0.84882 <.0001	0.33782 0.2181	0.60035 0.0180	0.65904 0.0075	0.81829 0.0002
R	0.85717 <.0001	1.00000	0.73839 0.0017	0.83976 <.0001	0.99633 <.0001	0.40110 0.1384	0.74236 0.0015	0.89053 <.0001	0.95974 <.0001
H	0.61361 0.0150	0.73839 0.0017	1.00000	0.38178 0.1603	0.72262 0.0023	0.31841 0.2474	0.98437 <.0001	0.79940 0.0003	0.70229 0.0035
HR	0.70249 0.0035	0.83976 <.0001	0.38178 0.1603	1.00000	0.83339 0.0001	0.46086 0.0838	0.39122 0.1493	0.63855 0.0104	0.87689 <.0001
RBI	0.84882 <.0001	0.99633 <.0001	0.72262 0.0023	0.83339 0.0001	1.00000	0.39273 0.1476	0.73636 0.0017	0.89059 <.0001	0.95621 <.0001
SB	0.33782 0.2181	0.40110 0.1384	0.31841 0.2474	0.46086 0.0838	0.39273 0.1476	1.00000	0.32679 0.2345	0.28955 0.2952	0.48920 0.0642
BA	0.60035 0.0180	0.74236 0.0015	0.98437 <.0001	0.39122 0.1493	0.73636 0.0017	0.32679 0.2345	1.00000	0.80310 0.0003	0.72161 0.0024
OBP	0.65904 0.0075	0.89053 <.0001	0.79940 0.0003	0.63855 0.0104	0.89059 <.0001	0.28955 0.2952	0.80310 0.0003	1.00000	0.81872 0.0002
SLG	0.81829 0.0002	0.95974 <.0001	0.70229 0.0035	0.87689 <.0001	0.95621 <.0001	0.48920 0.0642	0.72161 0.0024	0.81872 0.0002	1.00000



1d. Correlation Matrices of Defensive MLB Variables by League

The CORR Procedure

League=' '

3 Variables:	WINLOSSPER ERA WHIP

1d. Correlation Matrices of Defensive MLB Variables by League

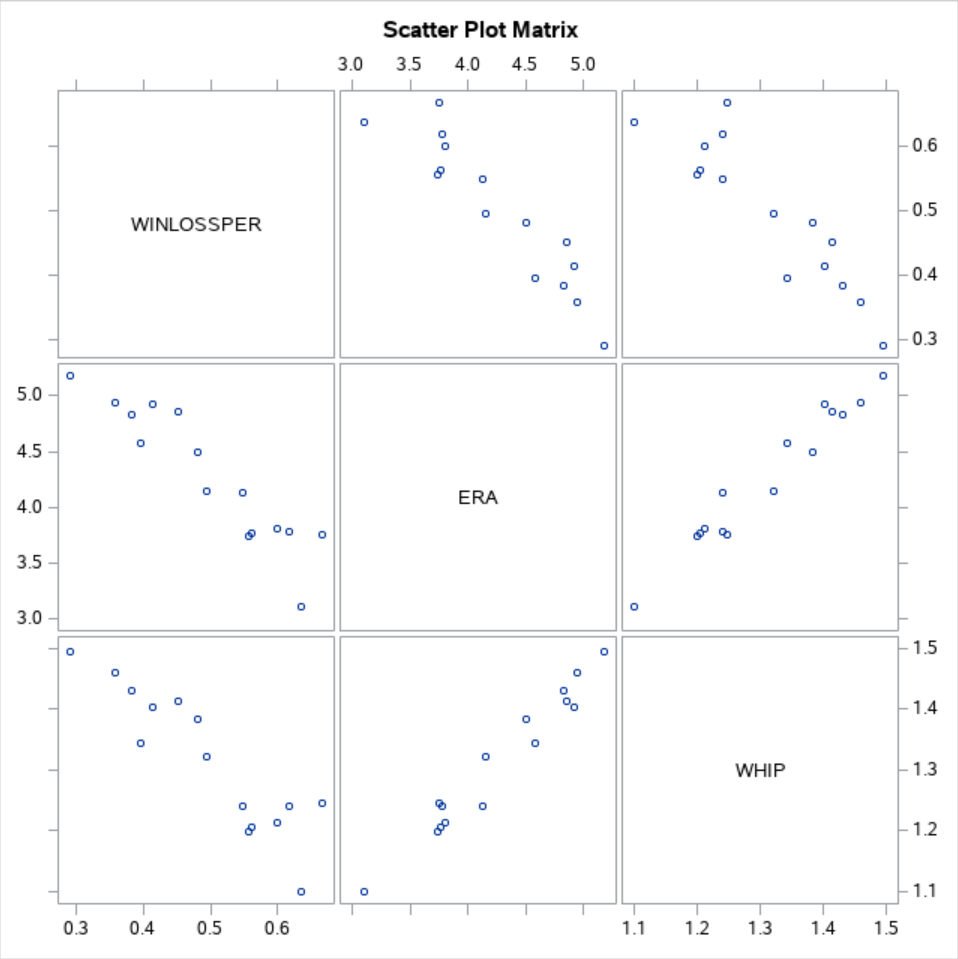
The CORR Procedure

League=AL

3 Variables:	WINLOSSPER ERA WHIP

Pearson Correlation Coefficients, N = 15
Prob > |r| under H0: Rho=0

	WINLOSSPER	ERA	WHIP
WINLOSSPER **WINLOSSPER**	1.00000	-0.92775 <.0001	-0.90347 <.0001
ERA **ERA**	-0.92775 <.0001	1.00000	0.97746 <.0001
WHIP **WHIP**	-0.90347 <.0001	0.97746 <.0001	1.00000



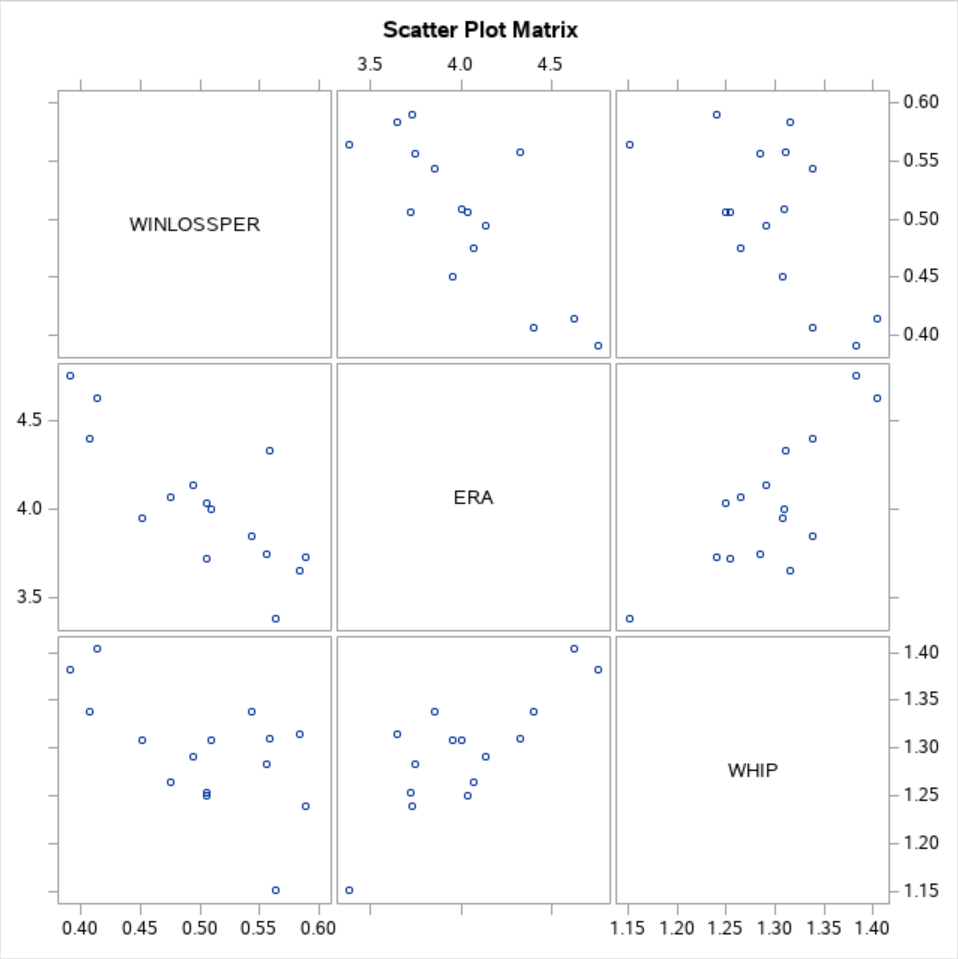
1d. Correlation Matrices of Defensive MLB Variables by League

The CORR Procedure

League=NL

3 Variables:	WINLOSSPER ERA WHIP

Pearson Correlation Coefficients, N = 15 Prob > |r| under H0: Rho=0	WINLOSSPER	ERA	WHIP
WINLOSSPER **WINLOSSPER**	1.00000	-0.79333 0.0004	-0.60558 0.0167
ERA **ERA**	-0.79333 0.0004	1.00000	0.78948 0.0005
WHIP **WHIP**	-0.60558 0.0167	0.78948 0.0005	1.00000



2a. Linear Regression of Bone Cracking Hypercarnivores Data

The REG Procedure
Model: MODEL1
Dependent Variable: SEJ SEJ

Number of Observations Read	36
Number of Observations Used	36

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	48.94323	48.94323	105.20	<.0001
Error	34	15.81857	0.46525		
Corrected Total	35	64.76180			

