

The UNIVARIATE Procedure
Variable: fixed_acidity

Moments			
N	1599	Sum Weights	1599
Mean	8.31963727	Sum Observations	13303.1
Std Deviation	1.74109632	Variance	3.03141639
Skewness	0.98275144	Kurtosis	1.1321434
Uncorrected SS	115521.17	Corrected SS	4844.20339
Coeff Variation	20.9275508	Std Error Mean	0.04354102

Basic Statistical Measures			
Location		Variability	
Mean	8.319637	Std Deviation	1.74110
Median	7.900000	Variance	3.03142
Mode	7.200000	Range	11.30000
		Interquartile Range	2.10000

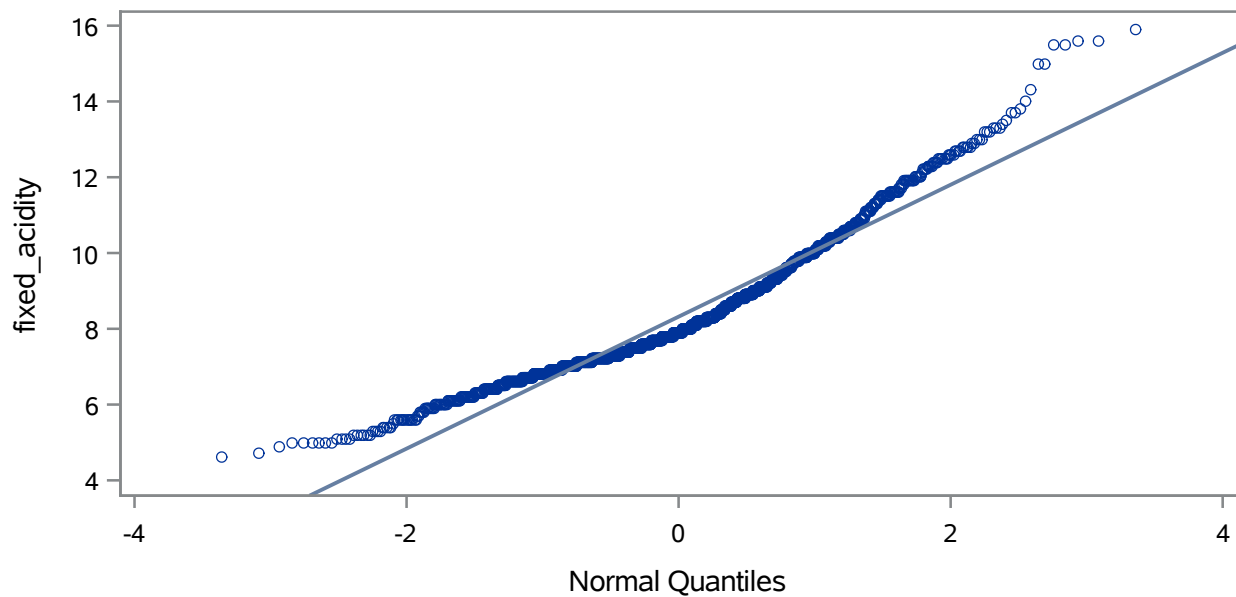
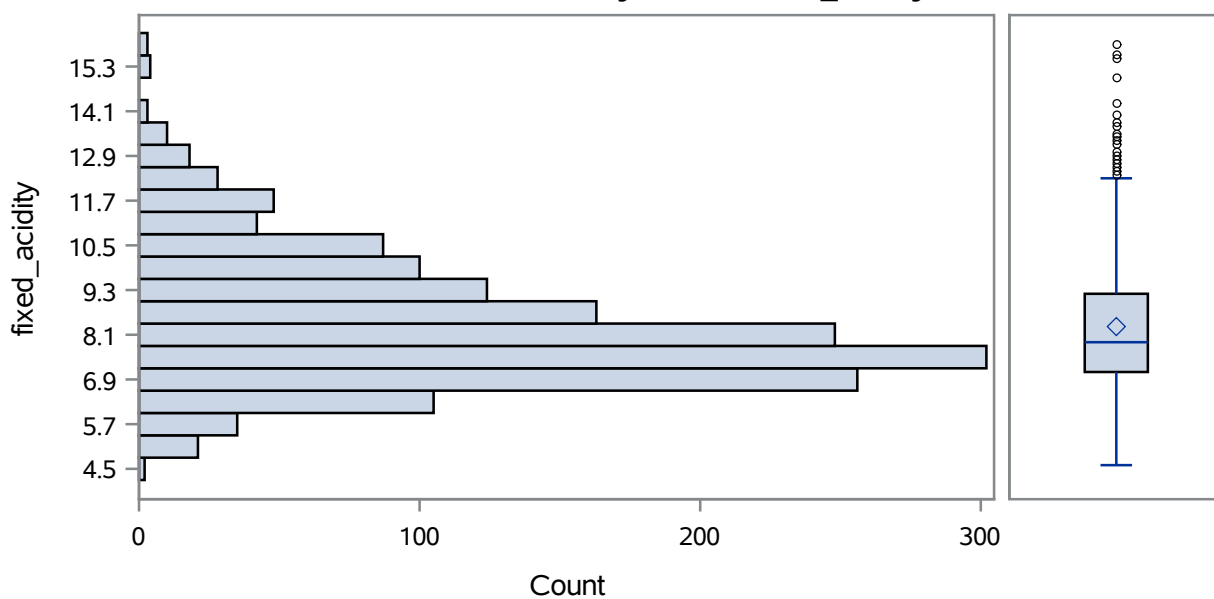
Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	191.0759	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	15.9
99%	13.3
95%	11.8
90%	10.7
75% Q3	9.2
50% Median	7.9
25% Q1	7.1
10%	6.5
5%	6.1
1%	5.2
0% Min	4.6

The UNIVARIATE Procedure
Variable: fixed_acidity

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
4.6	46	15.5	555
4.7	96	15.5	556
4.9	822	15.6	443
5.0	1322	15.6	558
5.0	1271	15.9	653

Distribution and Probability Plot for fixed_acidity



The UNIVARIATE Procedure
Variable: volatile_acidity

Moments			
N	1599	Sum Weights	1599
Mean	0.52782051	Sum Observations	843.985
Std Deviation	0.1790597	Variance	0.03206238
Skewness	0.67159257	Kurtosis	1.22554225
Uncorrected SS	496.708275	Corrected SS	51.2356795
Coeff Variation	33.9243549	Std Error Mean	0.00447789

