WEEK 4 ASSIGNMENT

Concepts of Statistics 2 – DATA-51200 | Spring 2 2020

Christina Morgenstern

---

1. In your own words, describe (in less than one page) stage 3: Assumptions in Multiple Regression Analysis.

Stage 3 of the Multiple Regression Analysis process deals with assessing the assumptions of this multivariate technique. The following four areas need to be investigated before and after model estimation: 1. Linearity, 2. Homoscedasticity, 3. Normality of error term distribution and 4. Independence of error terms. These assumptions must be tested both for the dependent and independent variables as well as for the variate. Graphical visualization provides an effective means to inspect possible violations of the assumptions. The residual is the measure for prediction error and denotes the difference between the actual and the predicted values of the dependent variable. Thus, plotting the residuals versus the predicted dependent values leads to characteristic patterns which allow for simple inspection and judgement.
In the following the individual assumptions are briefly described and measures to correct for noted.
If linearity is met, we would expect to see a linear pattern of the residuals. Nonlinear relationships like curvilinear patterns can be corrected through data transformations (e.g. logarithm, square root, etc.), the incorporation of polynomial terms or the application of specific nonlinear regression techniques.
The occurrence of unequal variances in residuals can lead to an inaccurate estimation of the standard error and following decreased statistical power. Strategies to overcome this phenomenon of heteroscedasticity are the transformation of variables, the use of weighted least squares or special heteroscedasticity-consistent standard errors.
Normality should be assessed by using Normal probability plots, but histograms and visual inspection of the distribution are also applicable. If the sample size is large enough (>200) though, Multiple Regression shouldn´t have issues with normality.
Addressing the independence of error terms is important to avoid groupings of residuals due to time series or hierarchically ordered data.

References:
[1] Multivariate Data Analysis by Joseph F. Hair Jr, William C. Black, Barry J. Babin and Rolphe E. Anderson, Pearson, 8th edition, 2019

2. (By Hand) For the dependent variable Y and the independent variables X1 and X2, the linear regression model is given by:

Y=0.08059*X1-0.16109*X2+5.26570. Complete the following table:

Actual Y	x1	X2	Predicted Y	Residuals (Predication Error)
6	6.8	4.7	5.1	0.9
3.1	5.3	5.5	4.8	-1.7
5.8	4.5	6.2	4.6	1.2
4.5	8.8	7	4.8	-0.3
4.5	6.8	6.1	4.8	-0.3
3.7	8.5	5.1	5.1	-1.4
5.4	8.9	4.8	5.2	0.2
5.1	6.9	5.4	5.0	0.1
5.8	9.3	5.9	5.1	0.7
5.7	8.4	5.4	5.1	0.6

The predicted values for Y were calculated by plugging in the values for the independent variables X1 and X2 into the equation according to the table values. Values were rounded to one decimal place.
The residuals were calculated by subtracting the predicted values of Y from the respective actual values of Y.

Is this a good model? Why? Why not?

To assess model fit, I would calculate the coefficient of determination (R^2) which is a common measure of predictive accuracy for regression models. It is calculated as the squared values from the correlations between the actual and predicted measures of the dependent variable. The values of R^2 range between 0 and 1, denoting bad and perfect prediction, respectively.
In order to calculate R^2, I calculated the mean and the sum of squared errors (SS) of Y and Y predicted ($\hat{Y}$). Using this information, I calculated the correlation coefficient and subsequently R^2.

$$M_Y = \frac{\sum Y_i}{n} = 4.96$$

$$SS_Y = \sum_{i=1}^{n} (Y_i - M_Y)^2 = 8.724$$

$$M_{\hat{Y}} = \frac{\sum \hat{Y}_i}{n} = 4.96$$

$$SS_{\hat{Y}} = \sum_{i=1}^{n} (\hat{Y}_i - M_{\hat{Y}})^2 = 0.344$$

$$\sum_{i=1}^{n} (Y_i - M_Y)(\hat{Y}_i - M_{\hat{Y}}) = 0.444$$

$$R = \sum_{i=1}^{n} \frac{(Y_i - M_Y)(\hat{Y}_i - M_{\hat{Y}})}{\sqrt{((SS_Y)(SS_{\hat{Y}}))}} = \mathbf{0.2563}$$

Although, there is a positive correlation denoted by the value of the correlation coefficient (R) of 0.2563, the correlation is very weak.

$$\boldsymbol{R^2 = 0.0657}$$

The coefficient of determination, which is the squared value of the correlation coefficient is close to 0 indicating a bad model fit. The value of 0.0657 means that the model only explained 6.5% of the possible variation in the dependent variable.

3. For the data set associated with this homework (HBAT (you may use any software and programming language you feel comfortable dealing with. Make sure to include your codes, diagrams and results).
Using X19 as the dependent variable and (X6, X7, X9, X11, X12 and X16) as the independent variables:

Using SAS Studio, I performed a regression analysis with the dependent variable x19 and the independent variables x6, x7, x9, x11 and x16. This is the code that was generated from the analysis:

```
ods noproctitle;
ods graphics / imagemap=on;

proc reg data=WORK.IMPORT alpha=0.05 plots(only)=(diagnostics
residuals
           observedbypredicted);
        model x19=x6 x7 x9 x11 x12 x16 / stb ss1 influence r p pcorr1
pcorr2 scorr1
           scorr2 collin tol vif;
        run;
quit;
```

a. Find the parameters (coefficients) for the Linear Regression Model, then write down the equation of the model.

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Type I SS	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	Tolerance	Variance Inflation
Intercept	Intercept	1	-1.26902	0.49935	-2.54	0.0127	4785.87240	0	.	.	.	.	.	0
x6	x6	1	0.36499	0.04676	7.81	<.0001	33.26012	0.42760	0.23651	0.23651	0.13283	0.39587	0.72651	1.37644
x7	x7	1	-0.43635	0.13103	-3.33	0.0012	17.50215	-0.25647	0.12446	0.16301	0.02417	0.10655	0.36752	2.72096
x9	x9	1	0.22577	0.08074	2.80	0.0063	35.93795	0.22891	0.25555	0.39991	0.01704	0.07756	0.32528	3.07424
x11	x11	1	0.17655	0.06034	2.93	0.0043	0.75326	0.19484	0.00536	0.01397	0.01866	0.08431	0.49166	2.03392
x12	x12	1	0.78167	0.08814	8.87	<.0001	23.75201	0.70329	0.16890	0.44668	0.17145	0.45821	0.34663	2.88493
x16	x16	1	0.15911	0.09215	1.73	0.0875	0.91402	0.12400	0.00650	0.03107	0.00650	0.03107	0.42269	2.36581

Table 1. Parameter Estimates for Linear Regression model on HBAT data. The red box denotes the coefficients b_0, b_1, b_2, b_3, b_4, b_5 and b_6 from top to bottom.

The coefficients for the model can be seen in the Parameter Estimates table (see Table 1). The values from the Parameter Estimate column for each variable was extracted and plugged into the regression equation.

$$\hat{Y} = b_0 + b_1 \times x6 + b_2 \times x7 + b_3 \times x9 + b_4 \times x11 + b_5 \times x12 + b_6 \times x16$$

$$\hat{Y} = -1.26902 + 0.36499 \times x6 - 0.43635 \times x7 + 0.22577 \times x9 + 0.17655 \times x11 + 0.78167 \times x12 + 0.15911 \times x16$$

b. Find the coefficient of determination and the standard error of the estimate. How accurate is the model?

Root MSE	0.55366	**R-Square**	0.7973
Dependent Mean	6.91800	**Adj R-Sq**	0.7842
Coeff Var	8.00317		

Table 2. Coefficient of determination (R-Square, R^2) for Linear Regression model on variables x6, x7, x9, x11, x12, x16 and x19 for HBAT data set.

The value for the coefficient of determination (R^2) is 0.7973, meaning that the model explains 79.73% of the dependent variable. A value of R^2 close to 1 is considered to be a good fit. Also, the adjusted R^2 (see Table 2, Adj R-Sq) with a value 0.7842 doesn´t drop to low and is close to R^2, indicating a robust model.

c. If you are asked to remove two independent variables, which two variables would you choose and Why?

To assess which variables to delete, correlation analysis of the independent and dependent variables is performed. The following SAS Code was generated for the Correlation analysis:

```
ods noproctitle;
ods graphics / imagemap=on;

proc corr data=WORK.IMPORT pearson nosimple noprob plots=none;
        var x6 x7 x9 x11 x12 x16 x19;
run;
```

7 Variables:	x6 x7 x9 x11 x12 x16 x19

Pearson Correlation Coefficients, N = 100							
	x6	x7	x9	x11	x12	x16	x19
x6 x6	1.00000	-0.13716	0.10637	0.47749	-0.15181	0.10430	0.48632
x7 x7	-0.13716	1.00000	0.14018	-0.05269	0.79154	0.15615	0.28275
x9 x9	0.10637	0.14018	1.00000	0.56142	0.22975	0.75687	0.60326
x11 x11	0.47749	-0.05269	0.56142	1.00000	-0.06132	0.42441	0.55055
x12 x12	-0.15181	0.79154	0.22975	-0.06132	1.00000	0.19513	0.50021
x16 x16	0.10430	0.15615	0.75687	0.42441	0.19513	1.00000	0.52173
x19 x19	0.48632	0.28275	0.60326	0.55055	0.50021	0.52173	1.00000

Table 3. Result of correlation analysis performed on variables x6, x7, x9, x11, x12, x16 and x19 of HBAT data set.