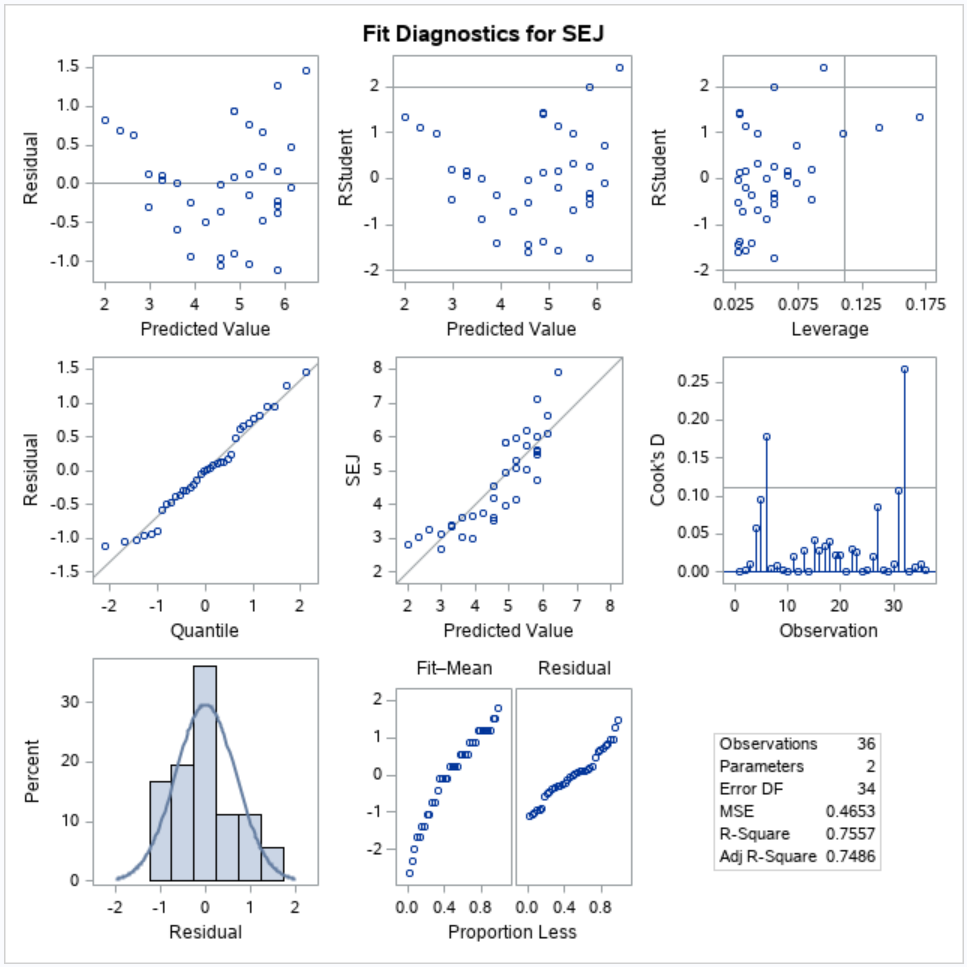
Root MSE	0.68209	R-Square	0.7557
Dependent Mean	4.65333	Adj R-Sq	0.7486
Coeff Var	14.65818		

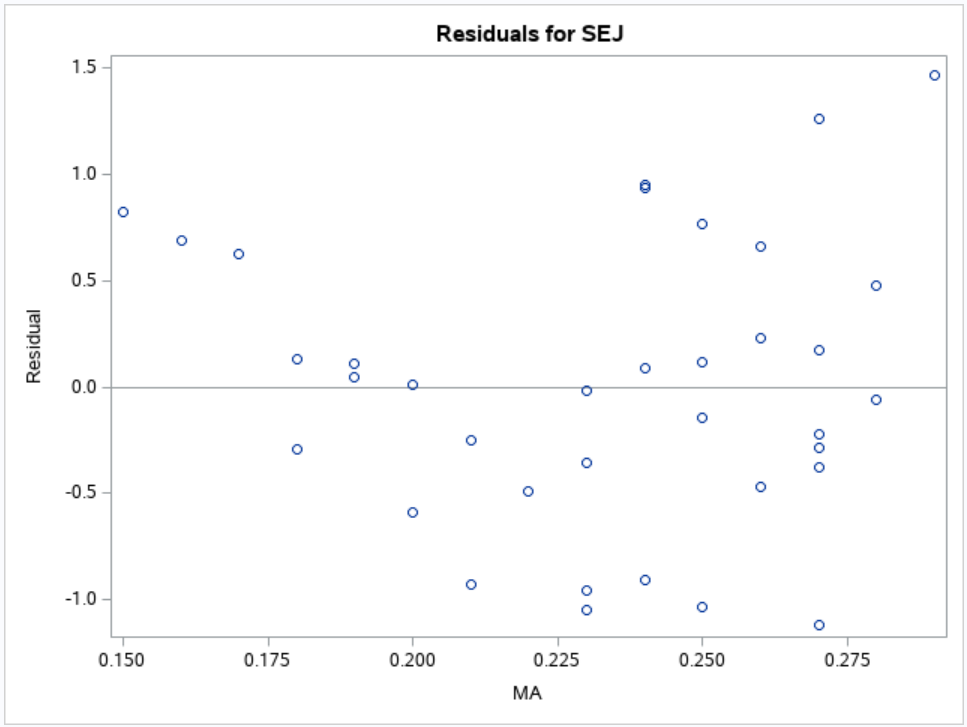
Parameter Estimates

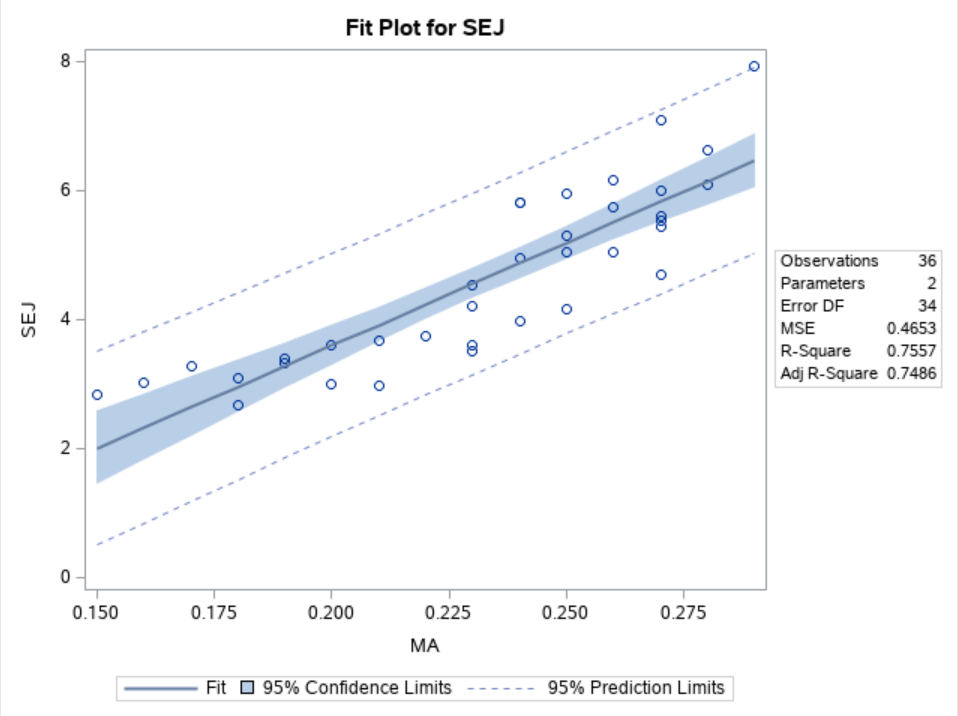
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	-2.76054	0.73173	-3.77	0.0006
MA	MA	1	31.81161	3.10158	10.26	<.0001

2a. Linear Regression of Bone Cracking Hypercarnivores Data

The REG Procedure
Model: MODEL1
Dependent Variable: SEJ SEJ


Fit Diagnostics for SEJ
Residual
Predicted Value
RStudent
Predicted Value
RStudent
Leverage
Residual
Quantile
SEJ
Predicted Value
Cook's D
Observation
Percent
Residual
Fit–Mean
Residual
Proportion Less
Observations 36
Parameters 2
Error DF 34
MSE 0.4653
R-Square 0.7557
Adj R-Square 0.7486


Residuals for SEJ
Residual
MA



2c. Quadratic Regression of Bone Cracking Hypercarnivores Data

The REG Procedure
Model: MODEL1
Dependent Variable: SEJ SEJ

Number of Observations Read	36
Number of Observations Used	36

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	52.58568	26.29284	71.26	<.0001
Error	33	12.17612	0.36897		
Corrected Total	35	64.76180			

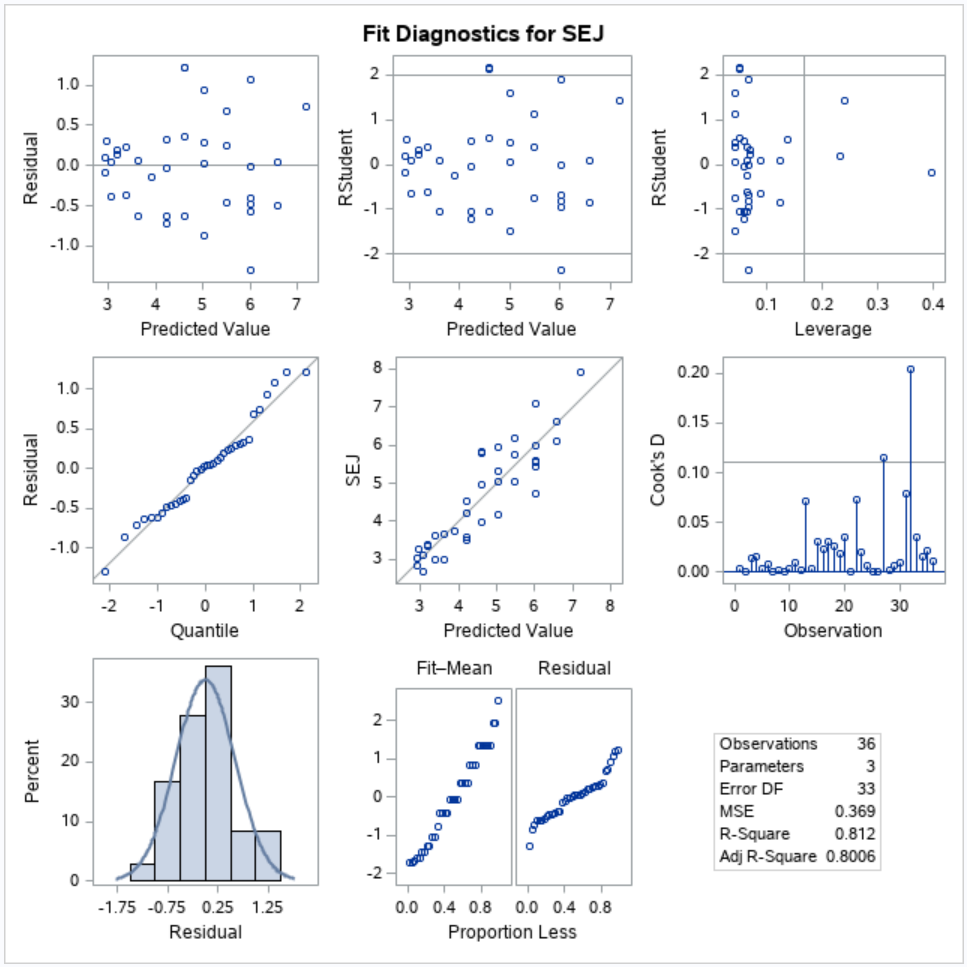
Root MSE	0.60743	R-Square	0.8120
Dependent Mean	4.65333	Adj R-Sq	0.8006
Coeff Var	13.05369		