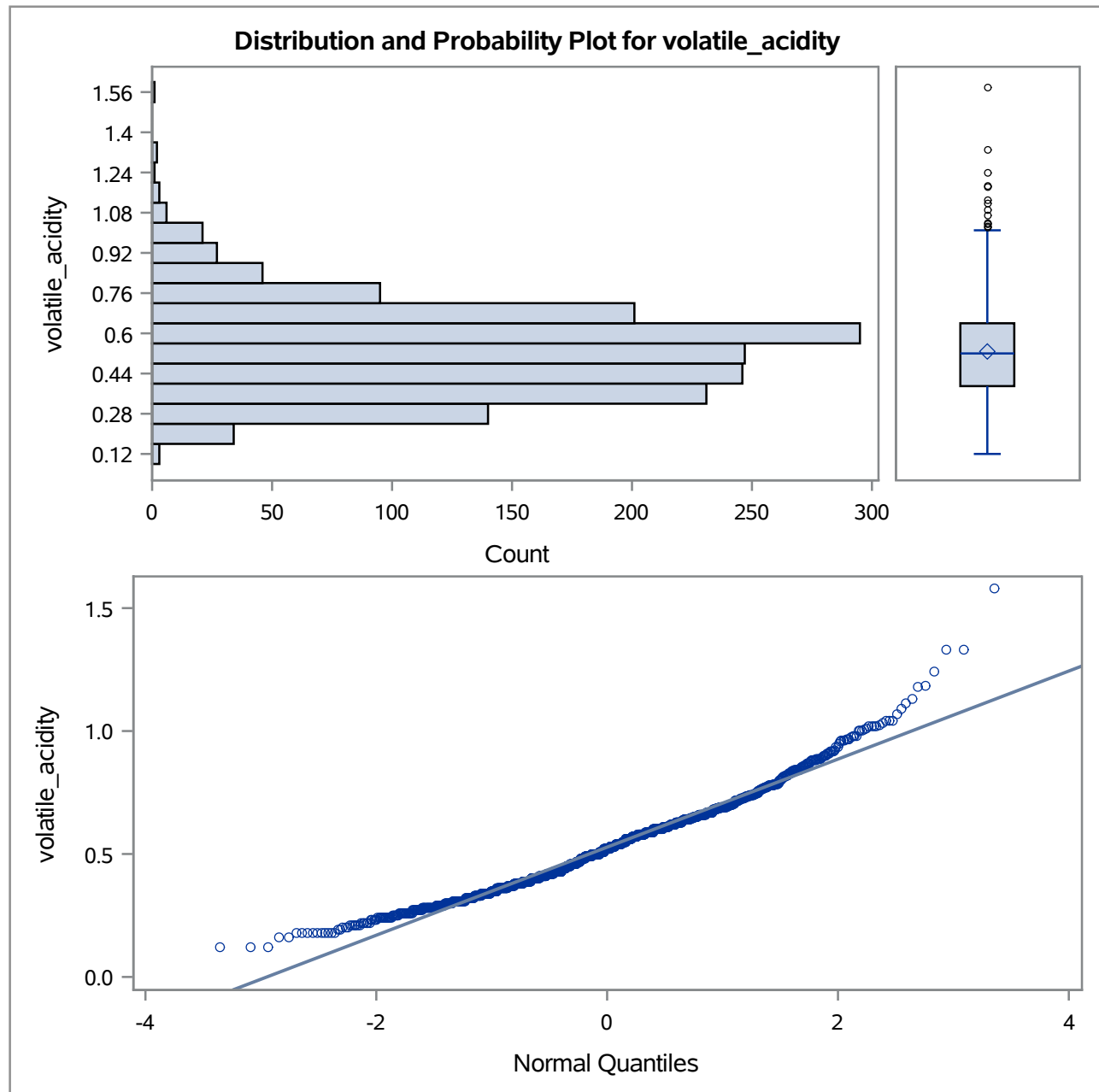
Basic Statistical Measures			
Location		Variability	
Mean	0.527821	Std Deviation	0.17906
Median	0.520000	Variance	0.03206
Mode	0.600000	Range	1.46000
		Interquartile Range	0.25000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	117.8725	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	1.580
99%	1.020
95%	0.840
90%	0.745
75% Q3	0.640
50% Median	0.520
25% Q1	0.390
10%	0.310
5%	0.270
1%	0.190
0% Min	0.120

The UNIVARIATE Procedure
Variable: volatile_acidity

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0.12	951	1.185	691
0.12	950	1.240	673
0.12	949	1.330	127
0.16	1567	1.330	128
0.16	1287	1.580	1300



The UNIVARIATE Procedure
Variable: citric_acid

Moments			
N	1599	Sum Weights	1599
Mean	0.27097561	Sum Observations	433.29
Std Deviation	0.19480114	Variance	0.03794748
Skewness	0.3183373	Kurtosis	-0.7889975
Uncorrected SS	178.0511	Corrected SS	60.640078
Coeff Variation	71.8888086	Std Error Mean	0.00487155

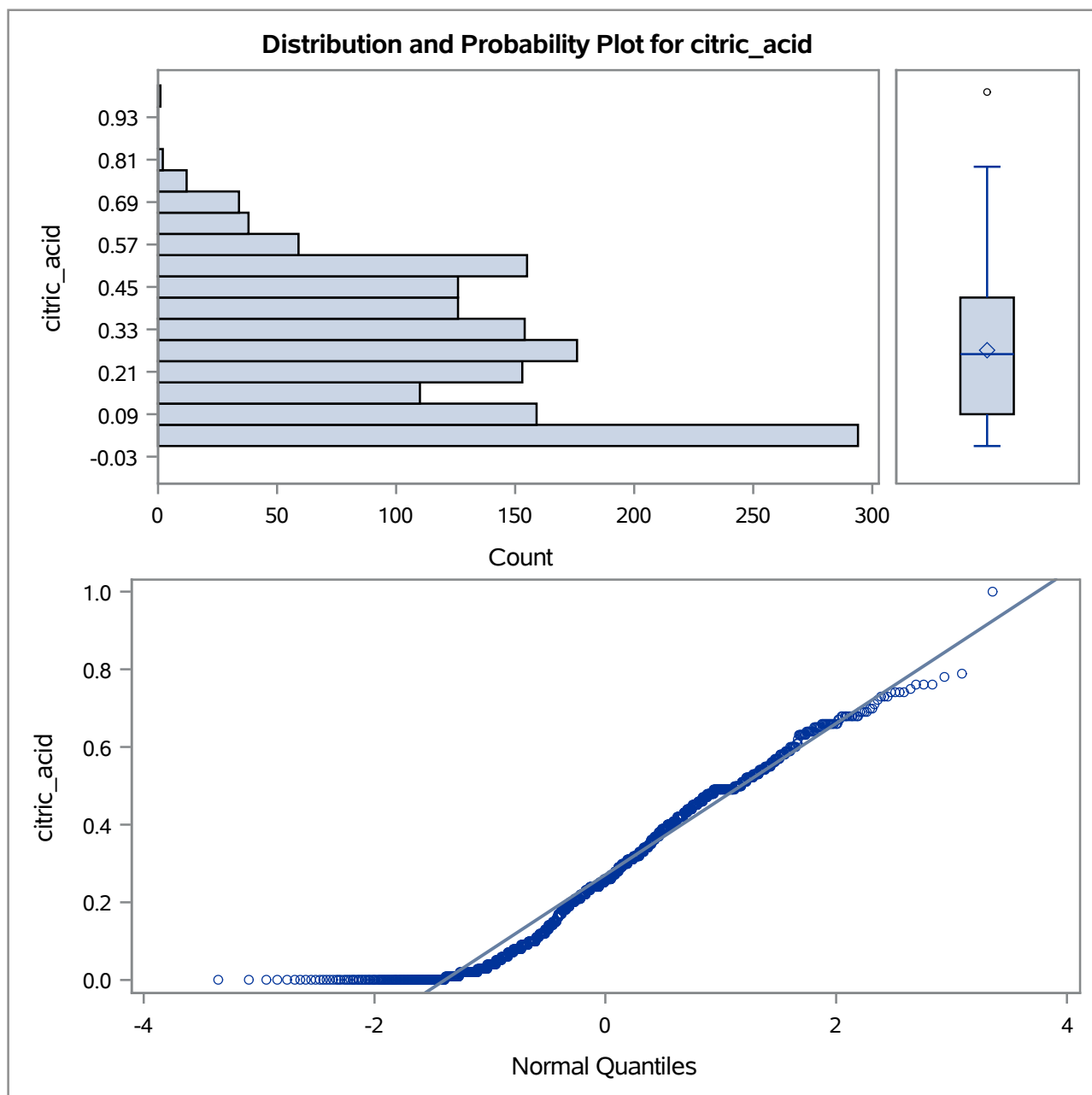
Basic Statistical Measures			
Location		Variability	
Mean	0.270976	Std Deviation	0.19480
Median	0.260000	Variance	0.03795
Mode	0.000000	Range	1.00000
		Interquartile Range	0.33000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	55.62409	Pr > t 	<.0001
Sign	M	733.5	Pr >= M 	<.0001
Signed Rank	S	538389	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	1.00
99%	0.71
95%	0.60
90%	0.53
75% Q3	0.42
50% Median	0.26
25% Q1	0.09
10%	0.01
5%	0.00
1%	0.00
0% Min	0.00