Examining the correlation values of the independent variables (x6, x7, x9, x11, x12 and x16) with the dependent variable x19, shows that variable x7 has the lowest correlation with x19, followed by variable x6. If I had to remove two variables, I would choose x6 and x7 because of their relatively low correlation values. All other variables have correlation values of > 0.5 denoting strong positive correlations with x19.
Variable x7 refers to the E-Commerce Activities whereas variable x6 deals with the perceived quality of HBAT´s products.

d. After removing the two variables found in part c, re-run parts a and b. Compare the results. Which model is more accurate and why?

I removed both x6 and x7 from the linear regression analysis set up and re-run the analysis without x6 and x7.

The following SAS code was generated:

```
ods noproctitle;
ods graphics / imagemap=on;

proc reg data=WORK.IMPORT alpha=0.05 plots(only)=(diagnostics
residuals
           observedbypredicted);
       model x19=x9 x11 x12 x16 / stb ss1 influence r p pcorr1
pcorr2 scorr1 scorr2
           collin tol vif;
       run;
quit;
```

Parameter Estimates														
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Type I SS	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	Tolerance	Variance Inflation
Intercept	Intercept	1	0.42420	0.52097	0.81	0.4175	4785.87240	0	.	.	.	.	.	0
x9	x9	1	0.14901	0.10489	1.42	0.1587	51.17801	0.15108	0.36393	0.36393	0.00777	0.02080	0.34029	2.93870
x11	x11	1	0.39805	0.06991	5.69	<.0001	9.21753	0.43927	0.06555	0.10305	0.12476	0.25440	0.64654	1.54668
x12	x12	1	0.51916	0.07296	7.12	<.0001	27.80110	0.46710	0.19769	0.34651	0.19490	0.34770	0.89329	1.11946
x16	x16	1	0.16656	0.12187	1.37	0.1750	1.01096	0.12981	0.00719	0.01928	0.00719	0.01928	0.42665	2.34383

Table 4. Parameter Estimates for Linear Regression model on HBAT data. The red box denotes the coefficients b_0, b_1, b_2, b_3 and b_4 from top to bottom.

The amended regression equation is as follows:

$$\hat{Y} = b_0 + b_1 \times x9 + b_2 \times x11 + b_3 \times x12 + b_4 \times x16$$

$$\hat{Y} = 0.42420 + 0.14901 \times x9 + 0.39805 \times x11 + 0.51916 \times x12 + 0.16656 \times x16$$

Root MSE	0.73571	R-Square	0.6344
Dependent Mean	6.91800	Adj R-Sq	0.6190
Coeff Var	10.63466		

Table 5. Coefficient of determination (R-Square, R^2) for Linear Regression model on variables x9, x11, x12, x16 and x19 for HBAT data set.

The coefficient of determination with a value of 0.6344 for the second model has a lower value of this metric than the previous model. In this case, the model is only able to explain 63.44% of the dependent variable as compared to almost 80% previously.

It seems that the factors concerning the perceived quality of the products (x6) and the user-friendliness of the website (x7) are an integral part to explain customer satisfaction (x19).

Model: MODEL1
Dependent Variable: x19 x19

Number of Observations Read	100
Number of Observations Used	100

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	112.11952	18.68659	60.96	<.0001
Error	93	28.50808	0.30654		
Corrected Total	99	140.62760			

Root MSE	0.55366	R-Square	0.7973
Dependent Mean	6.91800	Adj R-Sq	0.7842
Coeff Var	8.00317		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Type I SS	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	Tolerance	Variance Inflation
Intercept	Intercept	1	-1.26902	0.49935	-2.54	0.0127	4785.87240	0	.	.	.	.	.	0
x6	x6	1	0.36499	0.04676	7.81	<.0001	33.26012	0.42760	0.23651	0.23651	0.13283	0.39587	0.72651	1.37644
x7	x7	1	-0.43635	0.13103	-3.33	0.0012	17.50215	-0.25647	0.12446	0.16301	0.02417	0.10655	0.36752	2.72096
x9	x9	1	0.22577	0.08074	2.80	0.0063	35.93795	0.22891	0.25555	0.39991	0.01704	0.07756	0.32528	3.07424
x11	x11	1	0.17655	0.06034	2.93	0.0043	0.75326	0.19484	0.00536	0.01397	0.01866	0.08431	0.49166	2.03392
x12	x12	1	0.78167	0.08814	8.87	<.0001	23.75201	0.70329	0.16890	0.44668	0.17145	0.45821	0.34663	2.88493
x16	x16	1	0.15911	0.09215	1.73	0.0875	0.91402	0.12400	0.00650	0.03107	0.00650	0.03107	0.42269	2.36581

Collinearity Diagnostics

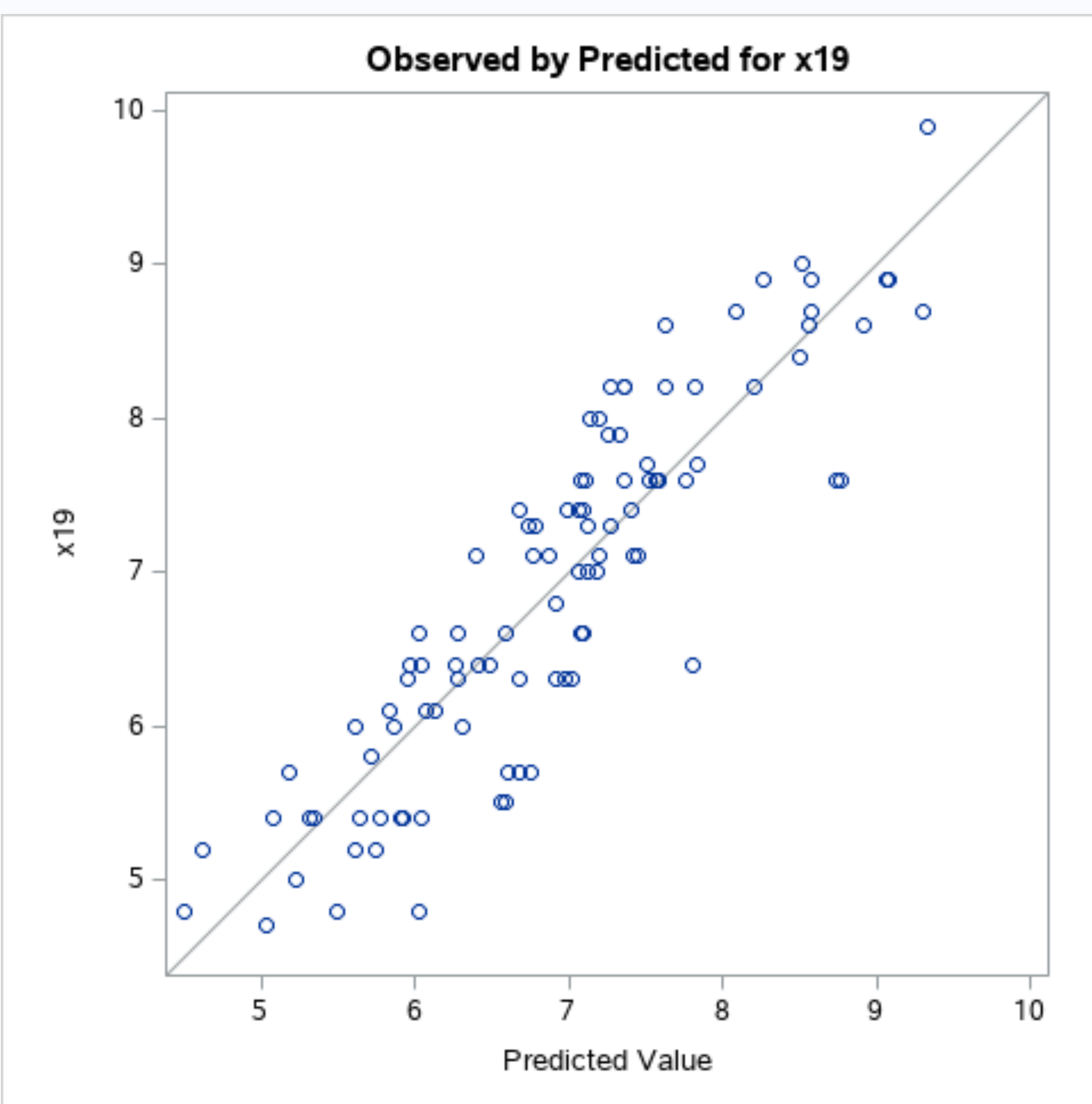
Number	Eigenvalue	Condition Index	Proportion of Variation						
			Intercept	x6	x7	x9	x11	x12	x16
1	6.83195	1.00000	0.00026035	0.00046381	0.00026670	0.00031740	0.00049481	0.00029964	0.00039476
2	0.07535	9.52206	0.00066644	0.01874	0.04777	0.01173	0.07218	0.06240	0.00939
3	0.04669	12.09656	0.01648	0.19278	0.00060397	0.08277	0.00967	0.00114	0.10228
4	0.01944	18.74715	0.05670	0.13714	0.01637	0.00475	0.60208	0.02732	0.22365
5	0.01008	26.03138	0.00034697	0.12412	0.18455	0.57303	0.19822	0.14258	0.43476
6	0.00963	26.64144	0.80988	0.42344	0.00034541	0.03798	0.00048683	0.13714	0.13072
7	0.00687	31.54647	0.11566	0.10332	0.75009	0.28942	0.11688	0.62912	0.09881

