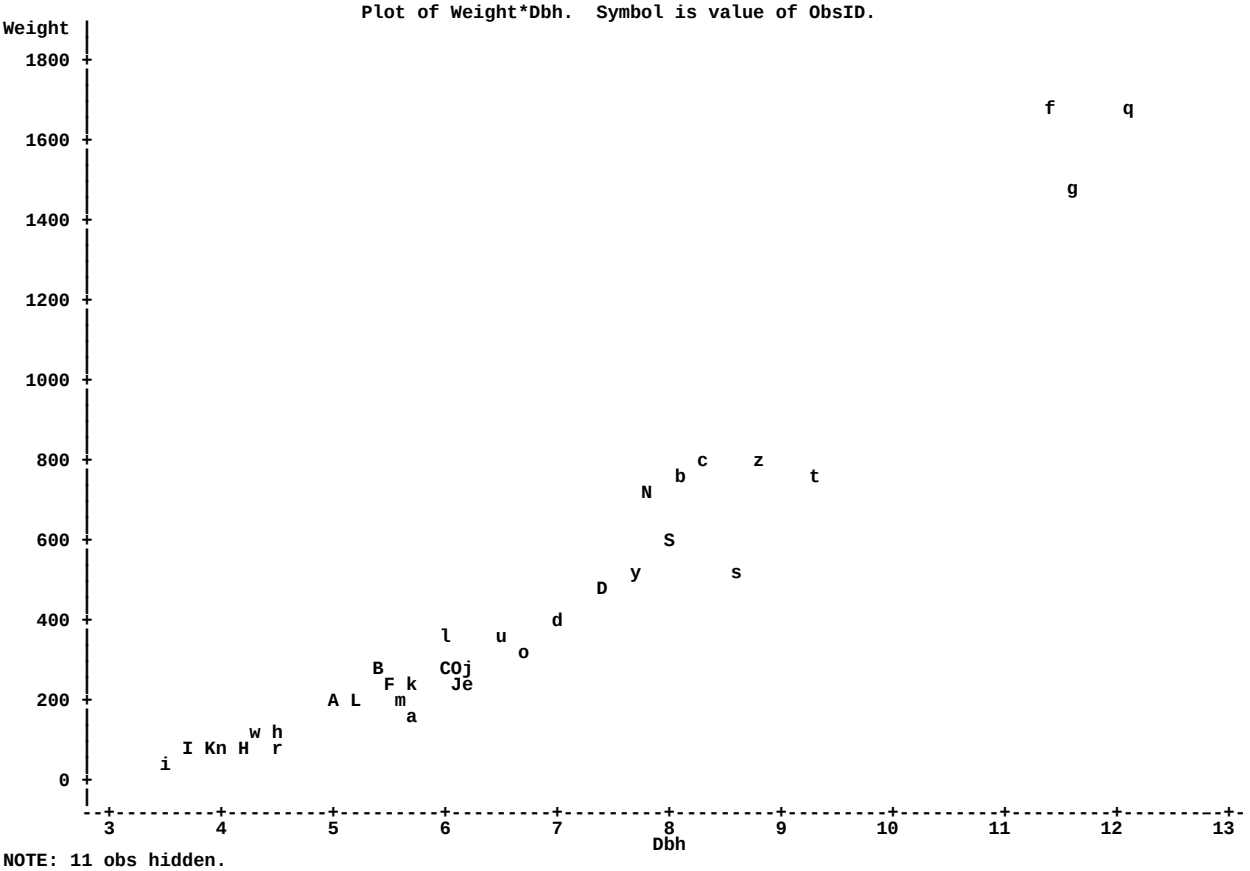
```
dm'log;clear;output;clear';
options ps=512 ls=120 nocenter nodate nonumber FORMCHAR="|----|+|---+=|-/\<>*";
TITLE1 'Appendix02:  Estimating tree harvest weights';

ODS HTML style=minimal body='C:\SAS\Appendix02 Slr-Trees.HTML' ;
ODS rtf style=minimal body='C:\SAS\Appendix02 Slr-Trees.RTF' ;
filename input1 'C:\SAS\Appendix02 Slr-Trees.csv';
FILENAME OUT1'C:\SAS\Appendix02 Slr-Trees01.CGM';
FILENAME OUT2'C:\SAS\Appendix02 Slr-Trees02.CGM';

*******************************************;
*** Data from Freund & Wilson (1993)      ***;
*** TABLE 8.24 : ESTIMATING TREE WEIGHTS  ***;
*******************************************;

data one; infile input1 missover DSD dlm="," firstobs=2;
  input ObsNo Dbh Height Age Grav Weight;
*********** label ObsNo  = 'Original observation number'
                  Dbh    = 'Diameter at breast height (inches)'
                  Height = 'Height of the tree (feet)'
                  Age    = 'Age of the tree (years)'
                  Grav   = 'Specific gravity of the wood'
                  Weight = 'Harvest weight of the tree (lbs)'
                  ObsId  = 'Identification letter added to dataset';
   lweight = log(weight);
   ldbh = log(DBH);
   observation + 1;
   if observation ge 27 then ObsID = byte(observation+64-26); * upper case *;
   if observation le 26 then ObsID = byte(observation+96); * lower case *;
   keep Dbh Height Age Grav Weight ldbh lweight obsid;
datalines; run;

proc print data=one; TITLE2 'Raw data print'; run;

options ls=95 ps=61; proc plot data=one; plot weight*Dbh=obsid;
 TITLE2 'Scatter plot'; run;
options ps=256 ls=85;

proc means data=one n mean max min std stderr;
     TITLE2 'Raw data means';
     var Dbh Height Age Grav Weight; run;

proc univariate data=one normal plot;
      TITLE2 'Raw data Univariate analysis';
      var Weight Dbh; run;

proc reg data=one LINEPRINTER; ID ObsID DBH;
   TITLE2 'Simple linear regression';
   model Weight = Dbh / clb alpha=0.01;  *** p xpx i influence CLI CLM;
      Slope:Test DBH = 180;
      Joint:TEST intercept = 0, DBH = 180;
   run; options ls=78 ps=45;
   plot residual.*predicted.=obsid / VREF=0; run;
   OUTPUT OUT=NEXT1 P=Predicted R=Resid cookd=cooksd dffits=dffits
   STUDENT=student rstudent=rstudent lclm=lclm uclm=uclm lcl=lcl ucl=ucl;
run;
options ps=61 ls=95;
proc print data=next1;
   TITLE3 'Listing of observation diagnostics';
   var ObsId DBH Weight Predicted Resid student rstudent; run;
proc print data=next1;
   TITLE3 'Listing of observation diagnostics';
   var ObsId cooksd dffits lclm uclm lcl ucl; run;
options ps=512 ls=85;

proc univariate data=next1 normal plot; var Resid;
    TITLE3 'Residual analysis'; run;

options ls=95 ps=61; proc plot data=one; plot weight*Dbh=obsid;
 TITLE2 'Scatter plot'; run;
options ps=512 ls=85;
```

```
ods html close;
ods rtf close;
run;
quit;
1          dm'log;clear;output;clear';
2          options ps=512 ls=120 nocenter nodate nonumber FORMCHAR="|----|+|---+=|-
/\<>*";
3          TITLE1 'Appendix02:  Estimating tree harvest weights';
4
5          ODS HTML style=minimal body='C:\SAS\Appendix02 Slr-Trees.HTML' ;
NOTE: Writing HTML Body file: C:\SAS\Appendix02 Slr-Trees.HTML
6          ODS rtf style=minimal body='C:\SAS\Appendix02 Slr-Trees.RTF' ;
NOTE: Writing RTF Body file: C:\SAS\Appendix02 Slr-Trees.RTF
7          filename input1 'C:\SAS\Appendix02 Slr-Trees.csv';
8          FILENAME OUT1'C:\SAS\Appendix02 Slr-Trees.CGM';
9          FILENAME OUT2'C:\SAS\Appendix02 Slr-Trees.CGM';
10
11         ********************************************;
12         *** Data from Freund & Wilson (1993)        ***;
13         *** TABLE 8.24 : ESTIMATING TREE WEIGHTS    ***;
14         ********************************************;
15
16         data one; infile input1 missover DSD dlm="," firstobs=2;
17           input ObsNo Dbh Height Age Grav Weight;
18         ********** label ObsNo  = 'Original observation number'
19                           Dbh    = 'Diameter at breast height (inches)'
20                           Height = 'Height of the tree (feet)'
21                           Age    = 'Age of the tree (years)'
22                           Grav   = 'Specific gravity of the wood'
23                           Weight = 'Harvest weight of the tree (lbs)'
24                           ObsId  = 'Identification letter added to dataset';
25            lweight = log(weight);
26            ldbh = log(DBH);
27            observation + 1;
28            if observation ge 27 then ObsID = byte(observation+64-26); * upper case
*;
29            if observation le 26 then ObsID = byte(observation+96); * lower case *;
30            keep Dbh Height Age Grav Weight ldbh lweight obsid;
31         datalines;
NOTE: The infile INPUT1 is:
      Filename=C:\SAS\Appendix02 Slr-Trees.csv, RECFM=V,LRECL=256,
      File Size (bytes)=1125, Last Modified=18Jan2009:19:36:54,
      Create Time=20Dec2009:11:35:59
NOTE: 47 records were read from the infile INPUT1.
      The minimum record length was 19.
      The maximum record length was 24.
NOTE: The data set WORK.ONE has 47 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.04 seconds
31       !            run;
33         proc print data=one; TITLE2 'Raw data print'; run;
NOTE: There were 47 observations read from the data set WORK.ONE.
NOTE: The PROCEDURE PRINT printed page 1.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.26 seconds
      cpu time            0.07 seconds

EXST7015: Estimating tree weights from other morphometric variables
Raw data print

      Obs                                          Obs
Obs    No    Dbh   Height   Age    Grav   Weight   ID    lweight     ldbh
```

```
  1     1    5.7     34      10   0.409     174     a    5.15906   1.74047
  2     2    8.1     68      17   0.501     745     b    6.61338   2.09186
  3     3    8.3     70      17   0.445     814     c    6.70196   2.11626
  4     4    7.0     54      17   0.442     408     d    6.01127   1.94591
  5     5    6.2     37      12   0.353     226     e    5.42053   1.82455
  6     6   11.4     79      27   0.429    1675     f    7.42357   2.43361
  7     7   11.6     70      26   0.497    1491     g    7.30720   2.45101
  8     8    4.5     37      12   0.380     121     h    4.79579   1.50408
  9     9    3.5     32      15   0.420      58     i    4.06044   1.25276
. . .
 46    46    5.2     47      13   0.432     194     T    5.26786   1.64866
 47    47    3.7     33      13   0.389      66     U    4.18965   1.30833
35          options ls=95 ps=61; proc plot data=one; plot weight*Dbh=obsid;
36           TITLE2 'Scatter plot'; run;
37          options ps=256 ls=85;
38
NOTE: There were 47 observations read from the data set WORK.ONE.
NOTE: The PROCEDURE PLOT printed page 2.
NOTE: PROCEDURE PLOT used (Total process time):
      real time           0.14 seconds
      cpu time            0.00 seconds

EXST7015: Estimating tree weights from other morphometric variables
Scatter plot
```