The UNIVARIATE Procedure
Variable: citric_acid

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0	1554	0.76	396
0	1552	0.76	443
0	1551	0.78	1575
0	1462	0.79	354
0	1456	1.00	152



The UNIVARIATE Procedure
Variable: residual_sugar

Moments			
N	1599	Sum Weights	1599
Mean	2.5388055	Sum Observations	4059.55
Std Deviation	1.40992806	Variance	1.98789713
Skewness	4.54065543	Kurtosis	28.6175954
Uncorrected SS	13483.0675	Corrected SS	3176.65962
Coeff Variation	55.5350954	Std Error Mean	0.03525922

Basic Statistical Measures			
Location		Variability	
Mean	2.538806	Std Deviation	1.40993
Median	2.200000	Variance	1.98790
Mode	2.000000	Range	14.60000
		Interquartile Range	0.70000

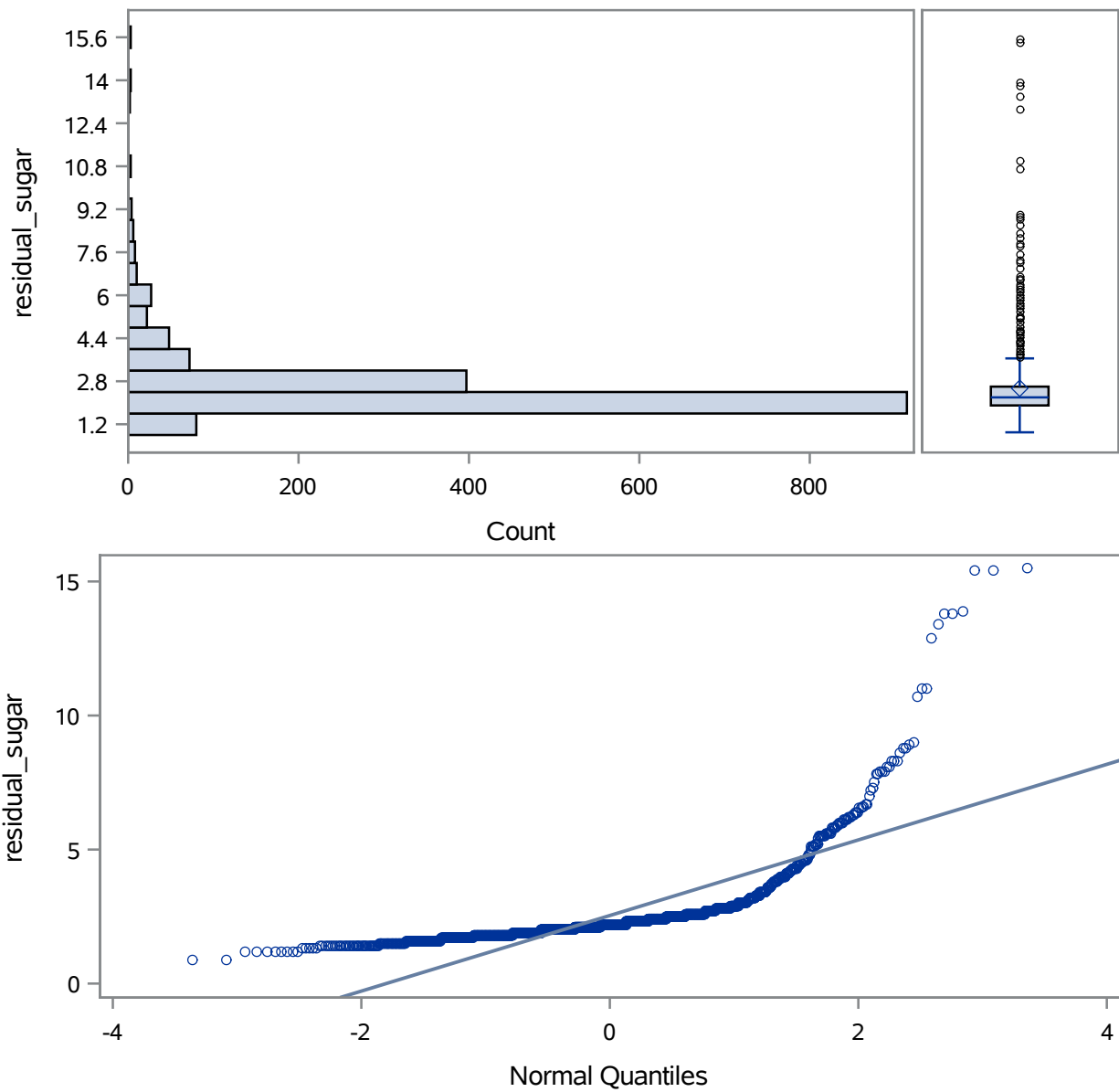
Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	72.00401	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	15.5
99%	8.6
95%	5.1
90%	3.6
75% Q3	2.6
50% Median	2.2
25% Q1	1.9
10%	1.7
5%	1.5
1%	1.4
0% Min	0.9

The UNIVARIATE Procedure
Variable: residual_sugar

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0.9	1019	13.8	1477
0.9	1018	13.9	1575
1.2	1375	15.4	1435
1.2	1322	15.4	1436
1.2	1317	15.5	481

Distribution and Probability Plot for residual_sugar



The UNIVARIATE Procedure
Variable: chlorides

Moments			
N	1599	Sum Weights	1599
Mean	0.08746654	Sum Observations	139.859
Std Deviation	0.0470653	Variance	0.00221514
Skewness	5.68034657	Kurtosis	41.7157872
Uncorrected SS	15.772781	Corrected SS	3.53979796
Coeff Variation	53.8094924	Std Error Mean	0.001177