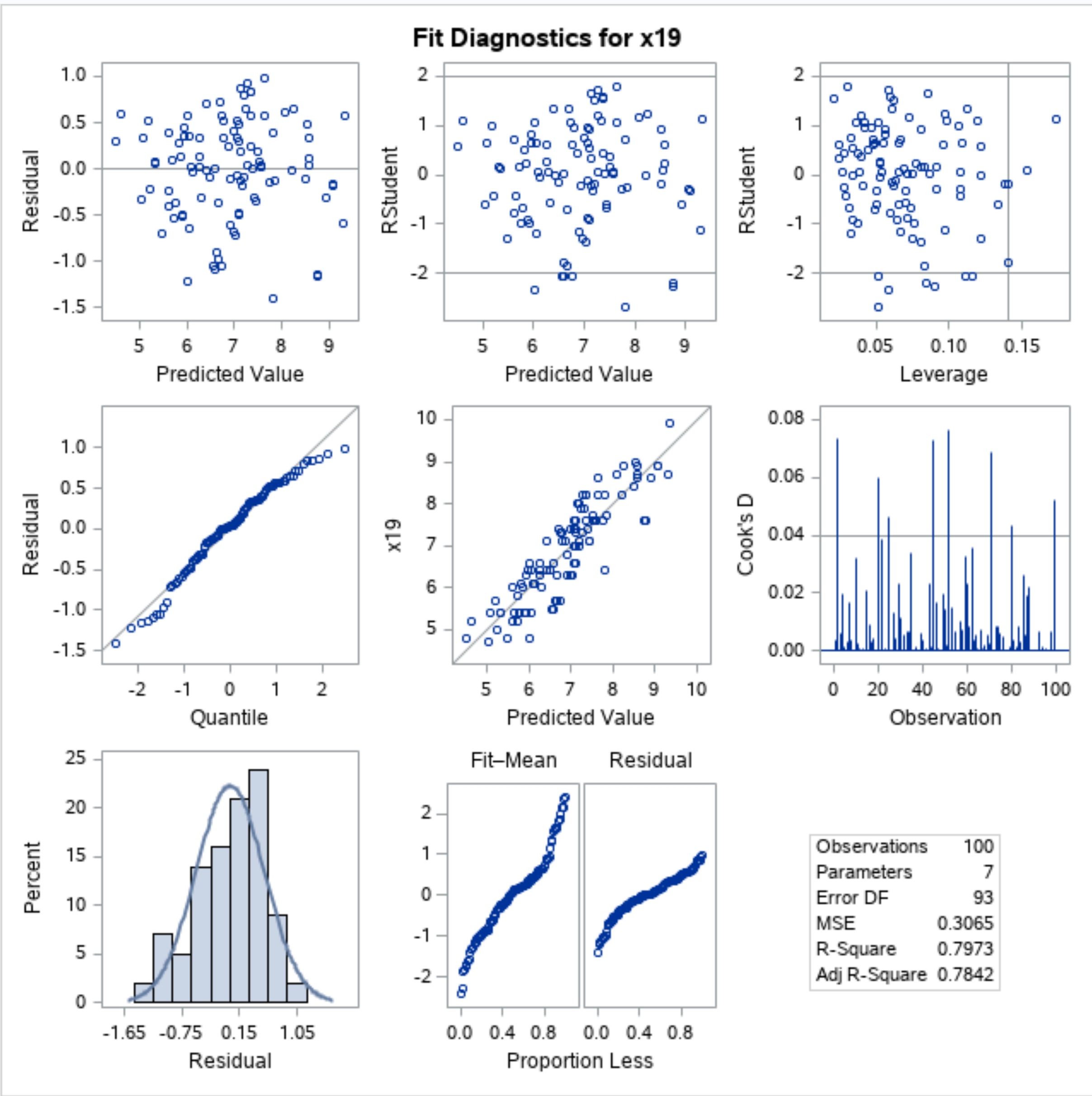
Model: MODEL1
Dependent Variable: x19 x19