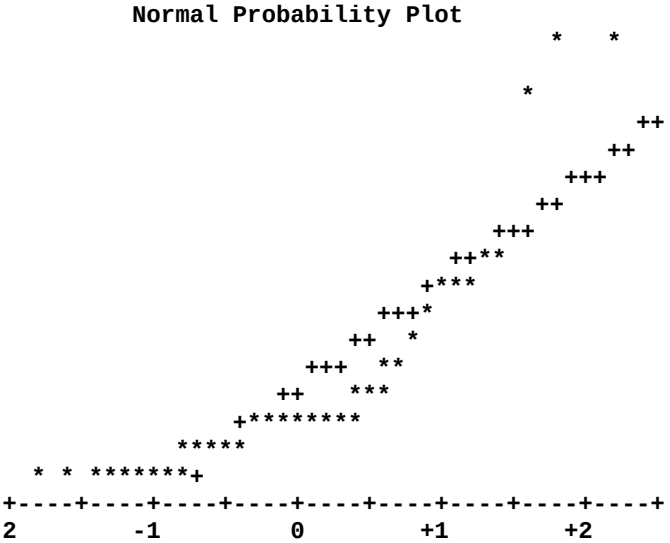

```
NOTE: 11 obs hidden.

39          proc means data=one n mean max min std stderr;
40               TITLE2 'Raw data means';
41               var Dbh Height Age Grav Weight; run;
NOTE: There were 47 observations read from the data set WORK.ONE.
NOTE: The PROCEDURE MEANS printed page 3.
```

```
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.28 seconds
      cpu time            0.04 seconds

EXST7015: Estimating tree weights from other morphometric variables
Raw data means

The MEANS Procedure
```