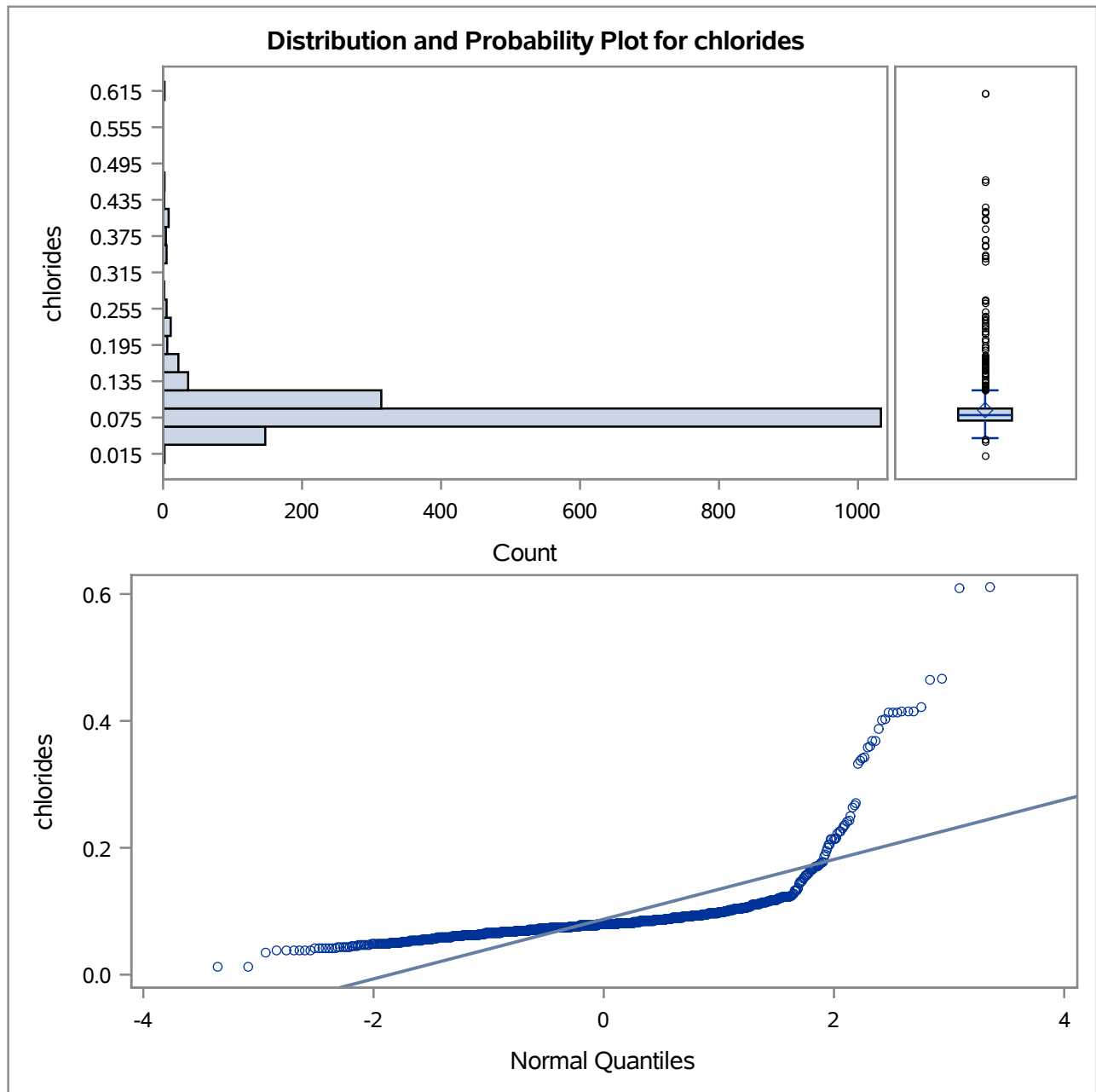
Basic Statistical Measures			
Location		Variability	
Mean	0.087467	Std Deviation	0.04707
Median	0.079000	Variance	0.00222
Mode	0.080000	Range	0.59900
		Interquartile Range	0.02000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	74.31309	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	0.611
99%	0.368
95%	0.127
90%	0.109
75% Q3	0.090
50% Median	0.079
25% Q1	0.070
10%	0.060
5%	0.054
1%	0.042
0% Min	0.012

The UNIVARIATE Procedure
Variable: chlorides

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0.012	838	0.422	693
0.012	837	0.464	82
0.034	696	0.467	107
0.038	1572	0.610	152
0.038	798	0.611	259



The UNIVARIATE Procedure
Variable: free_sulfur_dioxide

Moments			
N	1599	Sum Weights	1599
Mean	15.8749218	Sum Observations	25384
Std Deviation	10.460157	Variance	109.414884
Skewness	1.25056729	Kurtosis	2.02356205
Uncorrected SS	577814	Corrected SS	174844.984
Coeff Variation	65.891077	Std Error Mean	0.26158568

Basic Statistical Measures			
Location		Variability	
Mean	15.87492	Std Deviation	10.46016
Median	14.00000	Variance	109.41488
Mode	6.00000	Range	71.00000
		Interquartile Range	14.00000

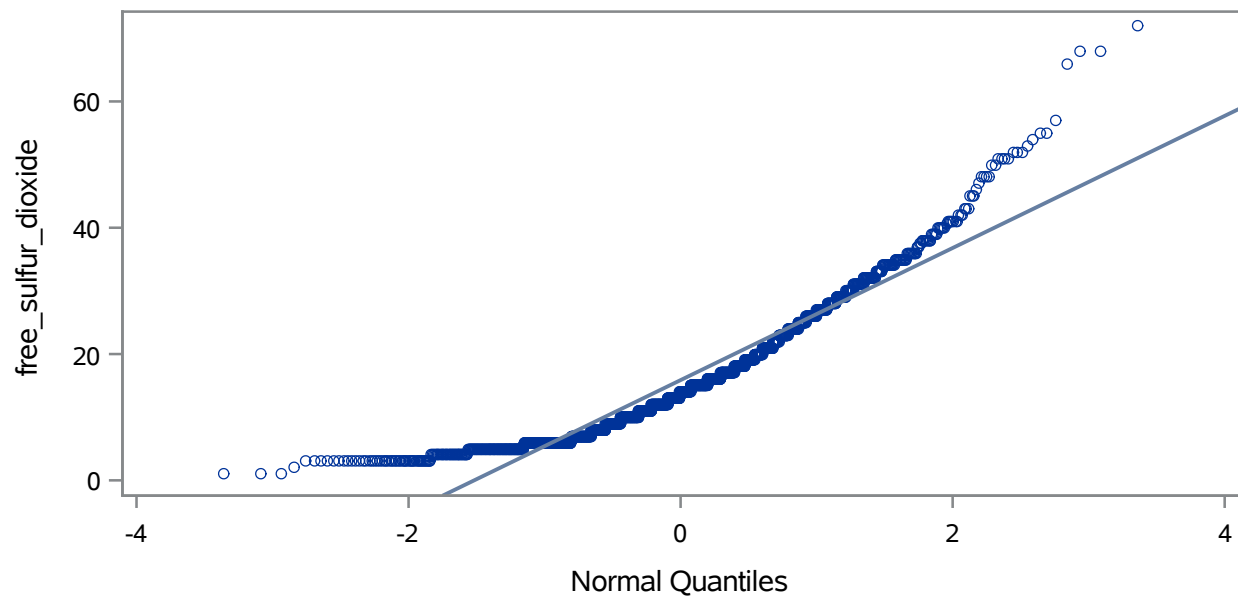
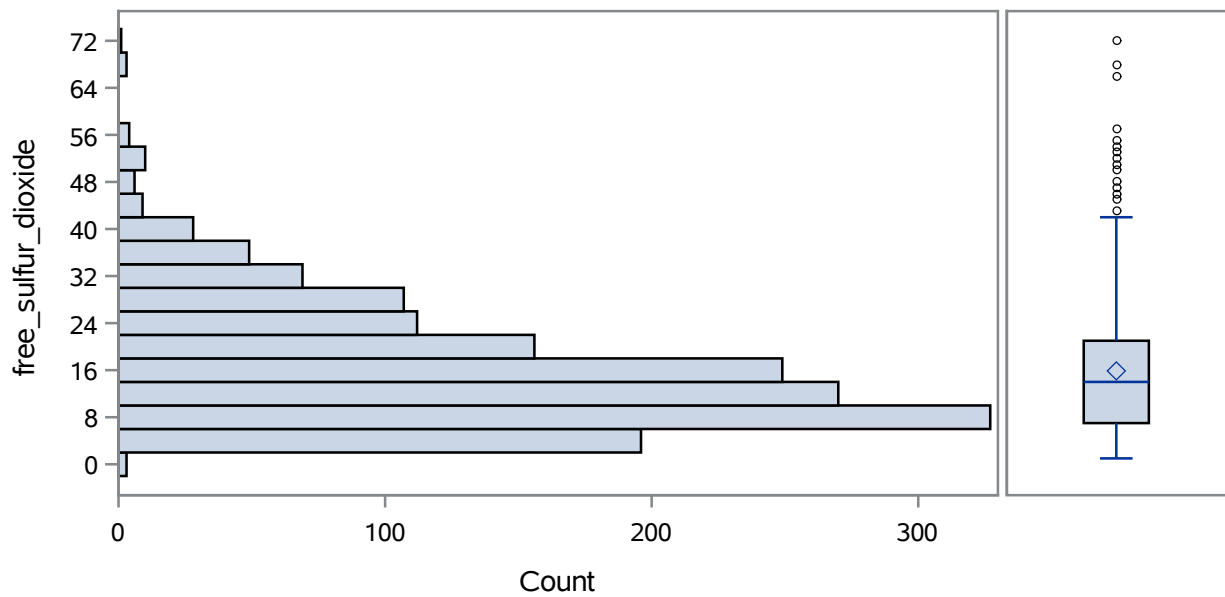
Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	60.68727	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	72
99%	51
95%	35
90%	31
75% Q3	21
50% Median	14
25% Q1	7
10%	5
5%	4
1%	3
0% Min	1