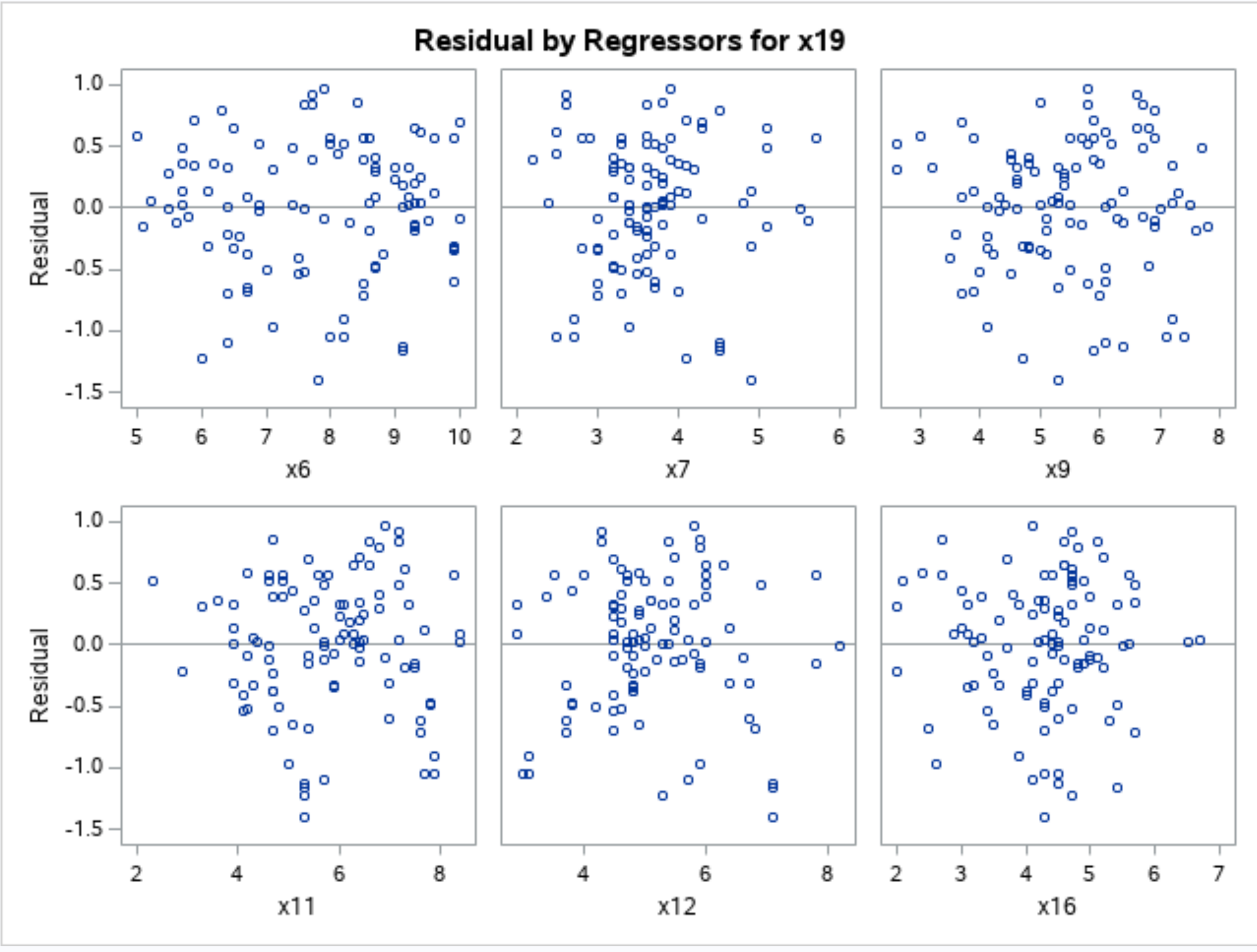
Output Statistics

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	Residual	Std Error Residual	Student Residual	-2-1 0 1 2	Cook's D	RStudent	Hat Diag H	Cov Ratio	DFFITS	DFBETAS						
													Intercept	x6	x7	x9	x11	x12	x16
1	8.2	7.8144	0.1211	0.3856	0.540	0.714	| |* |	0.004	0.7119	0.0478	1.0901	0.1596	-0.0514	0.0847	-0.0352	0.0134	-0.1002	0.0536	0.0525
2	5.7	6.6098	0.2075	-0.9098	0.513	-1.772	| ***| |	0.073	-1.7934	0.1404	0.9866	-0.7249	-0.1454	0.0859	-0.0888	-0.4661	-0.1107	0.3210	0.4360
3	8.9	8.5690	0.1713	0.3310	0.527	0.629	| |* |	0.006	0.6266	0.0957	1.1577	0.2038	-0.0532	0.0166	-0.1097	-0.1271	0.0858	0.1243	0.1181
4	4.8	5.4938	0.1516	-0.6938	0.533	-1.303	| **| |	0.020	-1.3079	0.0749	1.0249	-0.3723	-0.1869	0.1502	0.0551	0.2868	-0.0616	-0.0078	-0.2448
5	7.1	6.8637	0.1081	0.2363	0.543	0.435	| | |	0.001	0.4333	0.0381	1.1055	0.0863	-0.0053	0.0277	-0.0007	-0.0556	0.0082	-0.0072	0.0511
6	4.7	5.0315	0.1239	-0.3315	0.540	-0.614	| *| |	0.003	-0.6122	0.0500	1.1036	-0.1405	-0.1217	0.0450	0.0247	0.0250	0.0277	0.0336	-0.0175
7	5.7	5.1832	0.1806	0.5168	0.523	0.988	| |* |	0.017	0.9874	0.1064	1.1212	0.3408	0.1486	0.0577	-0.0296	-0.0189	-0.1612	0.0572	-0.0923
8	6.3	5.9440	0.1302	0.3560	0.538	0.662	| |* |	0.004	0.6596	0.0553	1.1047	0.1596	0.0871	-0.0269	-0.0604	-0.0129	-0.0854	0.0324	0.0511
9	7.0	7.0652	0.1393	-0.0652	0.536	-0.122	| | |	0.000	-0.1210	0.0633	1.1502	-0.0314	-0.0103	0.0179	0.0112	-0.0137	-0.0033	-0.0102	0.0110
10	5.5	6.5948	0.1253	-1.0948	0.539	-2.030	| ****| |	0.032	-2.0654	0.0512	0.8278	-0.4799	-0.0166	0.1796	-0.2829	-0.2206	-0.0081	0.1829	0.2137
11	7.4	6.9947	0.1000	0.4053	0.545	0.744	| |* |	0.003	0.7426	0.0326	1.0693	0.1363	0.0188	0.0026	-0.0411	-0.0550	0.0811	0.0289	-0.0094
12	6.0	5.8684	0.1544	0.1316	0.532	0.248	| | |	0.001	0.2463	0.0777	1.1642	0.0715	0.0100	-0.0144	0.0328	-0.0054	-0.0062	-0.0043	-0.0194
13	8.4	8.5014	0.2057	-0.1014	0.514	-0.197	| | |	0.001	-0.1962	0.1380	1.2476	-0.0785	0.0563	-0.0295	-0.0606	-0.0202	0.0079	0.0300	0.0081
14	7.6	7.5799	0.1510	0.0201	0.533	0.038	| | |	0.000	0.0375	0.0744	1.1652	0.0106	-0.0031	-0.0007	0.0031	-0.0042	0.0082	-0.0019	0.0010
15	8.0	7.2008	0.1374	0.7992	0.536	1.490	| |** |	0.021	1.5000	0.0616	0.9706	0.3843	-0.0309	-0.2115	0.1630	0.1223	0.1258	-0.0877	-0.0897
16	6.6	7.0770	0.1480	-0.4770	0.534	-0.894	| *| |	0.009	-0.8930	0.0714	1.0935	-0.2477	-0.0008	0.0034	-0.0622	-0.1304	-0.0592	0.1229	0.1181
17	6.4	6.0465	0.1236	0.3535	0.540	0.655	| |* |	0.003	0.6530	0.0498	1.0990	0.1495	0.0571	-0.0959	0.0569	0.0565	0.0071	-0.0599	-0.0442
18	7.4	7.0570	0.1415	0.3430	0.535	0.641	| |* |	0.004	0.6387	0.0653	1.1188	0.1689	0.0073	-0.1018	0.0356	0.0258	0.0219	-0.0373	0.0454
19	6.8	6.9156	0.1381	-0.1156	0.536	-0.216	| | |	0.000	-0.2144	0.0622	1.1461	-0.0552	-0.0220	0.0365	0.0277	-0.0016	-0.0073	-0.0216	-0.0099
20	7.6	8.7354	0.1603	-1.1354	0.530	-2.142	| ****| |	0.060	-2.1855	0.0838	0.8261	-0.6611	0.3535	-0.3905	0.0619	-0.2622	0.3099	-0.2862	0.1510
21	5.4	5.3374	0.1454	0.0626	0.534	0.117	| | |	0.000	0.1165	0.0690	1.1574	0.0317	0.0191	-0.0166	0.0066	0.0143	-0.0058	-0.0084	-0.0163
22	9.9	9.3263	0.2304	0.5737	0.503	1.139	| |** |	0.039	1.1413	0.1732	1.1823	0.5223	-0.3441	0.0721	0.1830	-0.0865	0.2551	0.1004	-0.0818
23	7.0	7.1769	0.1249	-0.1769	0.539	-0.328	| | |	0.001	-0.3264	0.0509	1.1273	-0.0756	0.0093	0.0092	-0.0051	0.0532	-0.0489	0.0046	-0.0398
24	8.6	8.5585	0.2169	0.0415	0.509	0.082	| | |	0.000	0.0811	0.1535	1.2735	0.0345	-0.0036	0.0054	-0.0202	-0.0067	-0.0014	0.0107	0.0220
25	4.8	6.0194	0.1345	-1.2194	0.537	-2.271	| ****| |	0.046	-2.3236	0.0590	0.7690	-0.5820	-0.1553	0.3434	-0.1340	0.3602	-0.1657	0.0816	-0.3392
26	6.6	6.5957	0.1632	0.004285	0.529	0.008	| | |	0.000	0.008056	0.0869	1.1813	0.0025	0.0004	-0.0001	-0.0003	0.0001	-0.0015	-0.0000	0.0013
27	6.3	6.9111	0.1425	-0.6111	0.535	-1.142	| **| |	0.013	-1.1441	0.0662	1.0463	-0.3047	-0.0179	0.0548	-0.0008	0.1321	-0.1441	0.0899	-0.1660
28	5.4	5.9024	0.1022	-0.5024	0.544	-0.923	| *| |	0.004	-0.9225	0.0341	1.0470	-0.1733	-0.0877	0.0181	-0.0289	-0.0618	0.0911	0.0913	-0.0002
29	6.3	7.0199	0.1576	-0.7199	0.531	-1.356	| **| |	0.023	-1.3626	0.0811	1.0206	-0.4047	-0.0053	0.0632	0.0019	0.1804	-0.1558	0.1130	-0.2662
30	5.4	5.9222	0.1524	-0.5222	0.532	-0.981	| *| |	0.011	-0.9808	0.0758	1.0851	-0.2809	-0.0486	-0.0260	-0.0265	0.1668	0.0809	0.0489	-0.2100
31	6.1	6.1291	0.1274	-0.0291	0.539	-0.054	| | |	0.000	-0.0538	0.0529	1.1386	-0.0127	-0.0057	0.0076	0.0018	0.0077	-0.0094	-0.0014	-0.0013
32	6.4	5.9606	0.1308	0.4394	0.538	0.817	| |* |	0.006	0.8153	0.0558	1.0863	0.1983	0.1201	0.0276	-0.0888	0.0475	-0.0379	0.0129	-0.0916
33	5.4	6.0460	0.0997	-0.6460	0.545	-1.186	| **| |	0.007	-1.1888	0.0325	1.0020	-0.2177	-0.1057	0.0646	-0.0519	-0.1129	0.0364	0.0657	0.1386
34	7.3	6.7317	0.1131	0.5683	0.542	1.049	| |** |	0.007	1.0492	0.0418	1.0357	0.2190	0.0289	0.0840	-0.0300	0.0623	-0.1715	-0.0255	0.0494
35	6.3	6.9781	0.1931	-0.6781	0.519	-1.307	| **| |	0.034	-1.3117	0.1216	1.0785	-0.4880	-0.1004	0.1272	0.1892	0.1008	-0.1895	-0.3292	0.1917
36	5.4	5.3180	0.1672	0.0820	0.528	0.155	| | |	0.000	0.1546	0.0912	1.1847	0.0490	0.0127	0.0051	0.0264	0.0043	0.0034	-0.0378	-0.0152
37	7.1	6.7682	0.0875	0.3318	0.547	0.607	| |* |	0.001	0.6048	0.0250	1.0760	0.0968	0.0010	0.0414	0.0043	-0.0362	0.0100	-0.0126	0.0097
38	8.7	8.5800	0.1277	0.1200	0.539	0.223	| | |	0.000	0.2216	0.0532	1.1350	0.0525	-0.0361	0.0219	0.0158	0.0225	0.0031	-0.0088	-0.0084
39	7.6	7.0741	0.1143	0.5259	0.542	0.971	| |* |	0.006	0.9704	0.0426	1.0491	0.2048	-0.0150	0.0953	0.0134	0.1162	-0.1649	-0.0419	-0.0067
40	6.0	6.3103	0.1468	-0.3103	0.534	-0.581	| *| |	0.004	-0.5791	0.0703	1.1309	-0.1592	0.0031	0.0272	-0.0738	0.0340	0.0479	0.0208	-0.0519
41	7.0	7.1273	0.1127	-0.1273	0.542	-0.235	| | |	0.000	-0.2337	0.0414	1.1206	-0.0486	-0.0004	-0.0242	0.0161	-0.0072	0.0354	-0.0103	-0.0117
42	7.6	7.3531	0.0928	0.2469	0.546	0.452	| | |	0.001	0.4505	0.0281	1.0928	0.0766	-0.0307	0.0452	0.0282	0.0063	0.0023	-0.0211	-0.0159
43	8.9	8.2569	0.1728	0.6431	0.526	1.223	| |** |	0.023	1.2259	0.0974	1.0669	0.4028	-0.2627	0.1729	0.2739	0.1869	-0.0736	-0.1330	-0.1340
44	7.6	7.7549	0.1821	-0.1549	0.523	-0.296	| | |	0.002	-0.2949	0.1081	1.2014	-0.1027	0.0106	0.0483	-0.0044	-0.0224	-0.0050	-0.0348	0.0120
45	5.5	6.5517	0.1848	-1.0517	0.522	-2.015	| ****| |	0.073	-2.0494	0.1114	0.8881	-0.7257	-0.2019	0.1282	-0.0088	-0.4058	-0.1136	0.3095	0.3160
46	7.4	6.6840	0.1366	0.7160	0.537	1.335	| |** |	0.016	1.3402	0.0609	1.0031	0.3412	0.0513	-0.2535	0.0522	-0.1312	0.1645	-0.0258	0.1551
47	7.1	7.1934	0.2074	-0.0934	0.513	-0.182	| | |	0.001	-0.1810	0.1403	1.2515	-0.0731	0.0292	-0.0447	-0.0474	-0.0269	0.0418	0.0473	-0.0019
48	7.6	7.5772	0.1818	0.0228	0.523	0.044	| | |	0.000	0.0434	0.1079	1.2088	0.0151	0.0006	-0.0062	-0.0037	-0.0000	-0.0016	0.0029	0.0083
49	8.7	9.2962	0.1726	-0.5962	0.526	-1.133	| **| |	0.020	-1.1350	0.0972	1.0839	-0.3724	0.1597	-0.1561	0.2151	0.0142	-0.0461	-0.2963	0.0274