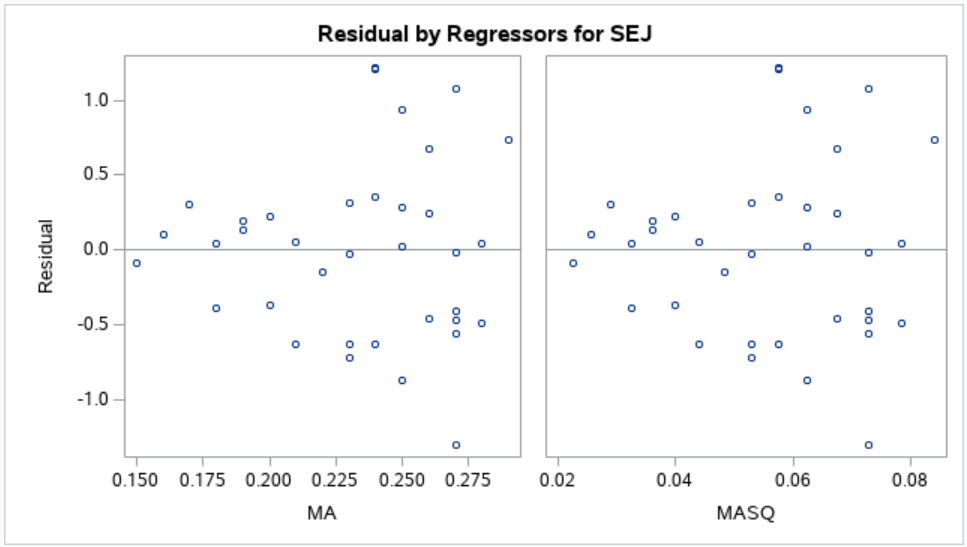
Parameter Estimates

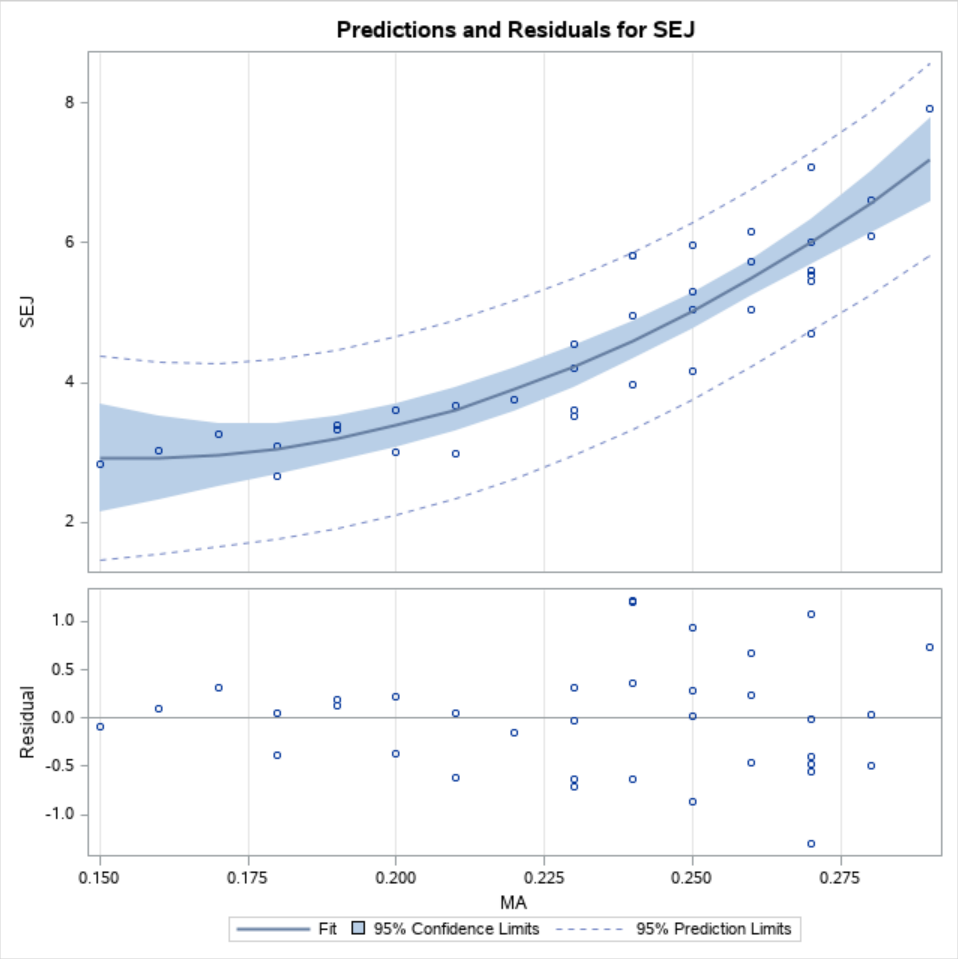
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	8.60935	3.67694	2.34	0.0254
MA	MA	1	-73.35032	33.58403	-2.18	0.0362
MASQ		1	236.05951	75.13149	3.14	0.0035

2c. Quadratic Regression of Bone Cracking Hypercarnivores Data

The REG Procedure
Model: MODEL1
Dependent Variable: SEJ SEJ


Fit Diagnostics for SEJ
Residual
Predicted Value
RStudent
Predicted Value
RStudent
Leverage
Residual
Quantile
SEJ
Predicted Value
Cook's D
Observation
Percent
Residual
Fit–Mean
Residual
Proportion Less
Observations 36
Parameters 3
Error DF 33
MSE 0.369
R-Square 0.812
Adj R-Square 0.8006


Residual by Regressors for SEJ
Residual
MA
MASQ



2d. Exponential Regression of Bone Cracking Hypercarnivores Data

The REG Procedure
Model: MODEL1
Dependent Variable: lnSEJ

Number of Observations Read	36
Number of Observations Used	36

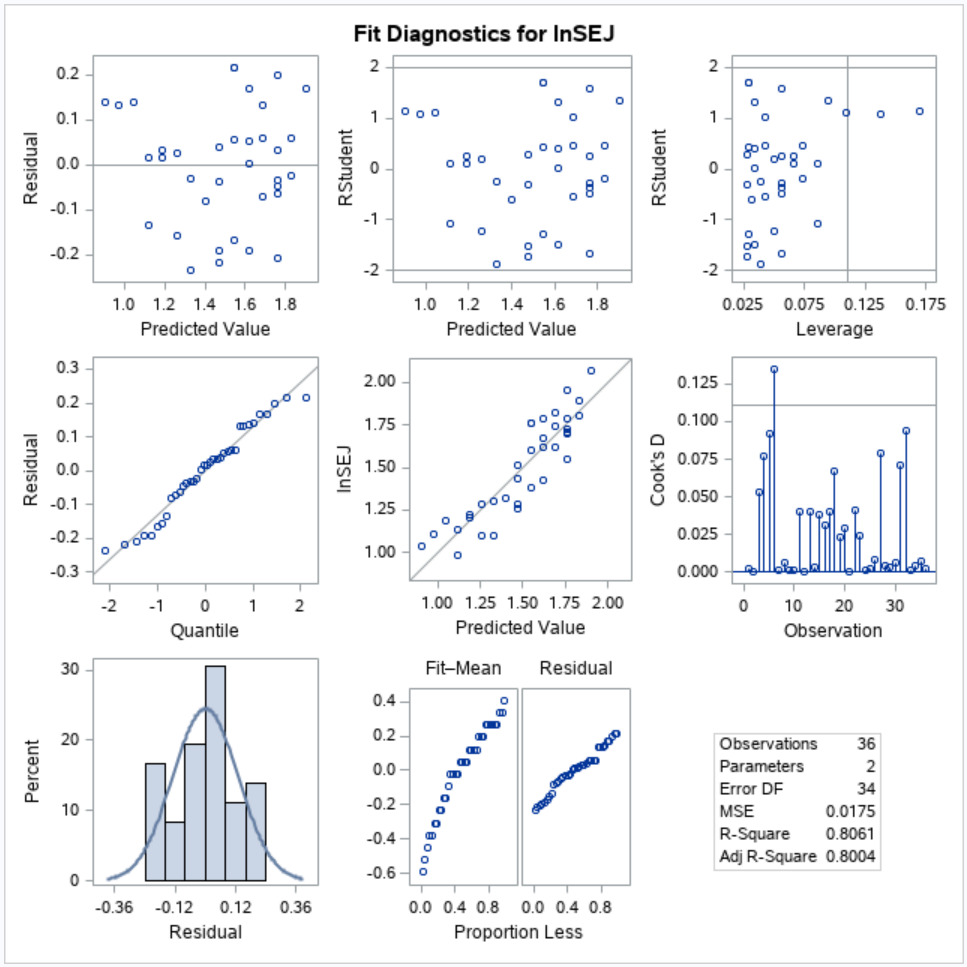
Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	2.46668	2.46668	141.34	<.0001
Error	34	0.59339	0.01745		
Corrected Total	35	3.06007			