The UNIVARIATE Procedure
Variable: free_sulfur_dioxide

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
1	774	57	1132
1	536	66	1559
1	531	68	397
2	775	68	401
3	1483	72	1245

Distribution and Probability Plot for free_sulfur_dioxide



The UNIVARIATE Procedure
Variable: total_sulfur_dioxide

Moments			
N	1599	Sum Weights	1599
Mean	46.4677924	Sum Observations	74302
Std Deviation	32.8953245	Variance	1082.10237
Skewness	1.51553126	Kurtosis	3.80982449
Uncorrected SS	5181849.5	Corrected SS	1729199.59
Coeff Variation	70.7916662	Std Error Mean	0.82264023

Basic Statistical Measures			
Location		Variability	
Mean	46.46779	Std Deviation	32.89532
Median	38.00000	Variance	1082
Mode	28.00000	Range	283.00000
		Interquartile Range	40.00000

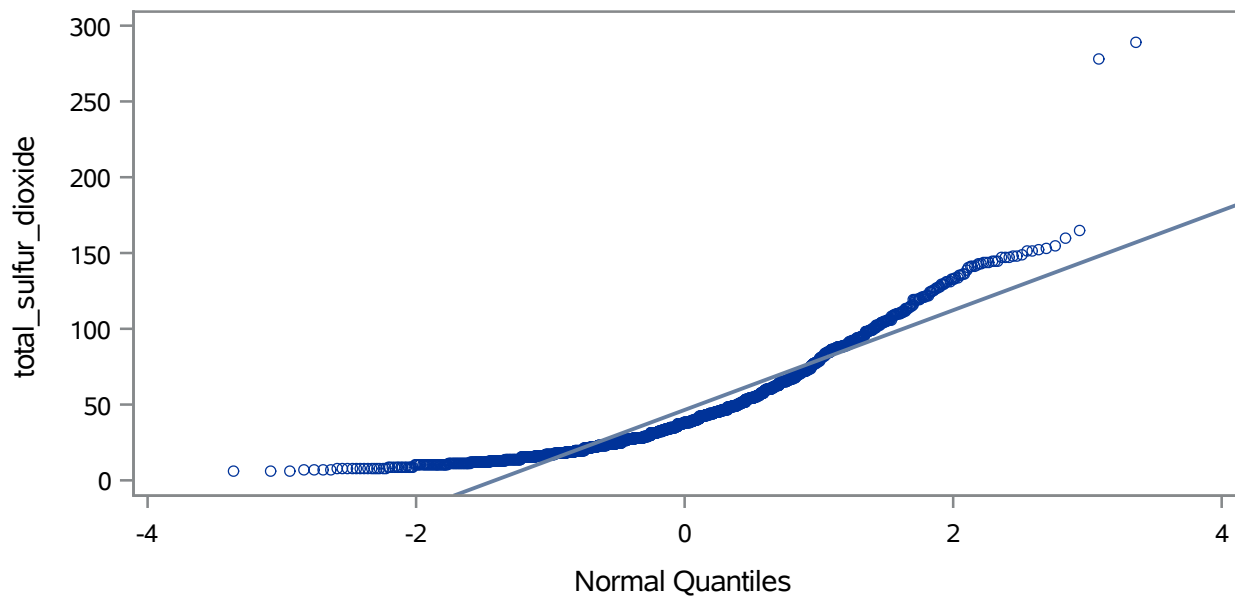
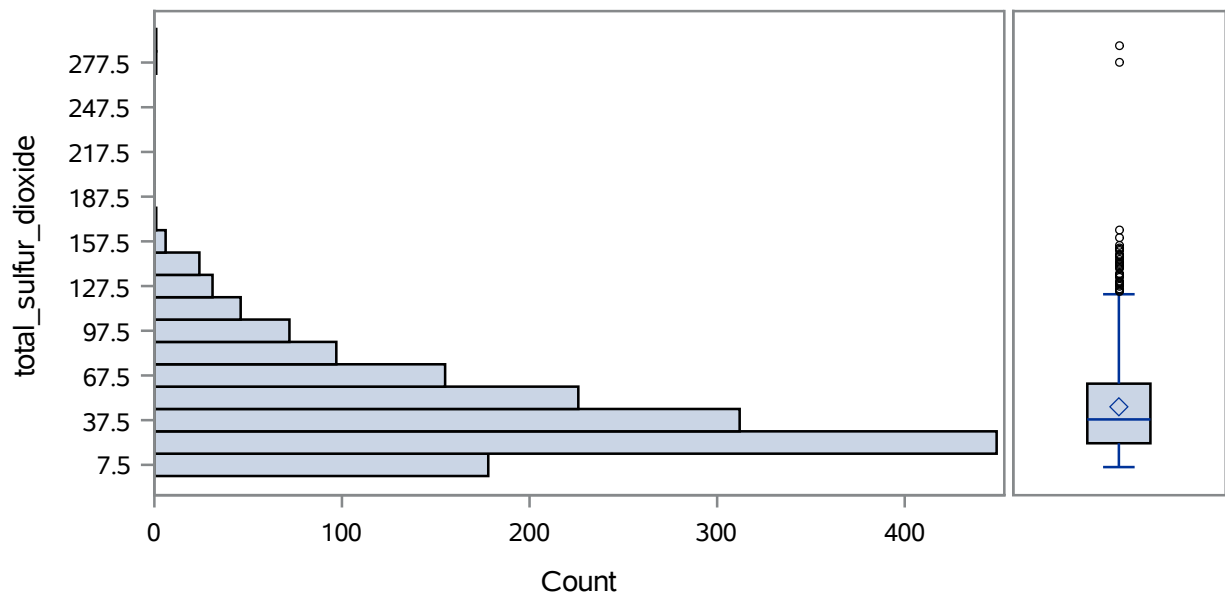
Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	56.48617	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	289
99%	145
95%	113
90%	94
75% Q3	62
50% Median	38
25% Q1	22
10%	14
5%	11
1%	8
0% Min	6