50	8.6	7.6264	0.0962	0.9736	0.545	1.786	| |*** |	0.014	1.8073	0.0302	0.8712	0.3190	-0.0451	-0.0667	-0.0517	0.0023	0.1910	0.1308	-0.1144
51	5.4	5.7721	0.0988	-0.3721	0.545	-0.683	| *| |	0.002	-0.6810	0.0319	1.0756	-0.1235	-0.0682	0.0456	-0.0053	0.0705	-0.0008	0.0137	-0.0527
52	5.7	6.7504	0.1889	-1.0504	0.520	-2.018	| ****| |	0.077	-2.0529	0.1164	0.8922	-0.7451	-0.1294	0.0966	-0.0895	-0.4442	-0.1002	0.3670	0.3168
53	8.7	8.0806	0.1497	0.6194	0.533	1.162	| |** |	0.015	1.1643	0.0731	1.0504	0.3269	0.0036	0.0652	-0.2539	-0.0223	0.0710	0.1712	0.0276
54	6.1	6.0722	0.1284	0.0278	0.539	0.052	| | |	0.000	0.0514	0.0538	1.1397	0.0123	0.0060	-0.0069	-0.0012	-0.0036	0.0086	0.0009	-0.0037
55	7.3	6.7861	0.1203	0.5139	0.540	0.951	| |* |	0.006	0.9504	0.0472	1.0572	0.2115	0.0207	0.0772	-0.0283	0.0491	-0.1616	-0.0248	0.0678
56	7.7	7.8356	0.0926	-0.1356	0.546	-0.249	| | |	0.000	-0.2472	0.0280	1.1045	-0.0420	0.0190	-0.0262	0.0018	-0.0101	0.0018	-0.0095	0.0150
57	9.0	8.5166	0.1576	0.4834	0.531	0.911	| |* |	0.010	0.9099	0.0810	1.1024	0.2702	-0.1533	-0.0413	0.1200	0.0706	0.0422	-0.0189	0.0047
58	8.2	7.3617	0.0800	0.8383	0.548	1.530	| |*** |	0.007	1.5414	0.0209	0.9215	0.2250	0.0107	-0.0840	-0.0869	-0.0600	0.1248	0.0956	0.0386
59	7.1	6.3995	0.1858	0.7005	0.522	1.343	| |** |	0.033	1.3490	0.1127	1.0598	0.4807	-0.1300	0.2475	0.3076	-0.1387	-0.0621	-0.2418	0.0667
60	7.9	7.3313	0.1915	0.5687	0.520	1.095	| |** |	0.023	1.0959	0.1196	1.1188	0.4039	-0.0543	0.2229	0.0133	0.1496	-0.2420	-0.1550	0.0882
61	6.6	7.0940	0.1411	-0.4940	0.535	-0.923	| *| |	0.008	-0.9219	0.0650	1.0817	-0.2430	0.0155	0.0293	-0.0372	0.0798	-0.1096	0.0976	-0.1181
62	8.0	7.1389	0.1621	0.8611	0.529	1.627	| |*** |	0.035	1.6414	0.0857	0.9640	0.5027	0.0105	0.1938	-0.0723	0.2612	-0.1775	0.1457	-0.3808
63	6.3	6.6745	0.1228	-0.3745	0.540	-0.694	| *| |	0.004	-0.6917	0.0492	1.0939	-0.1573	0.0289	-0.0956	-0.0693	-0.0176	0.1056	0.0705	-0.0285
64	6.0	5.6100	0.1433	0.3900	0.535	0.729	| |* |	0.005	0.7275	0.0670	1.1106	0.1950	0.1388	0.0104	-0.0981	0.0321	-0.0577	0.0017	-0.0416
65	5.4	5.6334	0.0940	-0.2334	0.546	-0.428	| | |	0.001	-0.4259	0.0288	1.0954	-0.0734	-0.0501	0.0315	-0.0054	0.0270	-0.0044	0.0088	-0.0013
66	7.6	7.1102	0.1309	0.4898	0.538	0.911	| |* |	0.007	0.9097	0.0559	1.0731	0.2213	0.0596	-0.1320	-0.0657	0.0783	0.0110	0.0706	-0.0378
67	6.4	6.2641	0.1273	0.1359	0.539	0.252	| | |	0.001	0.2510	0.0528	1.1333	0.0593	0.0161	-0.0360	0.0208	0.0138	-0.0035	-0.0249	0.0073
68	6.1	5.8250	0.1176	0.2750	0.541	0.508	| |* |	0.002	0.5062	0.0451	1.1078	0.1100	0.0619	-0.0887	0.0126	-0.0162	0.0197	-0.0249	0.0246
69	5.2	5.6092	0.1358	-0.4092	0.537	-0.762	| *| |	0.005	-0.7607	0.0602	1.0984	-0.1925	-0.0651	-0.0110	-0.0125	0.1211	0.0438	0.0284	-0.1095
70	6.6	6.2719	0.1213	0.3281	0.540	0.607	| |* |	0.003	0.6053	0.0480	1.1019	0.1360	0.0489	-0.0158	-0.0252	-0.0006	-0.0826	0.0100	0.0548
71	7.6	8.7657	0.1658	-1.1657	0.528	-2.207	| ****| |	0.068	-2.2545	0.0896	0.8131	-0.7074	0.4009	-0.3562	0.1153	0.1375	0.2337	-0.3490	-0.3129
72	5.8	5.7067	0.1596	0.0933	0.530	0.176	| | |	0.000	0.1751	0.0831	1.1737	0.0527	0.0285	-0.0292	-0.0098	-0.0245	0.0373	0.0075	-0.0089
73	7.9	7.2514	0.1104	0.6486	0.543	1.195	| |** |	0.008	1.1982	0.0397	1.0079	0.2437	-0.0092	-0.1239	0.0576	0.0933	0.0530	-0.0047	-0.0725
74	8.6	8.9164	0.2019	-0.3164	0.516	-0.614	| *| |	0.008	-0.6118	0.1330	1.2093	-0.2396	0.0714	-0.0644	0.1311	0.1127	-0.0864	-0.1904	-0.0308
75	8.2	7.6286	0.1064	0.5714	0.543	1.052	| |** |	0.006	1.0522	0.0369	1.0300	0.2060	-0.0561	0.1188	-0.0503	0.0287	-0.1206	0.0879	0.0119
76	7.1	7.4511	0.1507	-0.3511	0.533	-0.659	| *| |	0.005	-0.6570	0.0741	1.1273	-0.1858	0.0031	-0.1103	0.0698	-0.0578	0.0330	-0.0557	0.1026
77	6.4	6.4091	0.1017	-0.009102	0.544	-0.017	| | |	0.000	-0.0166	0.0337	1.1162	-0.0031	-0.0006	-0.0004	0.0002	0.0015	0.0011	-0.0000	-0.0020
78	7.6	7.5655	0.1087	0.0345	0.543	0.064	| | |	0.000	0.0632	0.0386	1.1215	0.0127	-0.0052	0.0076	0.0047	0.0070	-0.0031	-0.0045	-0.0051
79	8.9	9.0774	0.1463	-0.1774	0.534	-0.332	| | |	0.001	-0.3307	0.0699	1.1500	-0.0906	0.0386	-0.0283	0.0401	-0.0401	-0.0009	-0.0421	0.0173
80	5.7	6.6728	0.1593	-0.9728	0.530	-1.835	| ***| |	0.043	-1.8587	0.0828	0.9085	-0.5584	-0.2067	0.0771	0.3082	0.0272	-0.0949	-0.3702	0.2650
81	7.1	7.4219	0.1421	-0.3219	0.535	-0.602	| *| |	0.004	-0.5995	0.0659	1.1236	-0.1592	0.0028	-0.0965	0.0665	-0.0275	0.0214	-0.0550	0.0708
82	7.4	7.0968	0.1020	0.3032	0.544	0.557	| |* |	0.002	0.5551	0.0339	1.0906	0.1040	0.0070	0.0011	-0.0337	-0.0643	0.0578	0.0219	0.0344
83	6.6	6.0300	0.1251	0.5700	0.539	1.057	| |** |	0.009	1.0576	0.0511	1.0445	0.2454	0.1089	0.0440	-0.0475	-0.0115	0.0296	-0.0011	-0.1176
84	5.0	5.2220	0.1815	-0.2220	0.523	-0.424	| | |	0.003	-0.4225	0.1075	1.1923	-0.1466	-0.0876	-0.0006	0.0374	-0.0450	0.0620	-0.0271	0.0857
85	8.2	7.2772	0.1337	0.9228	0.537	1.718	| |*** |	0.026	1.7361	0.0583	0.9140	0.4319	0.1366	-0.1267	-0.2619	0.0851	0.1350	0.1008	-0.0413
86	5.2	5.7395	0.1079	-0.5395	0.543	-0.994	| *| |	0.006	-0.9935	0.0380	1.0405	-0.1975	-0.0864	-0.0452	-0.0429	-0.0590	0.1270	0.0733	0.0585
87	5.2	4.6160	0.1733	0.5840	0.526	1.111	| |** |	0.019	1.1121	0.0980	1.0891	0.3665	0.2683	-0.2345	-0.0086	-0.1200	0.1106	0.0156	-0.0779
88	8.2	7.3634	0.1356	0.8366	0.537	1.558	| |*** |	0.022	1.5707	0.0600	0.9534	0.3967	0.1071	-0.1159	-0.2434	0.0286	0.1136	0.0908	0.0547
89	7.3	7.1229	0.0880	0.1771	0.547	0.324	| | |	0.000	0.3224	0.0252	1.0978	0.0519	-0.0145	0.0270	0.0148	-0.0087	-0.0058	-0.0192	0.0167
90	8.2	8.2101	0.1934	-0.0101	0.519	-0.019	| | |	0.000	-0.0193	0.1220	1.2284	-0.0072	0.0021	0.0028	-0.0011	-0.0002	-0.0007	-0.0022	-0.0009
91	7.4	7.3970	0.1475	0.003039	0.534	0.006	| | |	0.000	0.005664	0.0710	1.1611	0.0016	-0.0003	0.0003	-0.0003	-0.0013	0.0006	0.0005	0.0009
92	4.8	4.4951	0.1927	0.3049	0.519	0.587	| |* |	0.007	0.5853	0.1212	1.1958	0.2173	0.0701	0.0151	0.1233	-0.0053	-0.0519	-0.1029	-0.0748
93	7.6	7.5189	0.1570	0.0811	0.531	0.153	| | |	0.000	0.1520	0.0804	1.1708	0.0449	-0.0120	-0.0037	0.0124	-0.0200	0.0356	-0.0069	0.0044
94	8.9	9.0589	0.1673	-0.1589	0.528	-0.301	| | |	0.001	-0.2997	0.0913	1.1789	-0.0950	0.0332	-0.0286	0.0338	-0.0599	0.0039	-0.0357	0.0429
95	7.7	7.5077	0.1105	0.1923	0.543	0.354	| | |	0.001	0.3527	0.0398	1.1128	0.0718	-0.0187	0.0289	-0.0072	-0.0232	0.0234	0.0250	-0.0128
96	7.3	7.2665	0.1418	0.0335	0.535	0.063	| | |	0.000	0.0623	0.0656	1.1540	0.0165	-0.0082	0.0040	0.0120	-0.0049	-0.0001	-0.0067	0.0062
97	6.3	6.2743	0.0909	0.0257	0.546	0.047	| | |	0.000	0.0468	0.0269	1.1083	0.0078	0.0032	0.0012	-0.0011	0.0006	-0.0052	-0.0005	0.0015
98	5.4	5.0696	0.1823	0.3304	0.523	0.632	| |* |	0.007	0.6299	0.1084	1.1739	0.2197	0.0605	0.0019	0.0953	-0.0893	0.0634	-0.1321	0.0091
99	6.4	7.8062	0.1251	-1.4062	0.539	-2.607	| *****| |	0.052	-2.6934	0.0511	0.6682	-0.6248	0.2873	-0.1086	-0.1253	0.0858	0.0402	-0.2324	-0.0145
100	6.4	6.4913	0.1367	-0.0913	0.537	-0.170	| | |	0.000	-0.1693	0.0610	1.1461	-0.0431	-0.0155	-0.0145	0.0177	-0.0213	0.0274	-0.0089	0.0184