Variable	N	Mean	Maximum	Minimum	Variance	Std Dev	Std Error
Dbh	47	6.1531915	12.1000000	3.5000000	4.4016744	2.0980168	0.3060272
Height	47	49.5957447	79.0000000	27.0000000	167.6808511	12.9491641	1.8888297
Age	47	16.9574468	27.0000000	10.0000000	26.9111933	5.1876000	0.7566892
Grav	47	0.4452979	0.5080000	0.3530000	0.0014853	0.0385402	0.0056217
Weight	47	369.3404255	1692.00	58.0000000	154916.75	393.5946534	57.4116808

```
43         proc univariate data=one normal plot;
44               TITLE2 'Raw data Univariate analysis';
45               var Weight Dbh; run;
NOTE: The PROCEDURE UNIVARIATE printed pages 4-5.
NOTE: PROCEDURE UNIVARIATE used (Total process time):
      real time           0.31 seconds
      cpu time            0.09 seconds

Appendix02:  Estimating tree harvest weights
Raw data Univariate analysis

The UNIVARIATE Procedure
Variable:  Weight

Moments
N                          47    Sum Weights                 47
Mean                 369.340426    Sum Observations         17359
Std Deviation        393.594653    Variance            154916.751
Skewness             2.20870748    Kurtosis            4.83581557
Uncorrected SS         13537551    Corrected SS        7126170.55
Coeff Variation      106.566903    Std Error Mean      57.4116808

Basic Statistical Measures
    Location                     Variability
Mean     369.3404     Std Deviation          393.59465
Median   224.0000     Variance                  154917
Mode      84.0000     Range                       1634
                      Interquartile Range    341.00000

Note: The mode displayed is the smallest of 3 modes with a count of 2.

Tests for Location: Mu0=0
Test            -Statistic-    -----p Value------
Student's t     t  6.433193    Pr > |t|    <.0001
Sign            M      23.5    Pr >= |M|   <.0001
Signed Rank     S       564    Pr >= |S|   <.0001

Tests for Normality
Test                    --Statistic---    -----p Value------
Shapiro-Wilk            W     0.710878    Pr < W     <0.0001
Kolmogorov-Smirnov      D      0.24806    Pr > D     <0.0100
Cramer-von Mises        W-Sq   0.77793    Pr > W-Sq  <0.0050
Anderson-Darling        A-Sq  4.435579    Pr > A-Sq  <0.0050

Quantiles (Definition 5)
Quantile      Estimate
```

```
100% Max          1692
99%               1692
95%               1491
90%                814
75% Q3             462
50% Median         224
25% Q1             121
10%                 74
5%                  66
1%                  58
0% Min              58

Extreme Observations
----Lowest----        ----Highest---
Value      Obs        Value      Obs
   58        9          814        3
   60       16          815       26
   66       47         1491        7
   70       35         1675        6
   74       18         1692       17

   Stem Leaf  Boxplot
     16 89                     2     *
     15
     14 9                      1     *
     13
     12
     11
     10
      9
      8 12                     2     |
      7 147                    3     |
      6 1                      1     |
      5 24                     2     |
      4 16                     2  +-----+
      3 00144                  5  |  +  |
      2 001112233488          12  *-----*
      1 00222799               8  +-----+
      0 667778889              9     |
        ----+----+----+----+
    Multiply Stem.Leaf by 10**+2
```