The UNIVARIATE Procedure
Variable: total_sulfur_dioxide

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
6	985	155	652
6	980	160	1245
6	916	165	355
7	1288	278	1080
7	1015	289	1082

Distribution and Probability Plot for total_sulfur_dioxide



The UNIVARIATE Procedure
Variable: density

Moments			
N	1599	Sum Weights	1599
Mean	0.99674668	Sum Observations	1593.79794
Std Deviation	0.00188733	Variance	3.56203E-6
Skewness	0.07128766	Kurtosis	0.93407907
Uncorrected SS	1588.6185	Corrected SS	0.00569212
Coeff Variation	0.18934941	Std Error Mean	0.0000472

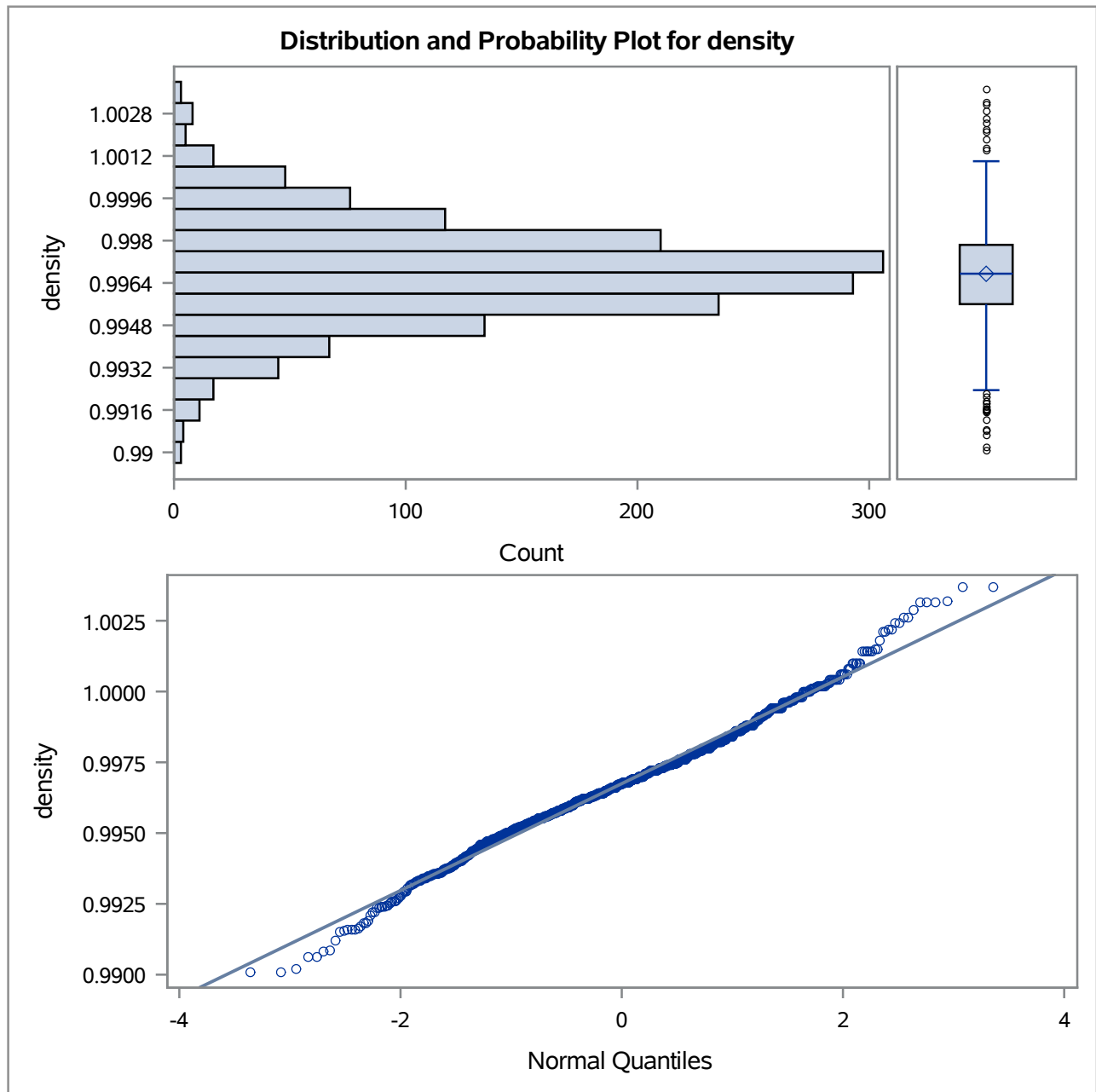
Basic Statistical Measures			
Location		Variability	
Mean	0.996747	Std Deviation	0.00189
Median	0.996750	Variance	3.56203E-6
Mode	0.997200	Range	0.01362
		Interquartile Range	0.00224

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	21118.36	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	1.00369
99%	1.00180
95%	1.00000
90%	0.99914
75% Q3	0.99784
50% Median	0.99675
25% Q1	0.99560
10%	0.99454
5%	0.99358
1%	0.99182
0% Min	0.99007

The UNIVARIATE Procedure
Variable: density

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0.99007	1019	1.00315	556
0.99007	1018	1.00315	558
0.99020	1115	1.00320	443
0.99064	838	1.00369	1435
0.99064	837	1.00369	1436



The UNIVARIATE Procedure
Variable: pH

Moments			
N	1599	Sum Weights	1599
Mean	3.3111132	Sum Observations	5294.47
Std Deviation	0.15438646	Variance	0.02383518
Skewness	0.1936835	Kurtosis	0.80694251
Uncorrected SS	17568.6781	Corrected SS	38.0886185
Coeff Variation	4.66267553	Std Error Mean	0.00386087