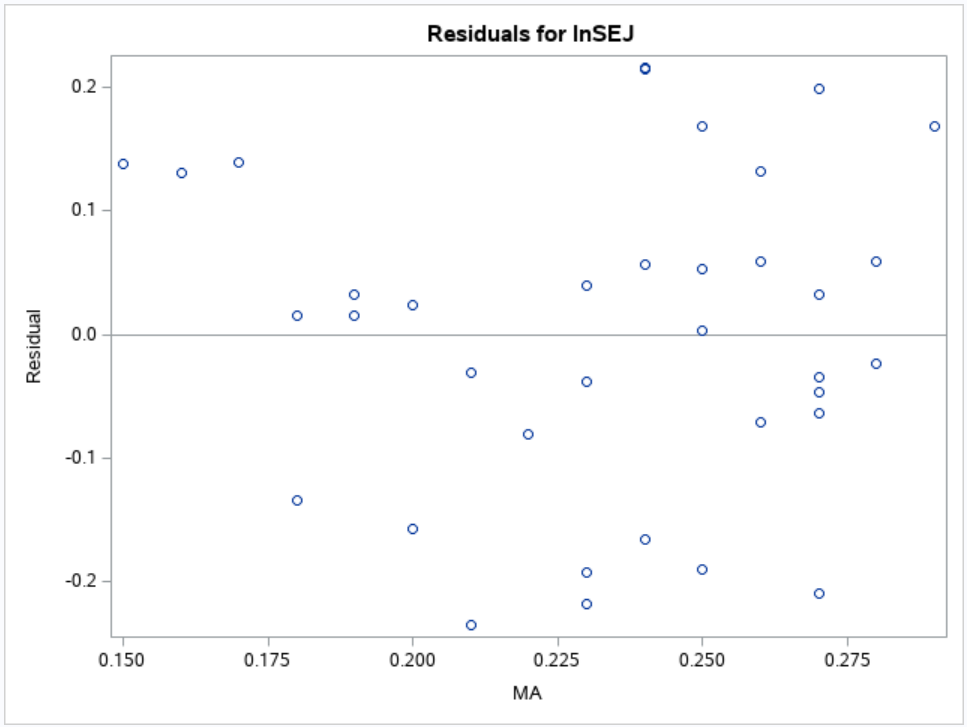
Root MSE	0.13211	R-Square	0.8061
Dependent Mean	1.49555	Adj R-Sq	0.8004
Coeff Var	8.83340		

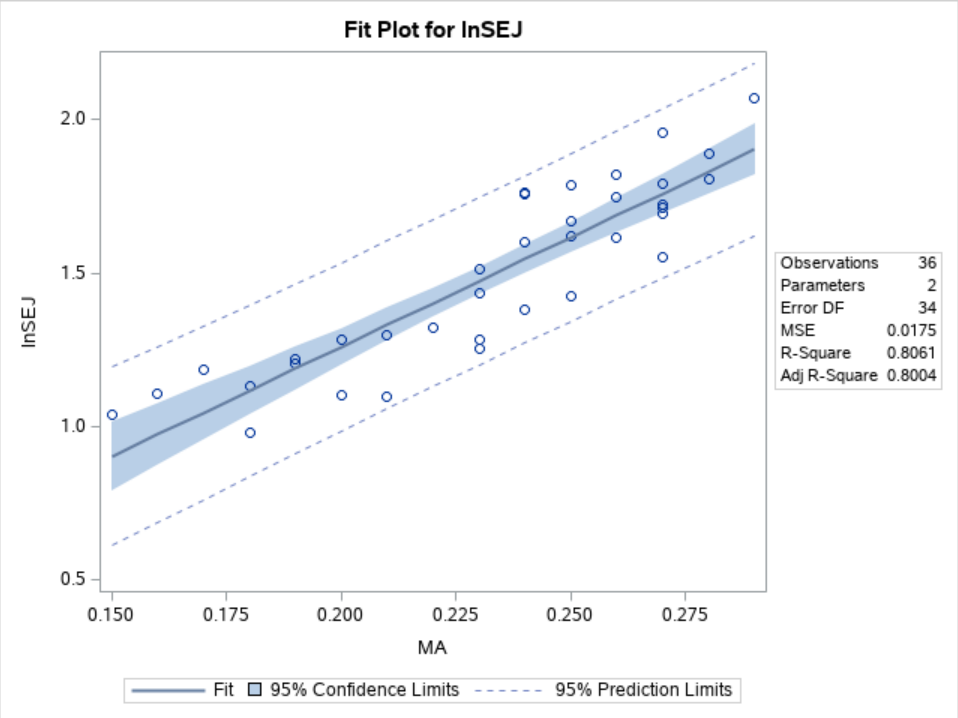
Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	-0.16884	0.14172	-1.19	0.2418
MA	MA	1	7.14161	0.60072	11.89	<.0001

2d. Exponential Regression of Bone Cracking Hypercarnivores Data

The REG Procedure
Model: MODEL1
Dependent Variable: lnSEJ


Fit Diagnostics for lnSEJ
Residual
Predicted Value
RStudent
Predicted Value
RStudent
Leverage
Residual
Quantile
lnSEJ
Predicted Value
Cook's D
Observation
Percent
Residual
Fit–Mean
Residual
Proportion Less
Observations 36
Parameters 2
Error DF 34
MSE 0.0175
R-Square 0.8061
Adj R-Square 0.8004


Residuals for lnSEJ
Residual
MA

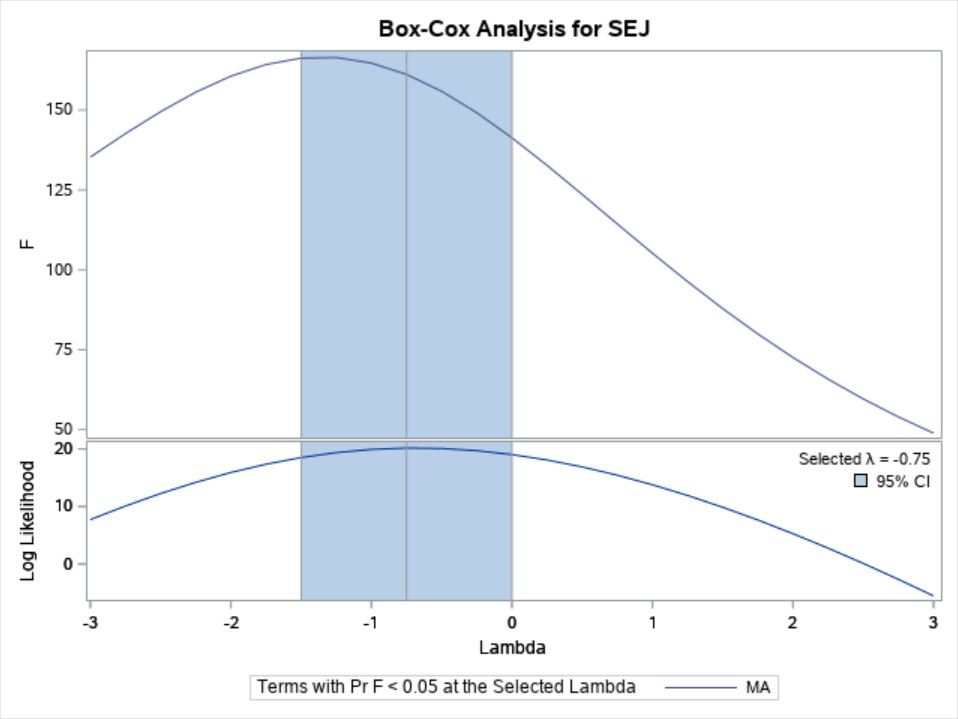


2d. Bone Cracking Hypercarnivores Data with Untransformed Regression Output (SEJ vs. SEJU)

Obs	Model name	DL	WL	Elements	SEJ	adjSEJ	FOUTN	MA	ST_Min	lnSEJ	SEJP	SEJU
1	J022611T38	0.33	0.42	1139265	3.39	3.3	7653.53	0.19	63	1.22083	1.18807	3.28073
2	J022611T39	0.33	0.55	1177734	3.1	3.05	7347.61	0.18	90	1.13140	1.11665	3.05461
3	J022611T40	0.33	0.69	1138486	2.67	2.63	6999.04	0.18	73	0.98208	1.11665	3.05461
4	J022611T41	0.33	0.83	1086419	3.27	3.21	6737.5	0.17	78	1.18479	1.04523	2.84407
5	J022611T42	0.33	0.97	1047996	3.02	2.93	6442.83	0.16	65	1.10526	0.97382	2.64804
6	J022611T43	0.33	1.11	1007072	2.83	2.72	5932.73	0.15	43	1.04028	0.90240	2.46552
7	J022611T33	0.38	0.42	1146486	4.2	4.1	8960	0.23	108	1.43508	1.47373	4.36549
8	J021411T01	0.38	0.55	1203707	3.75	3.75	8635.51	0.22	97	1.32176	1.40232	4.06460
9	J030211T48	0.38	0.69	1153383	3.67	3.7	8313.37	0.21	70	1.30019	1.33090	3.78444
10	J021511T03	0.38	0.83	1103659	3.61	3.64	7966.53	0.2	57	1.28371	1.25948	3.52360
11	J021711T08	0.38	0.97	1072618	3.01	3.02	7768.39	0.2	64	1.10194	1.25948	3.52360
12	J021711T09	0.38	1.11	1044292	3.33	3.32	7401.19	0.19	44	1.20297	1.18807	3.28073
13	J022611T34	0.51	0.42	1095971	5.81	5.62	9436.23	0.24	77	1.75958	1.54515	4.68866
14	J021711T10	0.51	0.55	1124466	5.31	5.32	9919.35	0.25	69	1.66959	1.61656	5.03576
15	J021811T14	0.51	0.69	1108403	4.16	4.22	9768.02	0.25	66	1.42552	1.61656	5.03576
16	J021811T15	0.51	0.83	1095138	3.6	3.67	9275.19	0.23	72	1.28093	1.47373	4.36549
17	J021811T16	0.51	0.97	1094398	3.51	3.57	9116.86	0.23	72	1.25562	1.47373	4.36549
18	J021811T17	0.51	1.11	1069458	2.99	3.03	8496.61	0.21	47	1.09527	1.33090	3.78444
19	J022611T35	0.59	0.42	1030327	6.17	5.91	10263.06	0.26	67	1.81970	1.68798	5.40854
20	J021711T11	0.59	0.55	1077924	5.96	5.94	10127.58	0.25	67	1.78507	1.61656	5.03576
21	J030211T46	0.59	0.69	1081675	5.05	5.13	10029.38	0.25	70	1.61939	1.61656	5.03576
22	J022011T21	0.59	0.83	1103739	5.82	5.95	9428.57	0.24	74	1.76130	1.54515	4.68866
23	J030211T47	0.59	0.97	1129459	3.97	4.06	9717.49	0.24	68	1.37877	1.54515	4.68866
24	J021911T18	0.59	1.11	1096699	4.54	4.64	9269.83	0.23	75	1.51293	1.47373	4.36549
25	J030311T49	0.65	0.42	995611	6	5.68	10898.32	0.27	56	1.79176	1.75940	5.80893
26	J021811T12	0.65	0.55	1049741	6.62	6.53	11338.75	0.28	48	1.89010	1.83081	6.23895
27	J022111T26	0.65	0.69	1085106	4.71	4.74	10571.1	0.27	63	1.54969	1.75940	5.80893
28	J022111T25	0.65	0.83	1127189	5.74	5.85	10200.98	0.26	81	1.74746	1.68798	5.40854
29	J022011T23	0.65	0.97	1182948	4.96	5.07	9366.17	0.24	86	1.60141	1.54515	4.68866
30	J022011T19	0.65	1.11	1134838	5.04	5.16	10320.85	0.26	74	1.61741	1.68798	5.40854
31	J030211T45	0.73	0.42	962202	7.09	6.63	10939.08	0.27	45	1.95869	1.75940	5.80893
32	J021811T13	0.73	0.55	1032173	7.93	7.76	11725.13	0.29	49	2.07065	1.90223	6.70081
33	J022111T28	0.73	0.69	1092655	6.09	6.1	11245.83	0.28	62	1.80665	1.83081	6.23895
34	J022111T27	0.73	0.83	1167406	5.54	5.63	10570.2	0.27	80	1.71199	1.75940	5.80893
35	J030211T44	0.73	0.97	1248480	5.45	5.56	10679.1	0.27	100	1.69562	1.75940	5.80893
36	J021611T06	0.73	1.11	1186504	5.61	5.74	10949	0.27	90	1.72455	1.75940	5.80893