Appendix02: Estimating tree harvest weights
Raw data Univariate analysis

The UNIVARIATE Procedure
Variable: Dbh

Moments

N	47	Sum Weights	47
Mean	6.15319149	Sum Observations	289.2
Std Deviation	2.09801677	Variance	4.40167438
Skewness	1.17285986	Kurtosis	1.18369068
Uncorrected SS	1981.98	Corrected SS	202.477021
Coeff Variation	34.0963998	Std Error Mean	0.3060272

Basic Statistical Measures

Location		Variability	
Mean	6.153191	Std Deviation	2.09802
Median	5.700000	Variance	4.40167
Mode	4.000000	Range	8.60000
		Interquartile Range	2.90000

Note: The mode displayed is the smallest of 2 modes with a count of 4.

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	20.10668	Pr > |t|	<.0001
Sign	M	23.5	Pr >= |M|	<.0001
Signed Rank	S	564	Pr >= |S|	<.0001

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.89407	Pr < W	0.0005
Kolmogorov-Smirnov	D	0.171951	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.214712	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	1.387777	Pr > A-Sq	<0.0050

Quantiles (Definition 5)

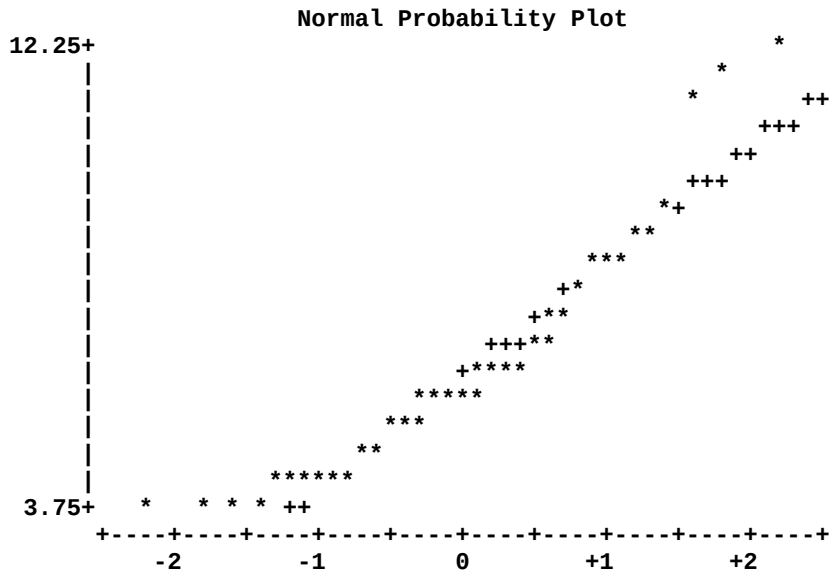
Quantile	Estimate
100% Max	12.1
99%	12.1
95%	11.4
90%	8.8
75% Q3	7.4
50% Median	5.7
25% Q1	4.5
10%	4.0
5%	3.7
1%	3.5
0% Min	3.5

Extreme Observations

----Lowest----		----Highest---	
Value	Obs	Value	Obs
3.5	9	8.8	26
3.7	47	9.3	20
3.7	35	11.4	6
3.9	37	11.6	7
4.0	44	12.1	17

Stem Leaf Boxplot

```
 12 1                        1     0
 11 6                        1     |
 11 4                        1     |
 10                                |
 10                                |
  9                                |
  9 3                        1     |
  8 68                       2     |
  8 013                      3     |
  7 78                       2     |
  7 04                       2  +-----+
  6 57                       2  |     |
  6 0011122                  7  |  +  |
  5 5666677                  7  *-----*
  5 0224                     4  |     |
  4 555                      3  +-----+
  4 0000233                  7     |
  3 5779                     4     |
    ----+----+----+----+
```




```
47       proc reg data=one LINEPRINTER; ID ObsID DBH;
48          TITLE2 'Simple linear regression';
49          model Weight = Dbh / clb alpha=0.01;  *** p xpx i influence CLI
CLM;
50               Slope:Test DBH = 180;
51               Joint:TEST intercept = 0, DBH = 180; run; options ls=78
ps=45;
53          plot residual.*predicted.=obsid / VREF=0; run;
54          OUTPUT OUT=NEXT1 P=Predicted R=Resid cookd=cooksd dffits=dffits
55          STUDENT=student rstudent=rstudent lclm=lclm uclm=uclm lcl=lcl
ucl=ucl;
56         run;
57         options ps=61 ls=95;
NOTE: The data set WORK.NEXT1 has 47 observations and 18 variables.
NOTE: The PROCEDURE REG printed pages 6-9.
NOTE: PROCEDURE REG used (Total process time):
      real time           0.59 seconds
      cpu time            0.28 seconds
```

Appendix02: Estimating tree harvest weights
Simple linear regression

The REG Procedure
Model: MODEL1
Dependent Variable: Weight

Number of Observations Read 47
Number of Observations Used 47

Analysis of Variance Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	6455980	6455980	433.49	<.0001
Error	45	670191	14893		
Corrected Total	46	7126171			

Root MSE	122.03740	R-Square	0.9060
Dependent Mean	369.34043	Adj R-Sq	0.9039
Coeff Var	33.04198		