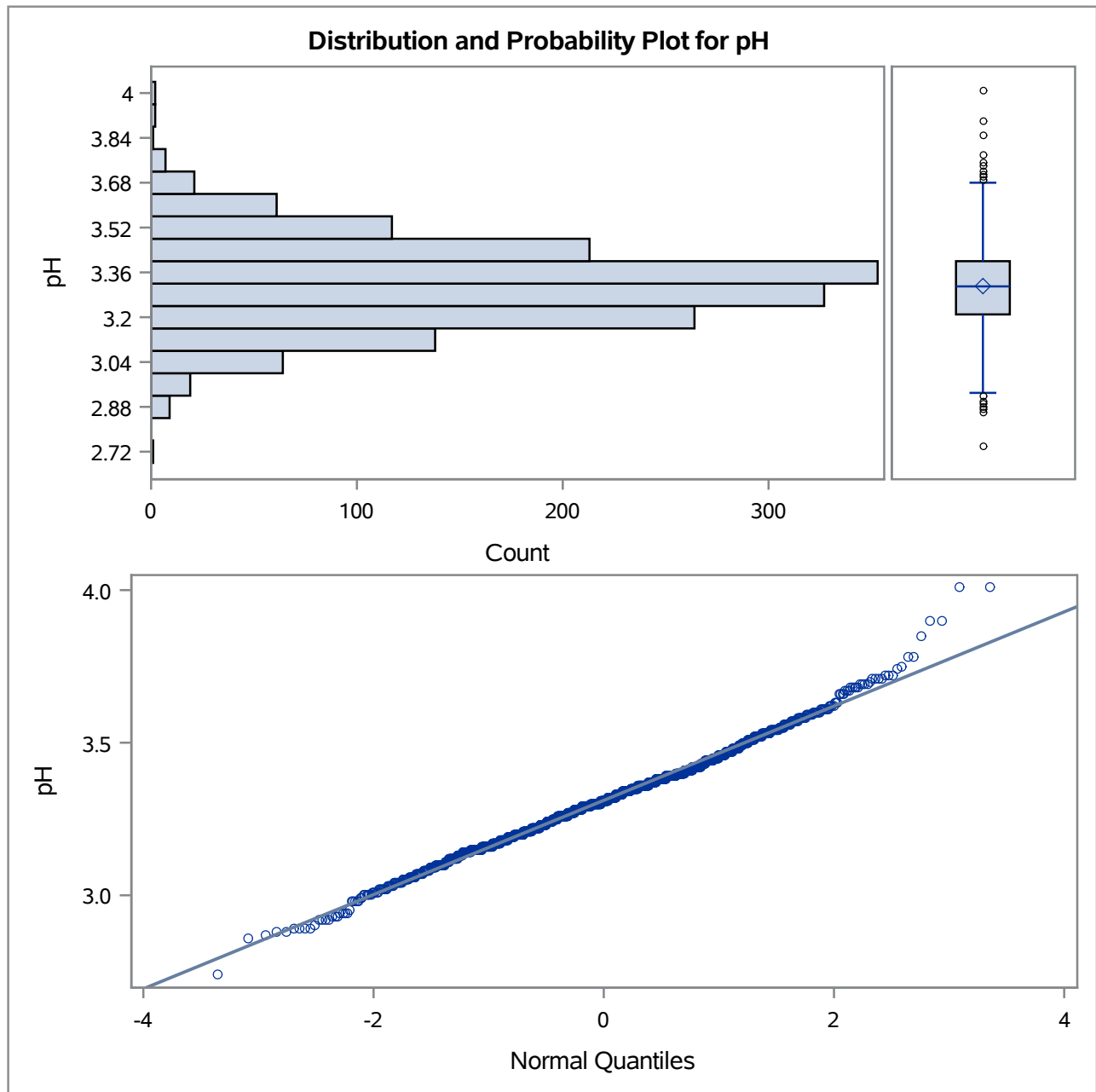
Basic Statistical Measures			
Location		Variability	
Mean	3.311113	Std Deviation	0.15439
Median	3.310000	Variance	0.02384
Mode	3.300000	Range	1.27000
		Interquartile Range	0.19000

Tests for Location: $\mu_0=0$				
Test	Statistic		p Value	
Student's t	t	857.6084	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	4.01
99%	3.71
95%	3.57
90%	3.51
75% Q3	3.40
50% Median	3.31
25% Q1	3.21
10%	3.12
5%	3.06
1%	2.93
0% Min	2.74

The UNIVARIATE Procedure
Variable: pH

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
2.74	152	3.85	96
2.86	545	3.90	46
2.87	615	3.90	696
2.88	1471	4.01	1317
2.88	441	4.01	1322



The UNIVARIATE Procedure
Variable: Sulphates

Moments			
N	1599	Sum Weights	1599
Mean	0.65814884	Sum Observations	1052.38
Std Deviation	0.16950698	Variance	0.02873262
Skewness	2.42867235	Kurtosis	11.7202507
Uncorrected SS	738.5374	Corrected SS	45.9147206
Coeff Variation	25.7551132	Std Error Mean	0.004239

Basic Statistical Measures			
Location		Variability	
Mean	0.658149	Std Deviation	0.16951
Median	0.620000	Variance	0.02873
Mode	0.600000	Range	1.67000
		Interquartile Range	0.18000

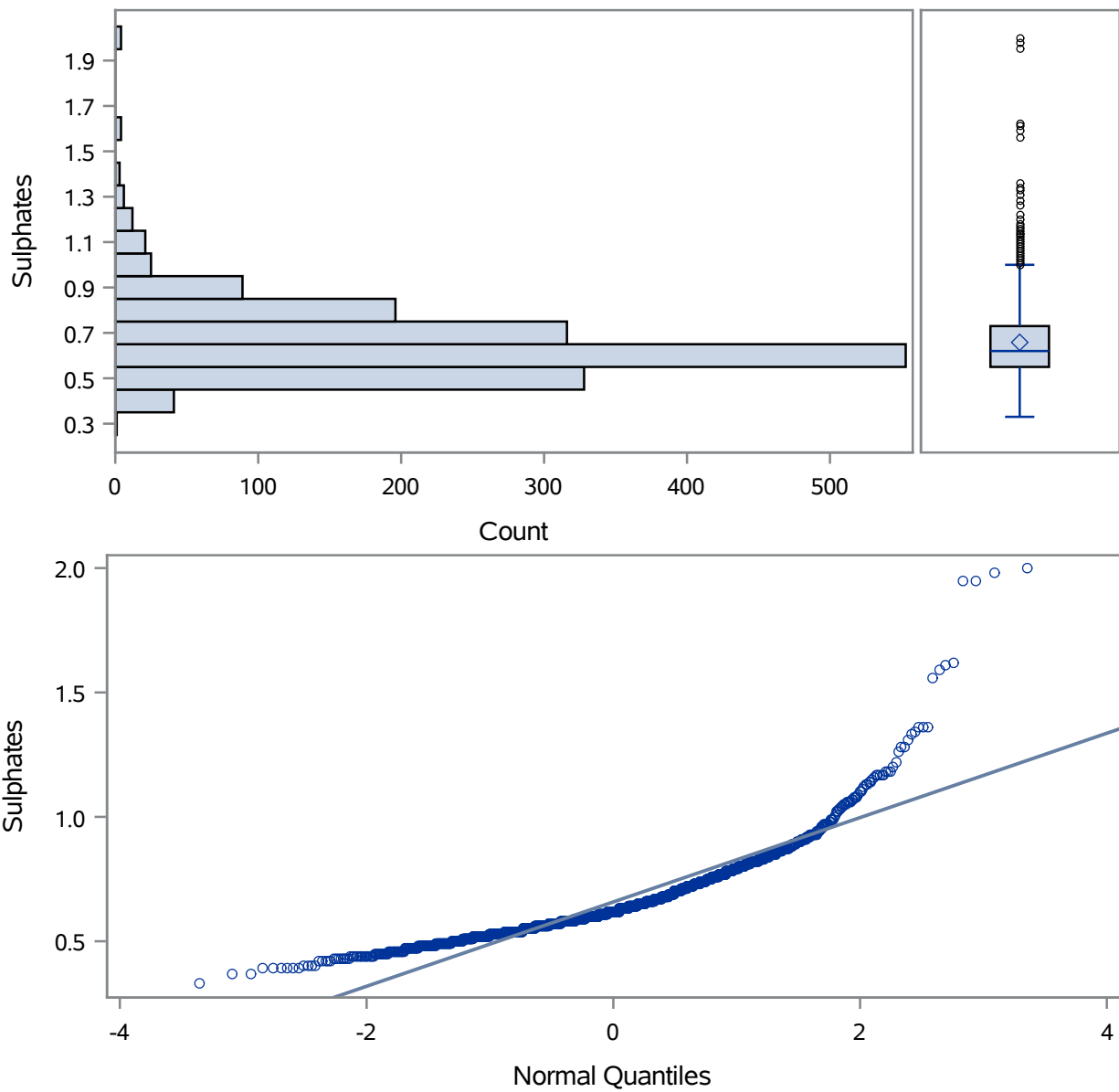
Tests for Location: $\mu_0=0$				
Test	Statistic		p Value	
Student's t	t	155.2604	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	2.00
99%	1.28
95%	0.93
90%	0.85
75% Q3	0.73
50% Median	0.62
25% Q1	0.55
10%	0.50
5%	0.47
1%	0.42
0% Min	0.33