Sum of Residuals	0
Sum of Squared Residuals	28.50808
Predicted Residual SS (PRESS)	33.25995







Model: MODEL1
Dependent Variable: x19 x19

Number of Observations Read	100
Number of Observations Used	100

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	89.20760	22.30190	41.20	<.0001
Error	95	51.42000	0.54126		
Corrected Total	99	140.62760			

Root MSE	0.73571	R-Square	0.6344
Dependent Mean	6.91800	Adj R-Sq	0.6190
Coeff Var	10.63466		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Type I SS	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	Tolerance	Variance Inflation
Intercept	Intercept	1	0.42420	0.52097	0.81	0.4175	4785.87240	0	.	.	.	.	.	0
x9	x9	1	0.14901	0.10489	1.42	0.1587	51.17801	0.15108	0.36393	0.36393	0.00777	0.02080	0.34029	2.93870
x11	x11	1	0.39805	0.06991	5.69	<.0001	9.21753	0.43927	0.06555	0.10305	0.12476	0.25440	0.64654	1.54668
x12	x12	1	0.51916	0.07296	7.12	<.0001	27.80110	0.46710	0.19769	0.34651	0.19490	0.34770	0.89329	1.11946
x16	x16	1	0.16656	0.12187	1.37	0.1750	1.01096	0.12981	0.00719	0.01928	0.00719	0.01928	0.42665	2.34383

Collinearity Diagnostics

Number	Eigenvalue	Condition Index	Proportion of Variation: Intercept	x9	x11	x12	x16
1	4.89343	1.00000	0.00082009	0.00065189	0.00127	0.00150	0.00078123
2	0.05237	9.66650	0.01838	0.02176	0.15325	0.41255	0.01502
3	0.02939	12.90451	0.09051	0.08601	0.39647	0.00003909	0.21652
4	0.01545	17.79819	0.65239	0.10269	0.19191	0.44517	0.14104
5	0.00937	22.84926	0.23790	0.78888	0.25710	0.14075	0.62665