2e. Box-Cox Transformation of Bone Cracking Hypercarnivores Data

The TRANSREG Procedure



2e. Power Regression of Bone Cracking Hypercarnivores Data

The REG Procedure
Model: MODEL1
Dependent Variable: SEJλ

Number of Observations Read	36
Number of Observations Used	36

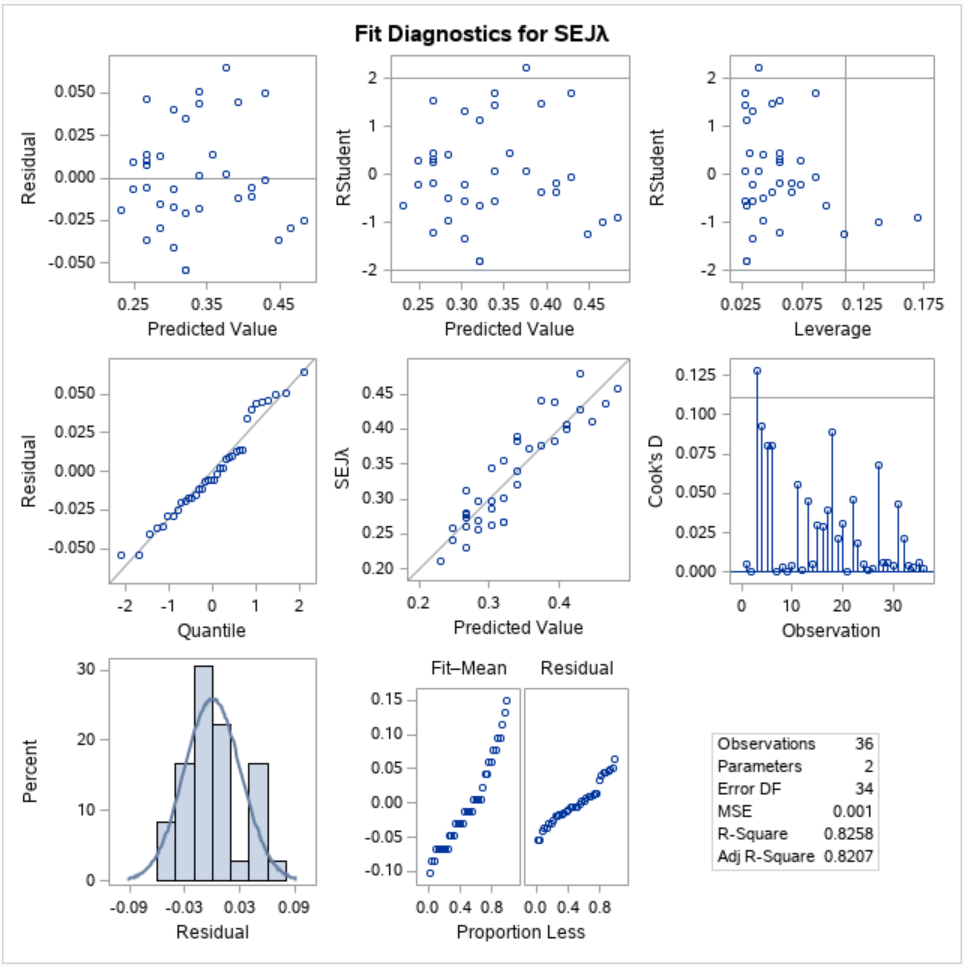
Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.15771	0.15771	161.17	<.0001
Error	34	0.03327	0.00097852		
Corrected Total	35	0.19097			

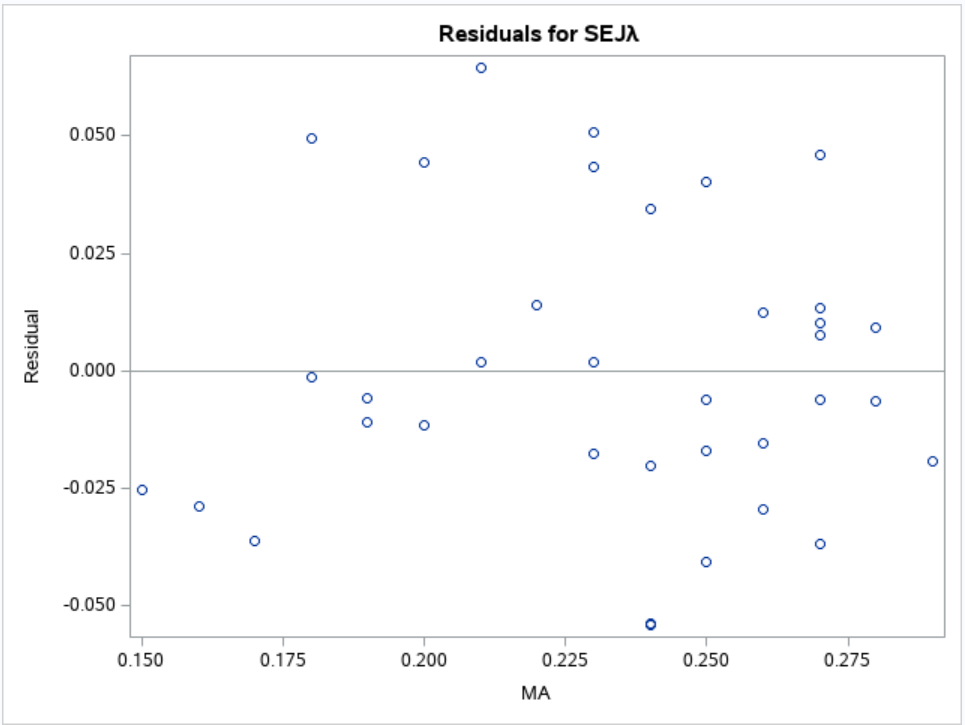
Root MSE	0.03128	R-Square	0.8258
Dependent Mean	0.33360	Adj R-Sq	0.8207
Coeff Var	9.37695		

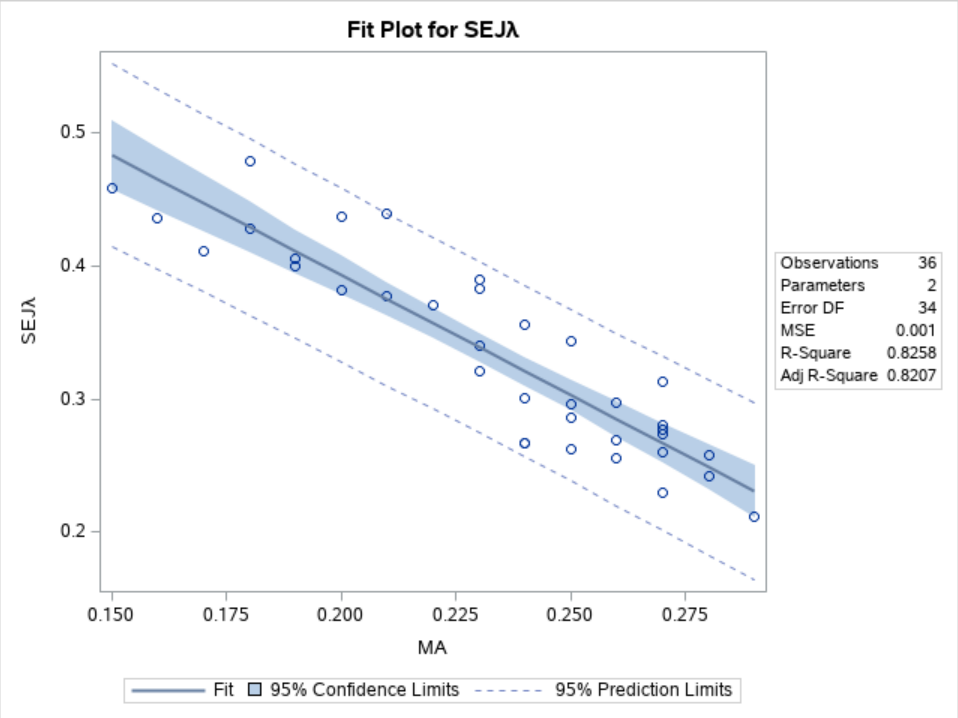
Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	0.75444	0.03356	22.48	<.0001
MA	MA	1	-1.80577	0.14224	-12.70	<.0001