Parameter Estimates

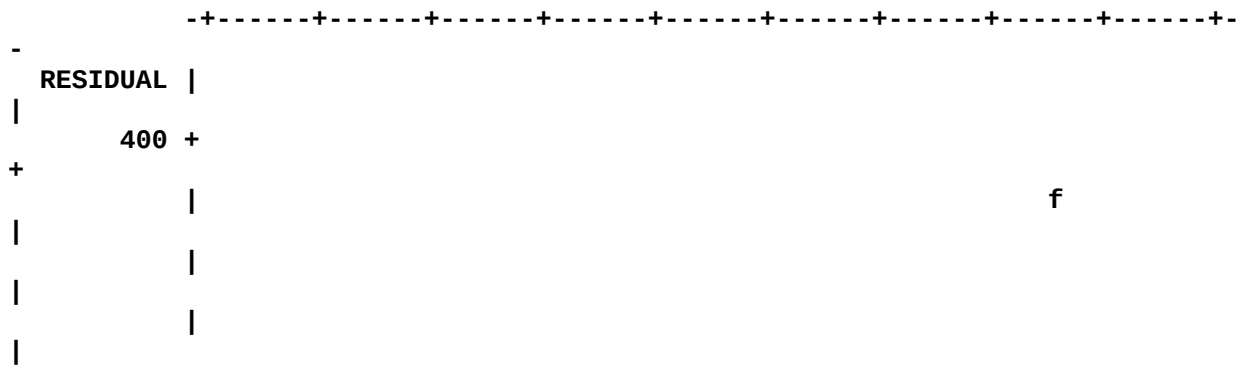
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	99% Confidence Limits
Intercept	1	-729.39630	55.69366	-13.10	<.0001	-879.18914 - 579.60346
Dbh	1	178.56371	8.57640	20.82	<.0001	155.49675 201.63067

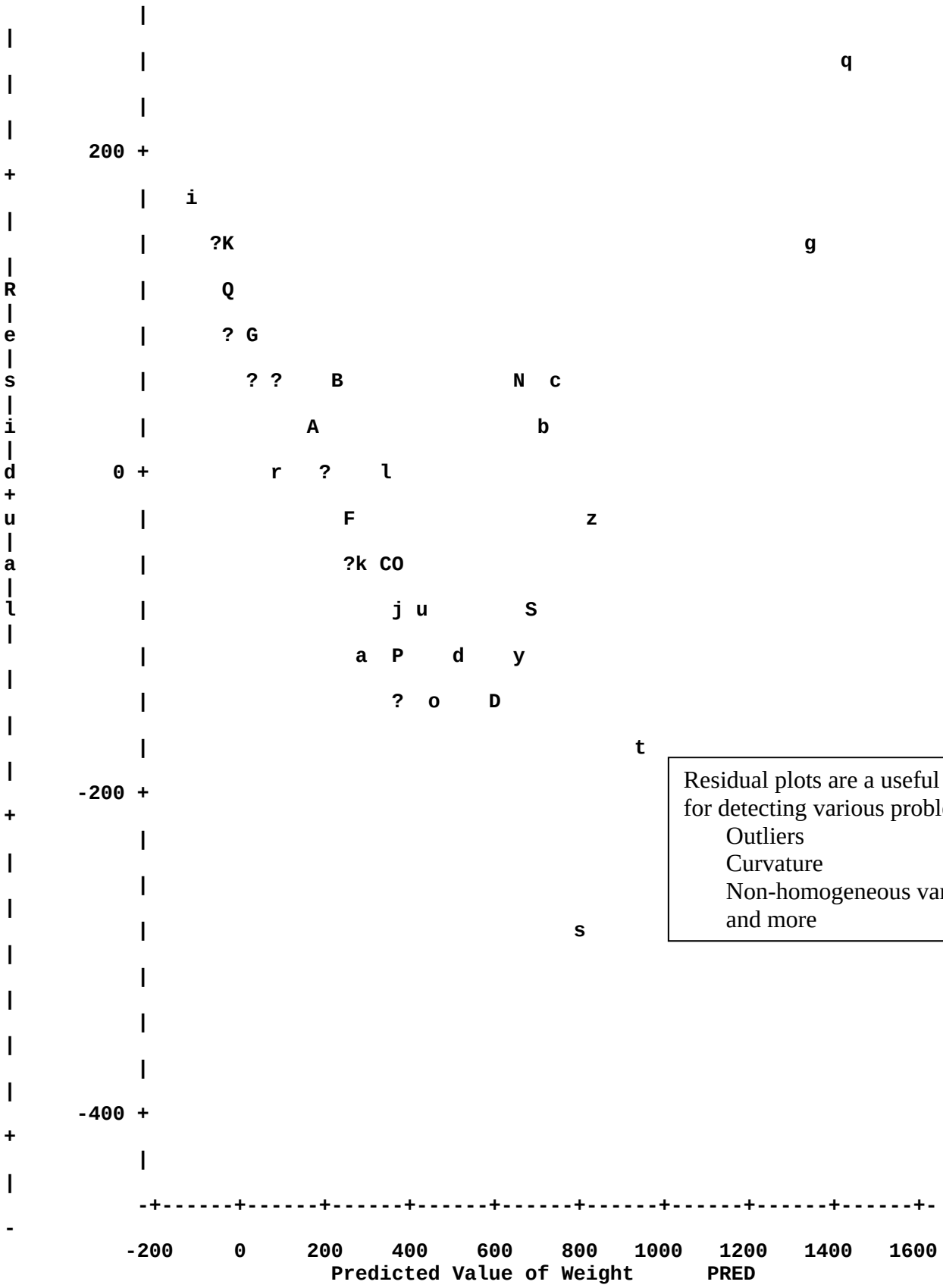
Test Slope Results for Dependent Variable Weight