Model: MODEL1
Dependent Variable: x19 x19

Output Statistics

Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	Residual	Std Error Residual	Student Residual	-2-1 0 1 2	Cook's D	RStudent	Hat Diag H	Cov Ratio	DFFITS	DFBETAS Intercept	DFBETAS x9	DFBETAS x11	DFBETAS x12	DFBETAS x16
1	8.2	7.2016	0.1305	0.9984	0.724	1.379	**	0.012	1.3856	0.0314	0.9839	0.2497	-0.0354	0.0059	-0.1334	0.0683	0.1036
2	5.7	6.9006	0.2715	-1.2006	0.684	-1.756	***	0.097	-1.7757	0.1362	1.0349	-0.7049	-0.1533	-0.4754	-0.0818	0.3922	0.4292
3	8.9	8.1148	0.1902	0.7852	0.711	1.105	**	0.017	1.1062	0.0669	1.0591	0.2961	-0.1620	-0.2086	0.1790	0.1051	0.1917
4	4.8	5.8988	0.1825	-1.0988	0.713	-1.542	***	0.031	-1.5531	0.0615	0.9897	-0.3976	-0.1353	0.3074	0.0182	0.0534	-0.2765
5	7.1	6.5837	0.1360	0.5163	0.723	0.714	*	0.004	0.7122	0.0342	1.0627	0.1340	0.0201	-0.1010	0.0406	-0.0238	0.0862
6	4.7	5.2673	0.1537	-0.5673	0.719	-0.788	*	0.006	-0.7869	0.0436	1.0668	-0.1681	-0.1477	0.0190	0.0741	0.1046	-0.0172
7	5.7	4.8804	0.2355	0.8196	0.697	1.176	**	0.032	1.1783	0.1024	1.0916	0.3980	0.2614	-0.0309	-0.1833	0.0599	-0.1102
8	6.3	5.9364	0.1581	0.3636	0.719	0.506	*	0.002	0.5041	0.0462	1.0906	0.1109	0.0546	-0.0011	-0.0879	-0.0166	0.0343
9	7.0	7.5151	0.1394	-0.5151	0.722	-0.713	*	0.004	-0.7112	0.0359	1.0647	-0.1373	0.0183	-0.1068	0.0387	-0.0217	0.0739
10	5.5	7.2442	0.1165	-1.7442	0.726	-2.401	****	0.030	-2.4643	0.0251	0.7908	-0.3953	0.0102	-0.2635	0.0927	-0.0891	0.2347
11	7.4	6.8673	0.1266	0.5327	0.725	0.735	*	0.003	0.7333	0.0296	1.0560	0.1281	0.0118	-0.0511	0.0914	-0.0053	-0.0126
12	6.0	6.3800	0.1764	-0.3800	0.714	-0.532	*	0.003	-0.5301	0.0575	1.1021	-0.1309	-0.0294	0.0146	0.0293	-0.0755	0.0370
13	8.4	8.4748	0.1469	-0.0748	0.721	-0.104		0.000	-0.1033	0.0399	1.0975	-0.0211	0.0153	-0.0042	-0.0050	-0.0128	0.0009
14	7.6	7.8289	0.1910	-0.2289	0.710	-0.322		0.001	-0.3206	0.0674	1.1244	-0.0862	0.0293	0.0388	-0.0781	-0.0077	-0.0102
15	8.0	8.0216	0.1283	-0.0216	0.724	-0.030		0.000	-0.0297	0.0304	1.0873	-0.0053	0.0026	-0.0028	-0.0006	-0.0016	0.0017
16	6.6	7.2313	0.1903	-0.6313	0.711	-0.888	*	0.011	-0.8873	0.0669	1.0838	-0.2376	-0.0195	-0.1256	-0.0681	0.1177	0.1126
17	6.4	6.8548	0.1062	-0.4548	0.728	-0.625	*	0.002	-0.6227	0.0208	1.0548	-0.0908	-0.0235	-0.0638	0.0403	0.0162	0.0414
18	7.4	7.8494	0.1431	-0.4494	0.722	-0.623	*	0.003	-0.6207	0.0378	1.0736	-0.1231	0.0476	-0.0383	0.0288	0.0071	-0.0420
19	6.8	7.3869	0.1073	-0.5869	0.728	-0.806	*	0.003	-0.8048	0.0213	1.0409	-0.1187	0.0248	-0.0414	0.0482	-0.0094	-0.0218
20	7.6	7.9231	0.1699	-0.3231	0.716	-0.451		0.002	-0.4495	0.0533	1.1018	-0.1067	0.0403	-0.0419	0.0284	-0.0712	0.0281
21	5.4	6.0561	0.1586	-0.6561	0.718	-0.913	*	0.008	-0.9125	0.0464	1.0580	-0.2014	-0.1163	-0.1296	0.1212	0.0309	0.1285
22	9.9	9.3728	0.2843	0.5272	0.679	0.777	*	0.021	0.7753	0.1494	1.2006	0.3249	-0.2186	-0.0820	0.2281	0.2584	-0.0427
23	7.0	7.3295	0.1643	-0.3295	0.717	-0.459		0.002	-0.4575	0.0498	1.0974	-0.1048	0.0231	0.0748	-0.0717	0.0004	-0.0561
24	8.6	7.8152	0.2274	0.7848	0.700	1.122	**	0.027	1.1232	0.0955	1.0905	0.3651	-0.1031	-0.0732	0.0069	-0.1158	0.2774
25	4.8	6.7686	0.1367	-1.9686	0.723	-2.723	*****	0.053	-2.8212	0.0345	0.7273	-0.5334	-0.0044	0.3886	-0.0051	-0.0763	-0.4029
26	6.6	6.5699	0.2149	0.0301	0.704	0.043		0.000	0.0426	0.0853	1.1525	0.0130	0.0018	0.0010	-0.0098	-0.0024	0.0070
27	6.3	7.1173	0.1862	-0.8173	0.712	-1.148	**	0.018	-1.1503	0.0641	1.0505	-0.3010	0.0152	0.1262	-0.1353	0.1398	-0.1650
28	5.4	6.0511	0.1331	-0.6511	0.724	-0.900	*	0.005	-0.8989	0.0327	1.0443	-0.1653	-0.1060	-0.0614	0.1104	0.1060	-0.0018
29	6.3	7.2137	0.2069	-0.9137	0.706	-1.294	**	0.029	-1.2989	0.0791	1.0475	-0.3807	0.0361	0.1650	-0.1365	0.1705	-0.2517
30	5.4	5.8630	0.2008	-0.4630	0.708	-0.654	*	0.007	-0.6522	0.0745	1.1138	-0.1851	-0.0591	0.1184	0.0513	0.0313	-0.1425
31	6.1	6.6688	0.1348	-0.5688	0.723	-0.786	*	0.004	-0.7848	0.0336	1.0559	-0.1463	-0.0210	0.0914	-0.0944	-0.0077	-0.0112
32	6.4	5.5973	0.1529	0.8027	0.720	1.115	**	0.011	1.1169	0.0432	1.0316	0.2373	0.1937	0.0737	-0.0433	-0.1267	-0.1336
33	5.4	6.3709	0.1220	-0.9709	0.726	-1.338	**	0.010	-1.3438	0.0275	0.9858	-0.2261	-0.1207	-0.1360	0.0851	0.0398	0.1555
34	7.3	6.3275	0.1368	0.9725	0.723	1.345	**	0.013	1.3512	0.0346	0.9920	0.2558	0.1093	0.0674	-0.1939	-0.1091	0.0654
35	6.3	7.1015	0.2282	-0.8015	0.699	-1.146	**	0.028	-1.1479	0.0962	1.0881	-0.3745	0.0212	0.0507	-0.1193	-0.2590	0.1848
36	5.4	5.5149	0.1865	-0.1149	0.712	-0.162		0.000	-0.1607	0.0643	1.1252	-0.0421	-0.0292	-0.0005	-0.0080	0.0286	0.0131
37	7.1	6.4838	0.1051	0.6162	0.728	0.846	*	0.003	0.8450	0.0204	1.0363	0.1220	0.0439	-0.0623	0.0484	-0.0251	0.0167
38	8.7	8.2985	0.1468	0.4015	0.721	0.557	*	0.003	0.5550	0.0398	1.0802	0.1130	-0.0633	0.0432	0.0410	0.0101	-0.0152
39	7.6	6.6772	0.1343	0.9228	0.723	1.276	**	0.011	1.2801	0.0333	1.0004	0.2377	0.0680	0.1321	-0.1777	-0.0757	-0.0017
40	6.0	6.7640	0.1686	-0.7640	0.716	-1.067	**	0.013	-1.0676	0.0525	1.0477	-0.2513	-0.0035	0.0706	0.1222	-0.1122	-0.1041
41	7.0	6.5406	0.1185	0.4594	0.726	0.633	*	0.002	0.6307	0.0259	1.0598	0.1029	0.0321	0.0134	-0.0746	-0.0147	0.0309
42	7.6	7.0430	0.0904	0.5570	0.730	0.763	*	0.002	0.7612	0.0151	1.0381	0.0943	0.0031	-0.0079	0.0488	-0.0032	-0.0193
43	8.9	8.1015	0.1417	0.7985	0.722	1.106	**	0.009	1.1074	0.0371	1.0262	0.2173	-0.1066	0.1128	0.0207	0.1028	-0.0909
44	7.6	8.4674	0.2129	-0.8674	0.704	-1.232	**	0.028	-1.2352	0.0838	1.0617	-0.3735	0.1890	-0.1274	0.0866	-0.2686	0.0576
45	5.5	6.8208	0.2417	-1.3208	0.695	-1.901	***	0.087	-1.9278	0.1079	0.9736	-0.6704	-0.1604	-0.4097	-0.0556	0.4468	0.3029
46	7.4	7.5724	0.1165	-0.1724	0.726	-0.237		0.000	-0.2361	0.0251	1.0783	-0.0379	0.0162	0.0166	-0.0086	-0.0075	-0.0257
47	7.1	6.6815	0.1358	0.4185	0.723	0.579	*	0.002	0.5768	0.0341	1.0724	0.1083	0.0297	0.0425	-0.0630	-0.0594	0.0236
48	7.6	8.0083	0.2132	-0.4083	0.704	-0.580	*	0.006	-0.5778	0.0839	1.1307	-0.1749	0.0630	-0.0200	0.0724	-0.0054	-0.1021
49	8.7	8.3474	0.1565	0.3526	0.719	0.490		0.002	0.4885	0.0452	1.0904	0.1063	-0.0699	-0.0069	0.0547	0.0809	-0.0160