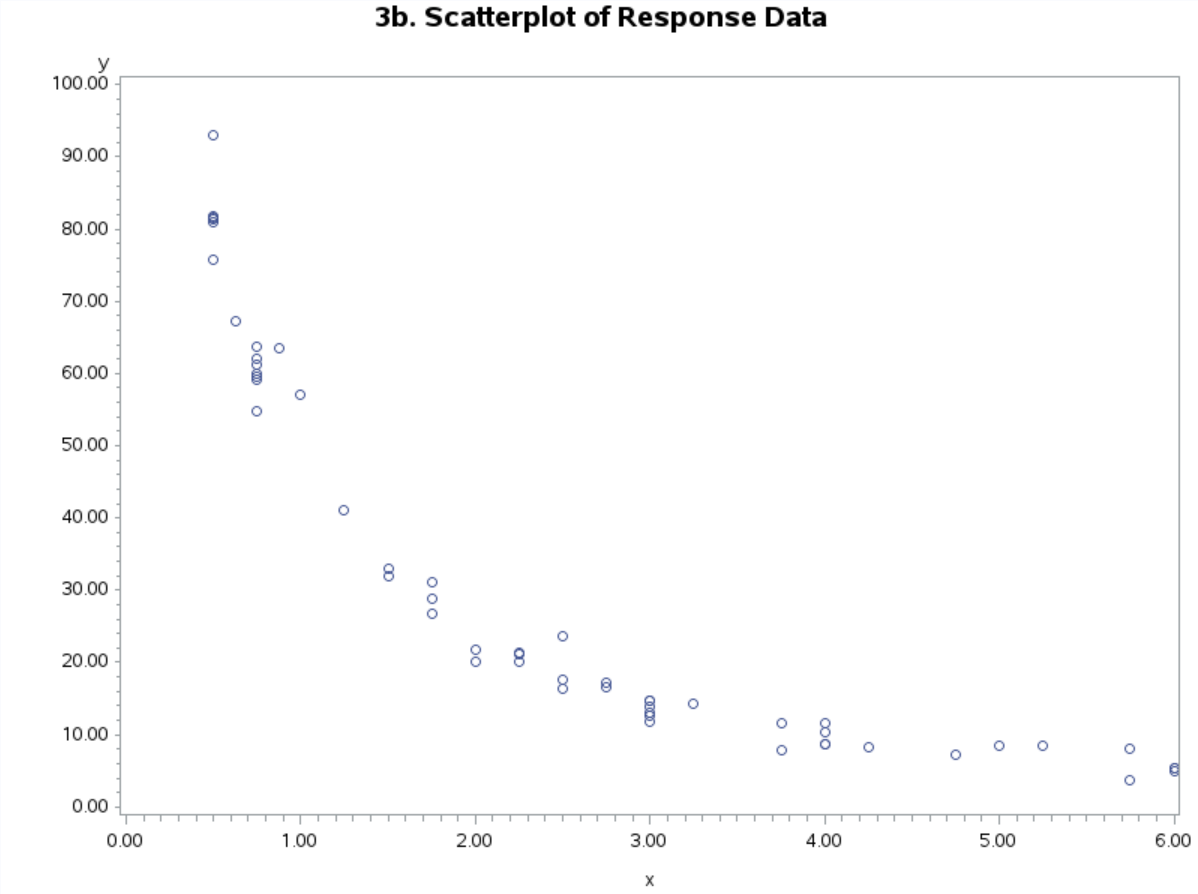
2e. Power Regression of Bone Cracking Hypercarnivores Data

The REG Procedure
Model: MODEL1
Dependent Variable: SEJλ


Fit Diagnostics for SEJλ
Residual
Predicted Value
RStudent
Predicted Value
RStudent
Leverage
Residual
Quantile
SEJλ
Predicted Value
Cook's D
Observation
Percent
Residual
Fit–Mean
Residual
Proportion Less
Observations 36
Parameters 2
Error DF 34
MSE 0.001
R-Square 0.8258
Adj R-Square 0.8207


Residuals for SEJλ
Residual
MA





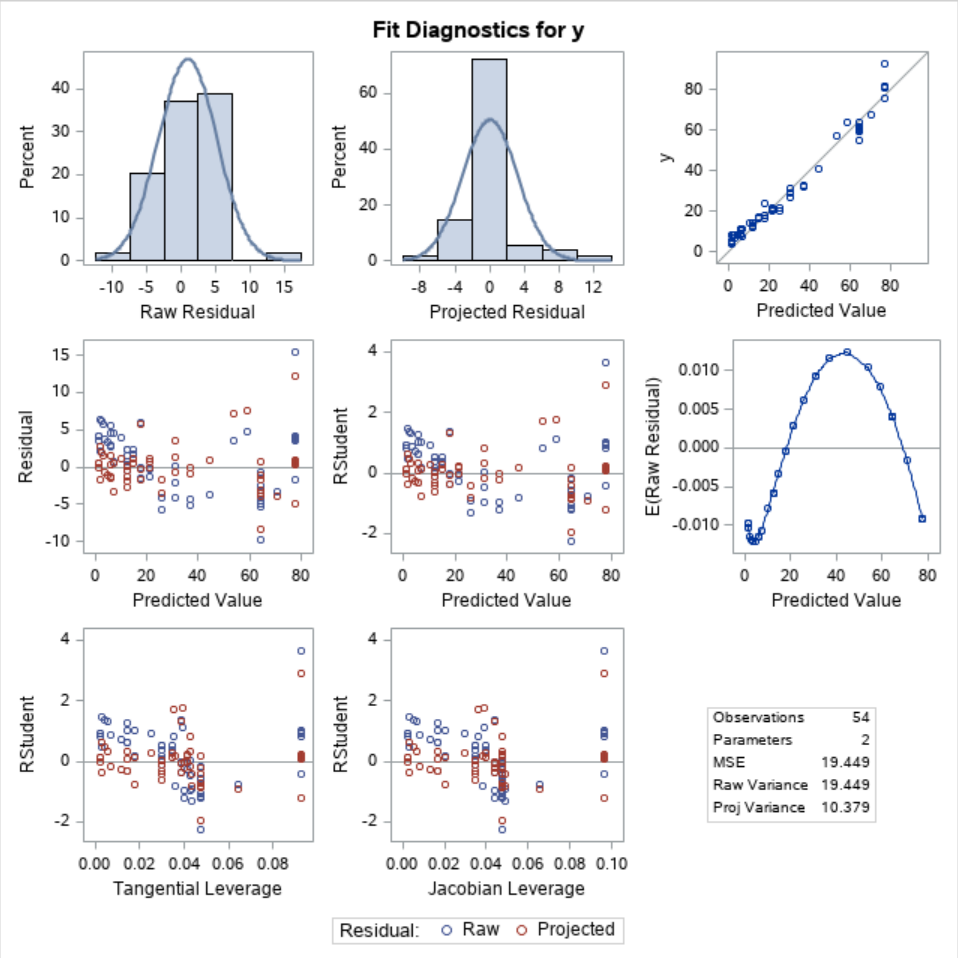
3c. Nonlinear Model of Response Data (y = a*e^(bx))

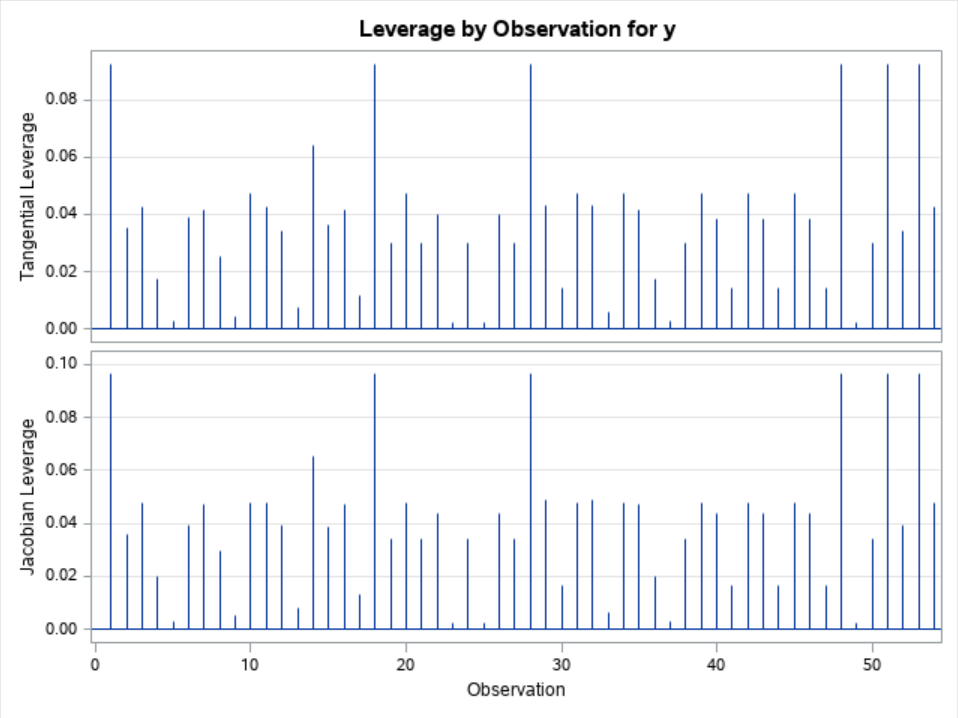
The NLIN Procedure
Dependent Variable y
Method: Gauss-Newton

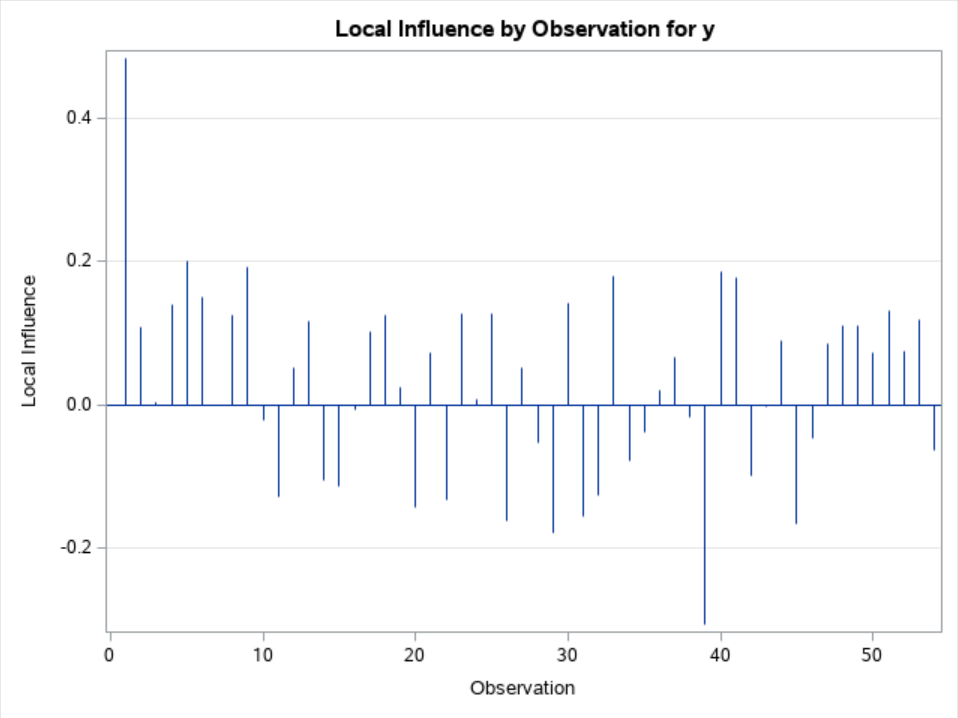
Iterative Phase			
Iter	a	b	Sum of Squares
0	1.0000	1.0000	823971