Source	DF	Mean Square	F Value	Pr > F
Numerator	1	417.69334	0.03	0.8678
Denominator	45	14893		

Test Joint Results for Dependent Variable Weight

Source	DF	Mean Square	F Value	Pr > F
Numerator	2	12807462	859.96	<.0001
Denominator	45	14893		





Residual plots are a useful tool for detecting various problems
- Outliers
- Curvature
- Non-homogeneous variance

and more

```
58         proc print data=next1;
59            TITLE3 'Listing of observation diagnostics';
60            var ObsId DBH Weight Predicted Resid student rstudent; run;
NOTE: There were 47 observations read from the data set WORK.NEXT1.
NOTE: The PROCEDURE PRINT printed page 10.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.13 seconds
      cpu time            0.03 seconds

Appendix02:  Estimating tree harvest weights
Simple linear regression
Listing of observation diagnostics
```

Obs	Obs ID	Dbh	Weight	Predicted	Resid	student	rstudent
1	a	5.7	174	288.42	-114.417	-0.94818	-0.94710
2	b	8.1	745	716.97	28.030	0.23442	0.23194
3	c	8.3	814	752.68	61.317	0.51389	0.50965
4	d	7.0	408	520.55	-112.550	-0.93392	-0.93256
5	e	6.2	226	377.70	-151.699	-1.25650	-1.26484
6	f	11.4	1675	1306.23	368.770	3.29162	3.73546
7	g	11.6	1491	1341.94	149.057	1.33889	1.35112
8	h	4.5	121	74.14	46.860	0.39083	0.38712
9	i	3.5	58	-104.42	162.423	1.36987	1.38372
10	j	6.2	278	377.70	-99.699	-0.82579	-0.82282
11	k	5.7	220	288.42	-68.417	-0.56698	-0.56266
12	l	6.0	342	341.99	0.014	0.00012	0.00011
13	m	5.6	209	270.56	-61.560	-0.51029	-0.50605
14	n	4.0	84	-15.14	99.141	0.83095	0.82804
15	o	6.7	313	466.98	-153.981	-1.27635	-1.28558
16	p	4.0	60	-15.14	75.141	0.62979	0.62552
17	q	12.1	1692	1431.22	260.775	2.38302	2.52082
18	r	4.5	74	74.14	-0.140	-0.00117	-0.00116
19	s	8.6	515	806.25	-291.252	-2.44967	-2.60199
20	t	9.3	766	931.25	-165.246	-1.40424	-1.42001
21	u	6.5	345	431.27	-86.268	-0.71476	-0.71082
22	v	5.6	210	270.56	-60.560	-0.50200	-0.49778
23	w	4.3	100	38.43	61.572	0.51447	0.51022
24	x	4.5	122	74.14	47.860	0.39917	0.39541
25	y	7.7	539	645.54	-106.544	-0.88786	-0.88573
26	z	8.8	815	841.96	-26.964	-0.22740	-0.22498
27	A	5.0	194	163.42	30.578	0.25412	0.25146
28	B	5.4	280	234.85	45.152	0.37452	0.37092
29	C	6.0	296	341.99	-45.986	-0.38092	-0.37727
30	D	7.4	462	591.98	-129.975	-1.08081	-1.08288
31	E	5.6	200	270.56	-70.560	-0.58489	-0.58057
32	F	5.5	229	252.70	-23.704	-0.19655	-0.19444
33	G	4.3	125	38.43	86.572	0.72336	0.71947
34	H	4.2	84	20.57	63.429	0.53050	0.52622
35	I	3.7	70	-68.71	138.711	1.16676	1.17159
36	J	6.1	224	359.84	-135.842	-1.12516	-1.12858
37	K	3.9	99	-33.00	131.998	1.10759	1.11046
38	L	5.2	200	199.14	0.865	0.00718	0.00710
39	M	5.6	214	270.56	-56.560	-0.46884	-0.46474
40	N	7.8	712	663.40	48.599	0.40532	0.40153
41	O	6.1	297	359.84	-62.842	-0.52051	-0.51625
42	P	6.1	238	359.84	-121.842	-1.00920	-1.00941
43	Q	4.0	89	-15.14	104.141	0.87285	0.87050
44	R	4.0	76	-15.14	91.141	0.76389	0.76031
45	S	8.0	614	699.11	-85.113	-0.71112	-0.70716
46	T	5.2	194	199.14	-5.135	-0.04263	-0.04215

```
 47     U      3.7       66        -68.71     134.711     1.13312     1.13679


61         proc print data=next1;
62            TITLE3 'Listing of observation diagnostics';
63            var ObsId cooksd dffits lclm uclm lcl ucl; run;
NOTE: There were 47 observations read from the data set WORK.NEXT1.
NOTE: The PROCEDURE PRINT printed page 11.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.12 seconds
      cpu time            0.03 seconds
64         options ps=512 ls=85;
```

Appendix02: Estimating tree harvest weights
Simple linear regression
Listing of observation diagnostics