50	8.6	7.7290	0.1235	0.8710	0.725	1.201	**	0.008	1.2037	0.0282	1.0050	0.2050	-0.0807	0.0134	0.1195	0.0998	-0.0814
51	5.4	6.0791	0.1218	-0.6791	0.726	-0.936	*	0.005	-0.9353	0.0274	1.0350	-0.1570	-0.0780	0.0888	0.0332	0.0163	-0.0703
52	5.7	7.0304	0.2469	-1.3304	0.693	-1.920	***	0.093	-1.9476	0.1126	0.9749	-0.6937	-0.1208	-0.4361	-0.0614	0.4442	0.2984
53	8.7	7.4099	0.1161	1.2901	0.726	1.776	***	0.016	1.7965	0.0249	0.9133	0.2870	-0.0535	-0.0067	0.1608	-0.0743	0.0145
54	6.1	6.6004	0.1408	-0.5004	0.722	-0.693	*	0.004	-0.6911	0.0366	1.0670	-0.1347	-0.0331	0.0316	-0.0793	-0.0067	0.0551
55	7.3	6.3757	0.1468	0.9243	0.721	1.282	**	0.014	1.2866	0.0398	1.0063	0.2620	0.0953	0.0540	-0.1936	-0.1096	0.0935
56	7.7	7.3594	0.0958	0.3406	0.729	0.467		0.001	0.4651	0.0170	1.0603	0.0611	-0.0123	0.0112	0.0232	0.0206	-0.0261
57	9.0	8.9691	0.1840	0.0309	0.712	0.043		0.000	0.0431	0.0626	1.1246	0.0111	-0.0086	0.0031	0.0014	0.0058	0.0006
58	8.2	7.4852	0.0905	0.7148	0.730	0.979	*	0.003	0.9788	0.0151	1.0176	0.1213	-0.0469	-0.0231	0.0586	0.0321	0.0175
59	7.1	6.0775	0.1473	1.0225	0.721	1.419	**	0.017	1.4263	0.0401	0.9869	0.2915	0.1124	-0.2247	0.0813	-0.0207	0.1057
60	7.9	6.5109	0.2122	1.3891	0.704	1.972	***	0.071	2.0030	0.0832	0.9331	0.6032	0.1625	0.2016	-0.2734	-0.4460	0.1790
61	6.6	7.3102	0.1838	-0.7102	0.712	-0.997	*	0.013	-0.9969	0.0624	1.0669	-0.2571	0.0298	0.0873	-0.1198	0.1162	-0.1300
62	8.0	6.5529	0.1957	1.4471	0.709	2.041	****	0.063	2.0757	0.0707	0.9068	0.5727	0.1557	0.3033	-0.1237	0.1609	-0.4762
63	6.3	6.2798	0.1108	0.0202	0.727	0.028		0.000	0.0276	0.0227	1.0788	0.0042	0.0021	-0.0003	-0.0026	-0.0013	0.0015
64	6.0	5.2804	0.1639	0.7196	0.717	1.003	**	0.011	1.0034	0.0496	1.0518	0.2293	0.2063	0.0581	-0.0882	-0.1660	-0.0676
65	5.4	5.9809	0.1122	-0.5809	0.727	-0.799	*	0.003	-0.7974	0.0233	1.0437	-0.1231	-0.0815	0.0424	0.0228	0.0091	-0.0007
66	7.6	7.5893	0.1316	0.0107	0.724	0.015		0.000	0.0148	0.0320	1.0892	0.0027	-0.0006	0.0018	-0.0010	0.0007	-0.0008
67	6.4	7.0477	0.1179	-0.6477	0.726	-0.892	*	0.004	-0.8909	0.0257	1.0376	-0.1446	-0.0087	-0.0630	0.0812	0.0384	-0.0258
68	6.1	6.6319	0.0894	-0.5319	0.730	-0.728	*	0.002	-0.7266	0.0147	1.0406	-0.0889	-0.0301	0.0036	0.0372	0.0245	-0.0307
69	5.2	5.5802	0.1799	-0.3802	0.713	-0.533	*	0.004	-0.5309	0.0598	1.1047	-0.1339	-0.0661	0.0888	0.0304	0.0213	-0.0779
70	6.6	6.3007	0.1575	0.2993	0.719	0.416		0.002	0.4146	0.0458	1.0949	0.0909	0.0293	0.0035	-0.0715	-0.0099	0.0357
71	7.6	7.9985	0.1858	-0.3985	0.712	-0.560	*	0.004	-0.5578	0.0637	1.1077	-0.1455	0.0735	0.0462	0.0181	-0.0947	-0.0783
72	5.8	6.3025	0.1733	-0.5025	0.715	-0.703	*	0.006	-0.7009	0.0555	1.0875	-0.1698	-0.0499	0.0743	-0.1027	-0.0076	0.0437
73	7.9	7.7965	0.1203	0.1035	0.726	0.143		0.000	0.1418	0.0267	1.0822	0.0235	-0.0092	0.0130	-0.0007	0.0087	-0.0087
74	8.6	8.0722	0.2102	0.5278	0.705	0.749	*	0.010	0.7469	0.0816	1.1145	0.2226	-0.1071	-0.1319	0.1534	0.1613	0.0273
75	8.2	7.0420	0.1089	1.1580	0.728	1.591	***	0.011	1.6046	0.0219	0.9417	0.2401	-0.0085	0.0220	-0.1123	0.1041	0.0200
76	7.1	6.5261	0.1392	0.5739	0.722	0.794	*	0.005	0.7929	0.0358	1.0577	0.1528	0.0586	0.0568	0.0245	-0.0078	-0.1227
77	6.4	6.2860	0.1338	0.1140	0.723	0.158		0.000	0.1568	0.0331	1.0890	0.0290	0.0093	-0.0147	-0.0104	-0.0023	0.0188
78	7.6	7.1955	0.1044	0.4045	0.728	0.555	*	0.001	0.5534	0.0201	1.0586	0.0793	0.0021	0.0456	0.0076	-0.0167	-0.0382
79	8.9	8.4712	0.1618	0.4288	0.718	0.597	*	0.004	0.5954	0.0484	1.0873	0.1343	-0.0764	0.0725	0.0269	0.0267	-0.0346
80	5.7	6.5215	0.1749	-0.8215	0.715	-1.150	**	0.016	-1.1516	0.0565	1.0419	-0.2819	-0.0645	-0.0133	-0.0322	-0.1299	0.1804
81	7.1	6.5129	0.1242	0.5871	0.725	0.810	*	0.004	0.8081	0.0285	1.0483	0.1384	0.0547	0.0252	0.0350	-0.0034	-0.0954
82	7.4	6.9654	0.1281	0.4346	0.724	0.600	*	0.002	0.5978	0.0303	1.0669	0.1057	-0.0018	-0.0666	0.0704	-0.0079	0.0342
83	6.6	5.7608	0.1601	0.8392	0.718	1.169	**	0.014	1.1710	0.0473	1.0294	0.2611	0.1694	-0.0153	0.0623	-0.0717	-0.1326
84	5.0	5.0439	0.2332	-0.0439	0.698	-0.063		0.000	-0.0626	0.1005	1.1719	-0.0209	-0.0147	-0.0074	0.0107	0.0005	0.0132
85	8.2	7.2889	0.1333	0.9111	0.724	1.259	**	0.011	1.2632	0.0328	1.0021	0.2327	-0.0018	0.1004	0.0524	-0.1132	-0.0496
86	5.2	5.6293	0.1364	-0.4293	0.723	-0.594	*	0.003	-0.5918	0.0344	1.0718	-0.1117	-0.0927	-0.0282	0.0705	0.0399	0.0316
87	5.2	5.4867	0.1769	-0.2867	0.714	-0.401		0.002	-0.3997	0.0578	1.1096	-0.0990	-0.0617	0.0284	0.0015	-0.0112	0.0315
88	8.2	7.3704	0.1342	0.8296	0.723	1.147	**	0.009	1.1488	0.0333	1.0172	0.2131	-0.0190	0.0562	0.0398	-0.1092	0.0212
89	7.3	6.8511	0.0951	0.4489	0.730	0.615	*	0.001	0.6133	0.0167	1.0511	0.0800	0.0101	-0.0290	0.0170	-0.0269	0.0364
90	8.2	8.9094	0.2333	-0.7094	0.698	-1.017	**	0.023	-1.0169	0.1006	1.1099	-0.3401	0.2225	-0.0275	0.0388	-0.2660	-0.0468
91	7.4	7.0792	0.1888	0.3208	0.711	0.451		0.003	0.4493	0.0658	1.1166	0.1193	-0.0198	-0.1075	0.0636	0.0367	0.0682
92	4.8	4.7945	0.2106	0.005463	0.705	0.008		0.000	0.007708	0.0819	1.1484	0.0023	0.0018	-0.0003	-0.0006	-0.0001	-0.0008
93	7.6	7.7824	0.1995	-0.1824	0.708	-0.258		0.001	-0.2563	0.0735	1.1340	-0.0722	0.0229	0.0358	-0.0660	-0.0080	-0.0088
94	8.9	8.4344	0.1952	0.4656	0.709	0.656	*	0.007	0.6544	0.0704	1.1087	0.1801	-0.0729	0.1301	0.0218	0.0271	-0.0963
95	7.7	7.1122	0.1333	0.5878	0.724	0.812	*	0.004	0.8110	0.0328	1.0528	0.1494	-0.0140	-0.0641	0.0977	0.0663	-0.0279
96	7.3	7.3776	0.1238	-0.0776	0.725	-0.107		0.000	-0.1065	0.0283	1.0844	-0.0182	0.0061	0.0118	-0.0043	-0.0067	-0.0124
97	6.3	6.1122	0.1179	0.1878	0.726	0.259		0.000	0.2573	0.0257	1.0783	0.0418	0.0248	0.0028	-0.0296	-0.0129	0.0081
98	5.4	5.3510	0.2183	0.0490	0.703	0.070		0.000	0.0693	0.0880	1.1558	0.0215	0.0120	-0.0112	0.0085	-0.0100	0.0019
99	6.4	7.7259	0.1606	-1.3259	0.718	-1.847	***	0.034	-1.8708	0.0476	0.9221	-0.4184	0.1720	0.0842	-0.0137	-0.3622	-0.0208
100	6.4	5.9142	0.1523	0.4858	0.720	0.675	*	0.004	0.6729	0.0429	1.0754	0.1424	0.0939	0.0838	-0.0948	-0.0362	-0.0761

Sum of Residuals	0
Sum of Squared Residuals	51.42000
Predicted Residual SS (PRESS)	57.58256