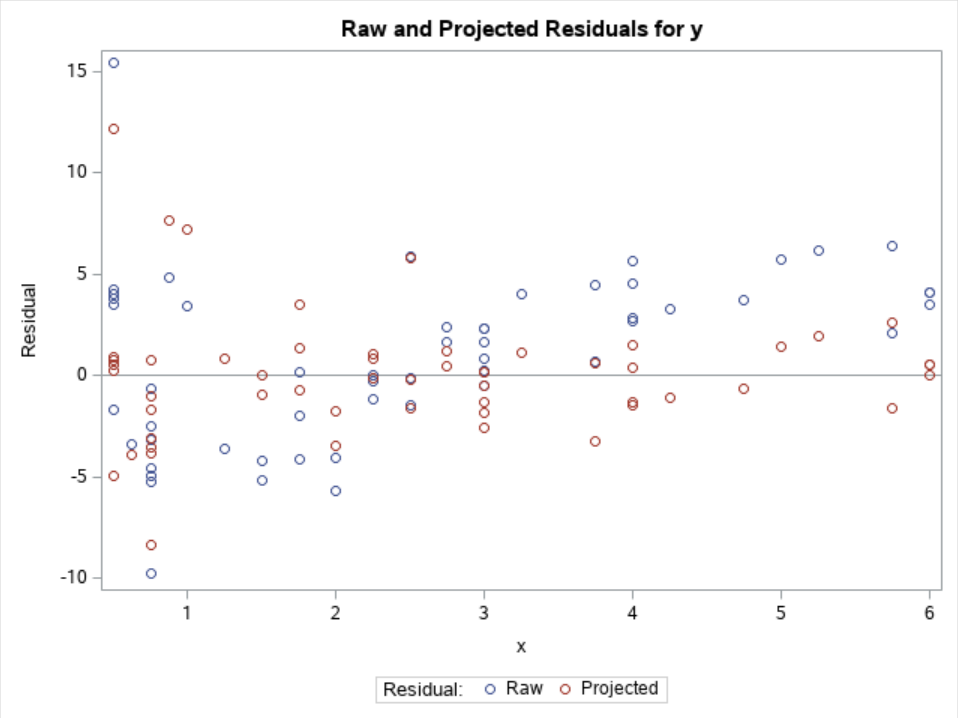
Iterative Phase			
Iter	a	b	Sum of Squares
1	1.2503	0.7892	173575
2	4.0202	0.2414	74795.0
3	38.3037	-1.5341	60007.0
4	46.9574	-0.3251	17464.2
5	87.7890	-0.6597	3518.6
6	110.4	-0.7330	1024.1
7	111.9	-0.7350	1011.3
8	111.9	-0.7352	1011.3
9	111.9	-0.7352	1011.3
10	111.9	-0.7352	1011.3

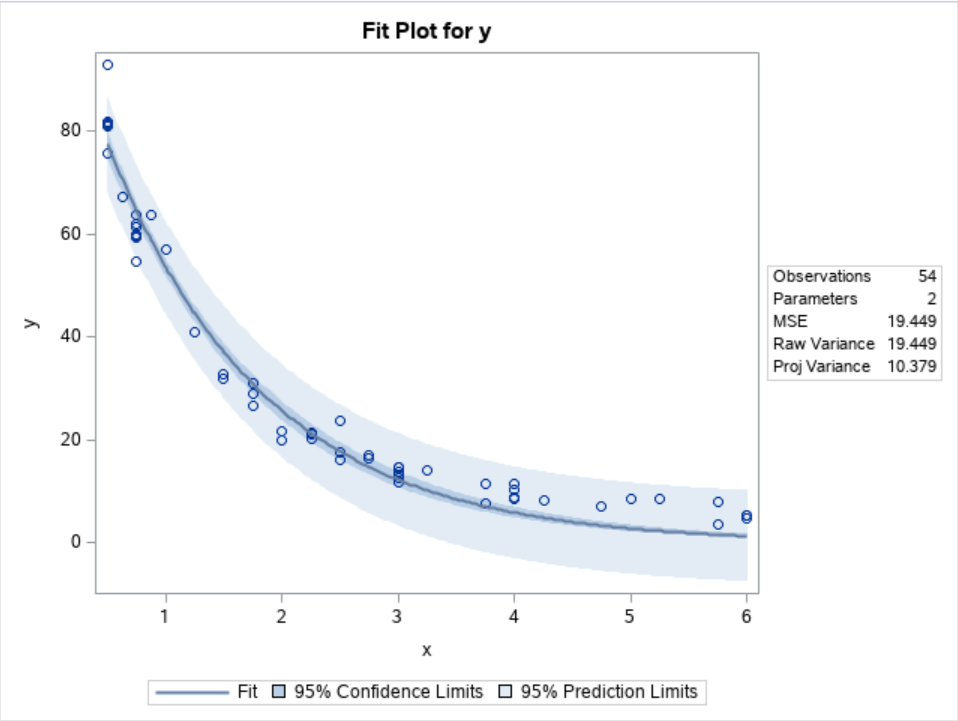
NOTE: Convergence criterion met.




Leverage by Observation for y
Tangential Leverage
0.08
0.06
0.04
0.02
0.00
Jacobian Leverage
0.10
0.08
0.06
0.04
0.02
0.00
0
10
20
30
40
50
Observation


Local Influence by Observation for y
Local Influence
0.4
0.2
0.0
-0.2
0
10
20
30
40
50
Observation





Estimation Summary	
Method	Gauss-Newton
Iterations	10
Subiterations	2
Average Subiterations	0.2
R	3.179E-6
PPC(b)	8.62E-7
RPC(b)	6.283E-6
Object	6.11E-10
Objective	1011.327
Observations Read	54
Observations Used	54
Observations Missing	0

Note: An intercept was not specified for this model.

Source	DF	Sum of Squares	Mean Square	F Value	Approx Pr > F

Source	DF	Sum of Squares	Mean Square	F Value	Approx Pr > F
Model	2	89484.3	44742.1	2300.53	<.0001
Error	52	1011.3	19.4486		
Uncorrected Total	54	90495.6			

Parameter	Estimate	Approx Std Error	Approximate 95% Confidence Limits	
a	111.9	3.0488	105.8	118.0
b	-0.7352	0.0276	-0.7907	-0.6798

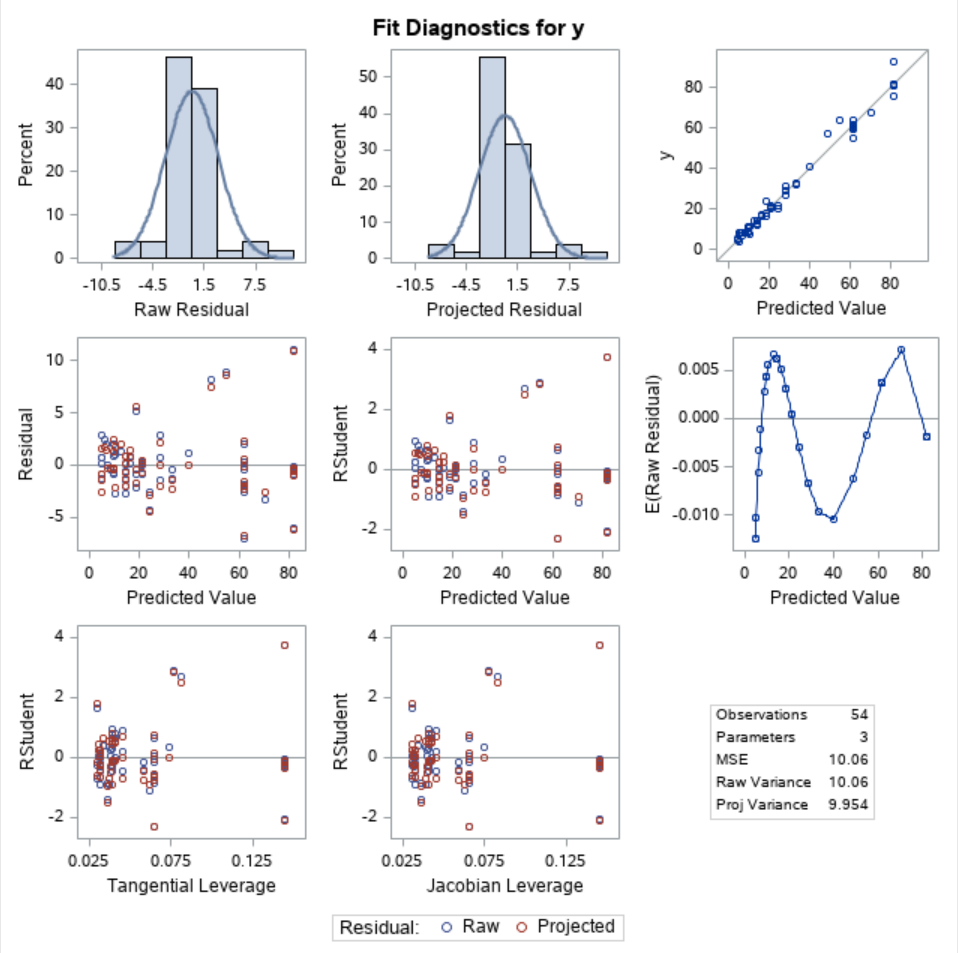
Approximate Correlation Matrix		
	a	b
a	1.0000000	-0.8409169
b	-0.8409169	1.0000000