Obs	Obs ID	cooksd	dffits	lclm	uclm	lcl	ucl
1	a	0.01025	-0.14301	239.41	337.42	-43.45	620.28
2	b	0.00114	0.04734	651.33	782.61	382.24	1051.70
3	c	0.00608	0.10939	683.80	821.56	417.30	1088.06
4	d	0.01110	-0.14877	468.84	572.26	188.27	852.83
5	e	0.01717	-0.18654	329.81	425.59	45.99	709.40
6	f	1.01075	1.61350	1176.08	1436.38	953.14	1659.32
7	g	0.18073	0.60670	1207.49	1476.40	987.24	1696.64
8	h	0.00275	0.07348	12.93	135.35	-259.75	408.03
9	i	0.05571	0.33716	-182.13	-26.72	-441.73	232.88
10	j	0.00742	-0.12135	329.81	425.59	45.99	709.40
11	k	0.00366	-0.08496	239.41	337.42	-43.45	620.28
12	l	0.00000	0.00002	293.98	389.99	10.26	673.71
13	m	0.00304	-0.07728	221.01	320.11	-61.39	602.51
14	n	0.01596	0.17801	-84.13	53.84	-350.54	320.26
15	o	0.01896	-0.19616	417.47	516.49	135.04	798.92
16	p	0.00917	0.13447	-84.13	53.84	-350.54	320.26
17	q	0.69191	1.24438	1285.93	1576.51	1072.28	1790.17
18	r	0.00000	-0.00022	12.93	135.35	-259.75	408.03
19	s	0.16073	-0.60223	732.24	880.26	469.78	1142.72
20	t	0.07442	-0.39013	844.29	1018.20	591.69	1270.80
21	u	0.00571	-0.10629	382.73	479.81	99.47	763.07
22	v	0.00294	-0.07602	221.01	320.11	-61.39	602.51
23	w	0.00526	0.10174	-25.76	102.61	-296.02	372.87
24	x	0.00287	0.07505	12.93	135.35	-259.75	408.03
25	y	0.01349	-0.16386	585.83	705.25	311.93	979.16
26	z	0.00153	-0.05473	764.38	919.55	504.69	1179.24
27	A	0.00092	0.04256	108.65	218.19	-169.35	496.19
28	B	0.00173	0.05826	183.92	285.78	-97.31	567.01
29	C	0.00159	-0.05578	293.98	389.99	10.26	673.71
30	D	0.01742	-0.18699	536.12	647.83	259.03	924.92
31	E	0.00399	-0.08866	221.01	320.11	-61.39	602.51
32	F	0.00046	-0.03009	202.51	302.90	-79.34	584.75
33	G	0.01040	0.14346	-25.76	102.61	-296.02	372.87
34	H	0.00588	0.10758	-45.17	86.31	-314.18	355.32
35	I	0.03658	0.27160	-142.83	5.41	-405.21	267.79
36	J	0.01377	-0.16646	311.95	407.74	28.14	691.55
37	K	0.02981	0.24481	-103.66	37.67	-368.75	302.75
38	L	0.00000	0.00115	146.45	251.82	-133.30	531.57
39	M	0.00256	-0.07097	221.01	320.11	-61.39	602.51
40	N	0.00295	0.07610	602.28	724.52	329.53	997.27
41	O	0.00295	-0.07614	311.95	407.74	28.14	691.55
42	P	0.01108	-0.14888	311.95	407.74	28.14	691.55
43	Q	0.01761	0.18714	-84.13	53.84	-350.54	320.26
44	R	0.01348	0.16345	-84.13	53.84	-350.54	320.26
45	S	0.01002	-0.14078	635.03	763.20	364.69	1033.54
46	T	0.00002	-0.00686	146.45	251.82	-133.30	531.57
47	U	0.03450	0.26353	-142.83	5.41	-405.21	267.79

```
66          proc univariate data=next1 normal plot; var Resid;
67              TITLE3 'Residual analysis'; run;
NOTE: The PROCEDURE UNIVARIATE printed page 12.
NOTE: PROCEDURE UNIVARIATE used (Total process time):
      real time           0.14 seconds
      cpu time            0.04 seconds
68
```

EXST7015: Estimating tree weights from other morphometric variables
Simple linear regression
Residual analysis

The UNIVARIATE Procedure
Variable: E (Residual)

Moments

N	47	Sum Weights	47
Mean	0	Sum Observations	0
Std Deviation	120.703619	Variance	14569.3637
Skewness	0.47869472	Kurtosis	1.04153074
Uncorrected SS	670190.732	Corrected SS	670190.732
Coeff Variation	.	Std Error Mean	17.6064324

Basic Statistical Measures

Location		Variability	
Mean	0.00000	Std Deviation	120.70362
Median	-0.14041	Variance	14569
Mode	.	Range	660.02160
		Interquartile Range	161.40929

Tests for Location: Mu0=0

Test	-Statistic-		-----p Value------	
Student's t	t	0	Pr > |t|	1.0000
Sign	M	-0.5	Pr >= |M|	1.0000
Signed Rank	S	-25	Pr >= |S|	0.7946

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.973389	Pr < W	0.3544
Kolmogorov-Smirnov	D	0.084574	Pr > D	>0.1500
Cramer-von Mises	W-Sq	0.044081	Pr > W-Sq	>0.2500
Anderson-Darling	A-Sq	0.354877	Pr > A-Sq	>0.2500