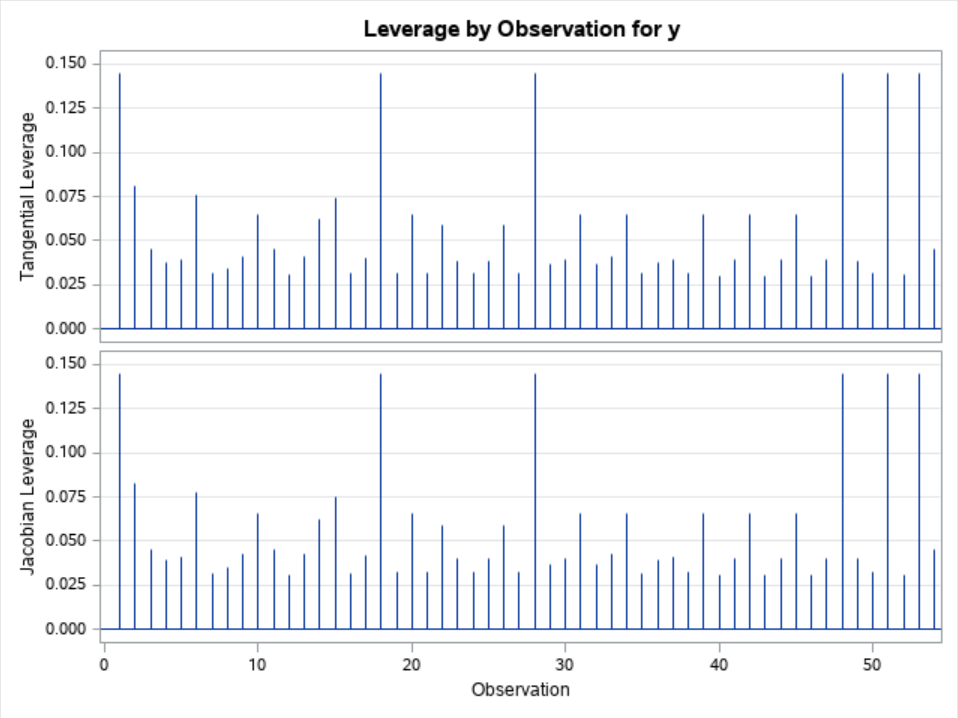
3d. Nonlinear Model of Response Data (y = e^(ax)/(b + cx))

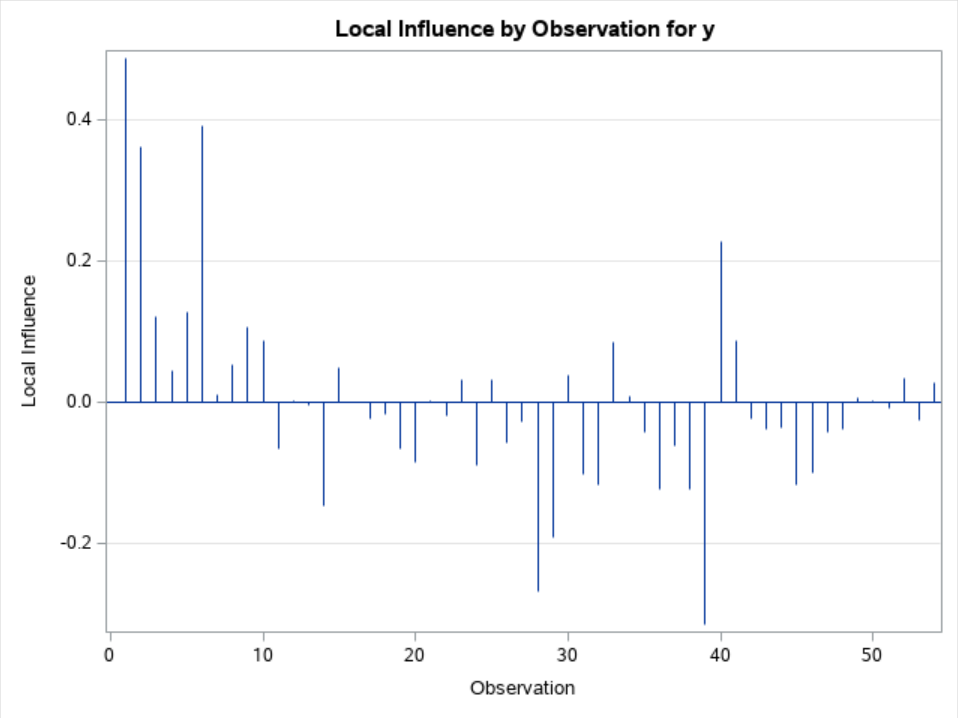
The NLIN Procedure
Dependent Variable y
Method: Gauss-Newton

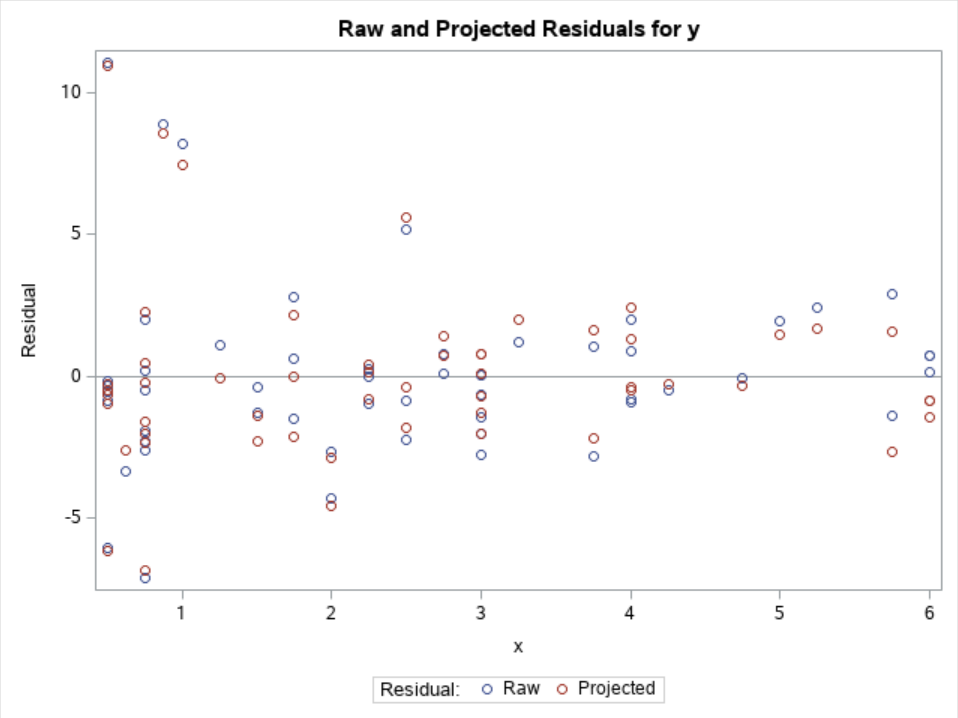
Iterative Phase				
Iter	a	b	c	Sum of Squares
0	0.1000	0.1000	0.1000	72705.2
1	0.0880	-0.00177	0.1015	51310.0
2	-0.0305	0.0139	0.0196	18614.2
3	-0.0656	0.00580	0.0183	4151.1
4	-0.1607	0.00496	0.0112	1004.2
5	-0.1656	0.00515	0.0121	515.1
6	-0.1665	0.00516	0.0122	513.0
7	-0.1666	0.00517	0.0122	513.0
8	-0.1666	0.00517	0.0122	513.0

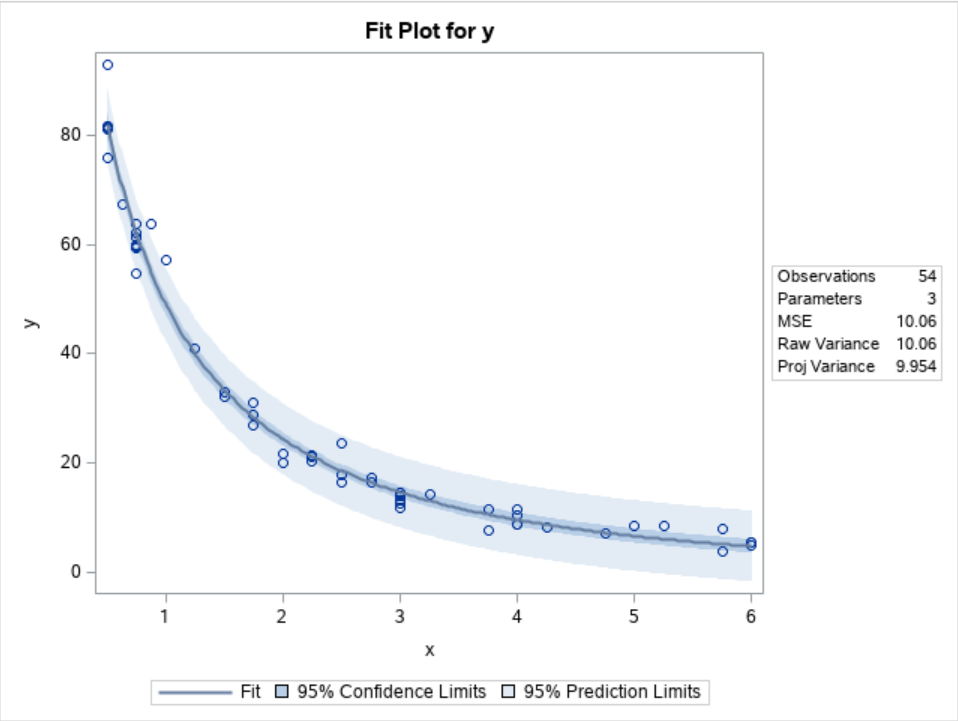
NOTE: Convergence criterion met.




Leverage by Observation for y
Tangential Leverage
0.150
0.125
0.100
0.075
0.050
0.025
0.000
Jacobian Leverage
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0
10
20
30
40
50
Observation


Local Influence by Observation for y
Local Influence
0.4
0.2
0.0
-0.2
0
10
20
30
40
50
Observation





Estimation Summary	
Method	Gauss-Newton
Iterations	8
Subiterations	6
Average Subiterations	0.75
R	4.722E-7
PPC(a)	7.723E-7
RPC(a)	0.000017
Object	1.14E-10
Objective	513.048
Observations Read	54
Observations Used	54
Observations Missing	0

Note: An intercept was not specified for this model.

Source	DF	Sum of Squares	Mean Square	F Value	Approx Pr > F

Source	DF	Sum of Squares	Mean Square	F Value	Approx Pr > F
Model	3	89982.5	29994.2	2981.60	<.0001
Error	51	513.0	10.0598		
Uncorrected Total	54	90495.6			

Parameter	Estimate	Approx Std Error	Approximate 95% Confidence Limits	
a	-0.1666	0.0383	-0.2435	-0.0897
b	0.00517	0.000666	0.00383	0.00650
c	0.0122	0.00153	0.00908	0.0152

Approximate Correlation Matrix			
	a	b	c
a	1.0000000	-0.8441931	0.9397393
b	-0.8441931	1.0000000	-0.9620080
c	0.9397393	-0.9620080	1.0000000