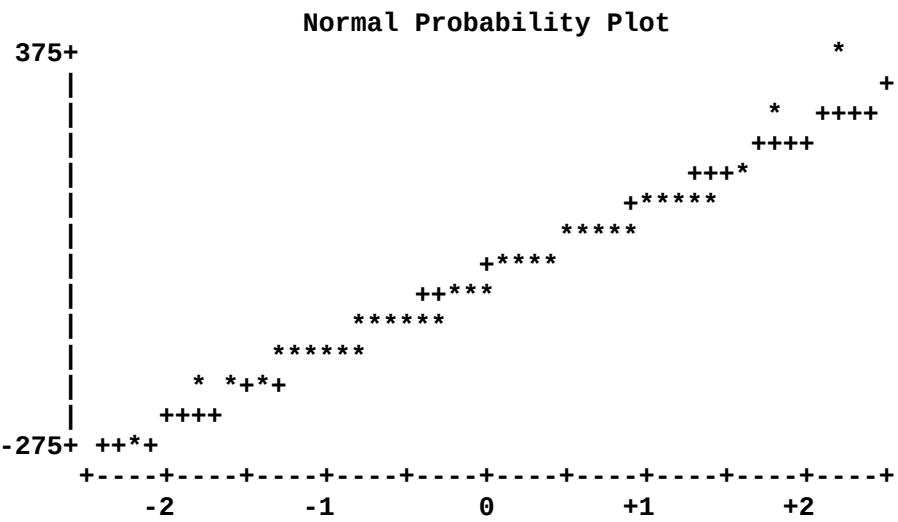
Quantiles (Definition 5)

Quantile	Estimate
100% Max	368.769960
99%	368.769960
95%	162.423301
90%	138.710558
75% Q3	75.141444
50% Median	-0.140413
25% Q1	-86.267841
10%	-135.842356
5%	-153.980584
1%	-291.251641
0% Min	-291.251641

Extreme Observations

------Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-291.252	19	138.711	35
-165.246	20	149.057	7
-153.981	15	162.423	9
-151.699	5	260.775	17

```
-135.842       36         368.770        6

   Stem Leaf                     #  Boxplot
      3 7                        1     0
      3
      2 6                        1     |
      2                              |
      1 56                       2     |
      1 00334                    5     |
      0 5555666899              10  +-----+
      0 0033                     4  |  +  |
     -0 3210                     4  *-----*
     -0 997766665                9  +-----+
     -1 4321110                  7     |
     -1 755                      3     |
     -2                             |
     -2 9                        1     |
        ----+----+----+----+
    Multiply Stem.Leaf by 10**+2
```




```
110        GOPTIONS DEVICE=CGMflwa GSFMODE=REPLACE GSFNAME=OUT NOPROMPT noROTATE
111           ftext='TimesRoman' ftitle='TimesRoman' htext=1 htitle=1 ctitle=black ctext=black;
112
113        GOPTIONS GSFNAME=OUT1;
114        FILENAME OUT1'C:\SAS\SLR-Trees1.CGM';
NOTE: There were 47 observations read from the data set WORK.ONE.
NOTE: The PROCEDURE PLOT printed page 14.
NOTE: PROCEDURE PLOT used:
      real time           0.09 seconds
      cpu time            0.04 seconds
115        PROC GPLOT DATA=ONE;
116           TITLE1 font='TimesRoman' H=1 'Simple Linear Regression Example';
117           TITLE2 font='TimesRoman' H=1 'Wood harvest from trees';
118         PLOT weight*Dbh=1 weight*Dbh=2 / overlay HAXIS=AXIS1 VAXIS=AXIS2;
119        AXIS1 LABEL=(font='TimesRoman' H=1 'Diameter at breast height (inches)') WIDTH=1
MINOR=(N=1)
120              VALUE=(font='TimesRoman' H=1) color=black ORDER=3 TO 13 BY 1;
121         AXIS2 LABEL=(ANGLE=90 font='TimesRoman' H=1 'Weight of wood harvested (lbs)') WIDTH=1
122                  VALUE=(font='TimesRoman' H=1) MINOR=(N=5) color=black ORDER=0 TO 1800 BY
200;
123            SYMBOL1 color=red  V=None I=RLcli99  L=1 MODE=INCLUDE;
124            SYMBOL2 color=blue V=dot  I=None     L=1 MODE=INCLUDE; RUN;
NOTE: Regression equation :  Weight = -729.3963 + 178.5637*Dbh.
```

```
NOTE: Foreground color BLACK same as background. Part of your graph may not be visible.
NOTE:  52 RECORDS WRITTEN TO C:\SAS\SLR-Trees1.CGM
125         **** V = "dot" would place a dot for each point;
126         **** I = for regression: R requests fitted regression line, L, Q or C requests Linear,
127              Quadraatic or cubic, CLM or CLI requests corresponding confidence interval and
128              95 specifies alpha level for CI (any value from 50 to 99);
129         **** I = for categories: requests STD (std dev) 1 (1 width, 2 or 3) M (of mean=std
err)
130              J (join means of bars) t (add top & bottom hash) p (use pooled variance);
131         **** Other options for categories: omit M=std dev, use B to get bar for min/max;
132         RUN:
NOTE: There were 47 observations read from the data set WORK.ONE.
NOTE: PROCEDURE GPLOT used:
      real time           0.22 seconds
      cpu time            0.10 second
```