The UNIVARIATE Procedure
Variable: Sulphates

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0.33	171	1.62	724
0.37	1370	1.95	87
0.37	1288	1.95	92
0.39	1349	1.98	93
0.39	1348	2.00	152

Distribution and Probability Plot for Sulphates



The UNIVARIATE Procedure
Variable: alcohol

Moments			
N	1599	Sum Weights	1599
Mean	10.4229831	Sum Observations	16666.35
Std Deviation	1.06566758	Variance	1.1356474
Skewness	0.86082881	Kurtosis	0.20002931
Uncorrected SS	175527.849	Corrected SS	1814.76454
Coeff Variation	10.224209	Std Error Mean	0.02665002

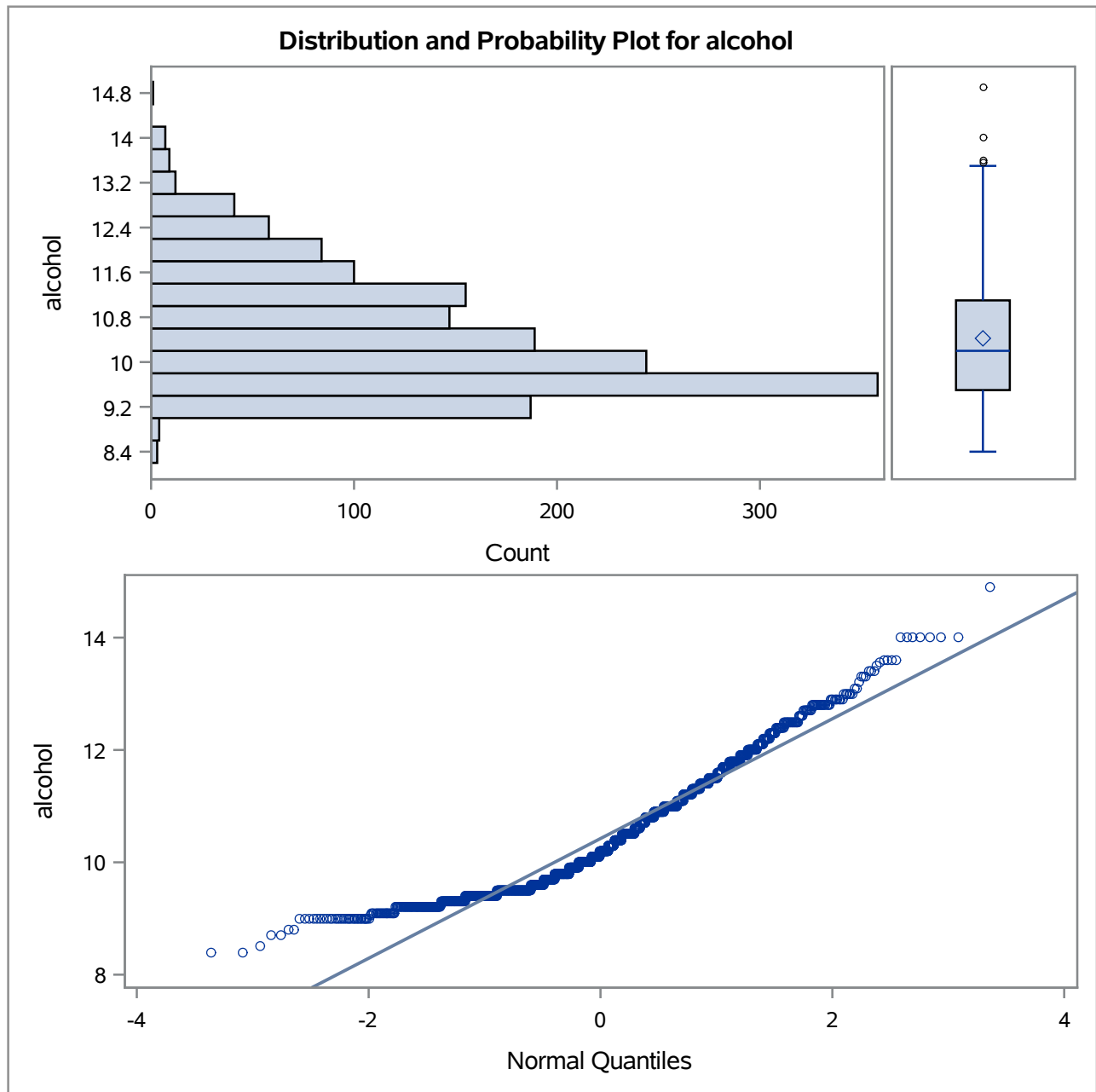
Basic Statistical Measures			
Location		Variability	
Mean	10.42298	Std Deviation	1.06567
Median	10.20000	Variance	1.13565
Mode	9.50000	Range	6.50000
		Interquartile Range	1.60000

Tests for Location: $\mu_0=0$				
Test	Statistic		p Value	
Student's t	t	391.106	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	14.9
99%	13.4
95%	12.5
90%	12.0
75% Q3	11.1
50% Median	10.2
25% Q1	9.5
10%	9.3
5%	9.2
1%	9.0
0% Min	8.4

The UNIVARIATE Procedure
Variable: alcohol

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
8.4	545	14.0	589
8.4	518	14.0	822
8.5	1437	14.0	1270
8.7	529	14.0	1271
8.7	372	14.9	653



The UNIVARIATE Procedure
Variable: quality

Moments			
N	1599	Sum Weights	1599
Mean	5.63602251	Sum Observations	9012
Std Deviation	0.80756944	Variance	0.6521684
Skewness	0.21780158	Kurtosis	0.29670812
Uncorrected SS	51834	Corrected SS	1042.1651
Coeff Variation	14.3287121	Std Error Mean	0.02019555

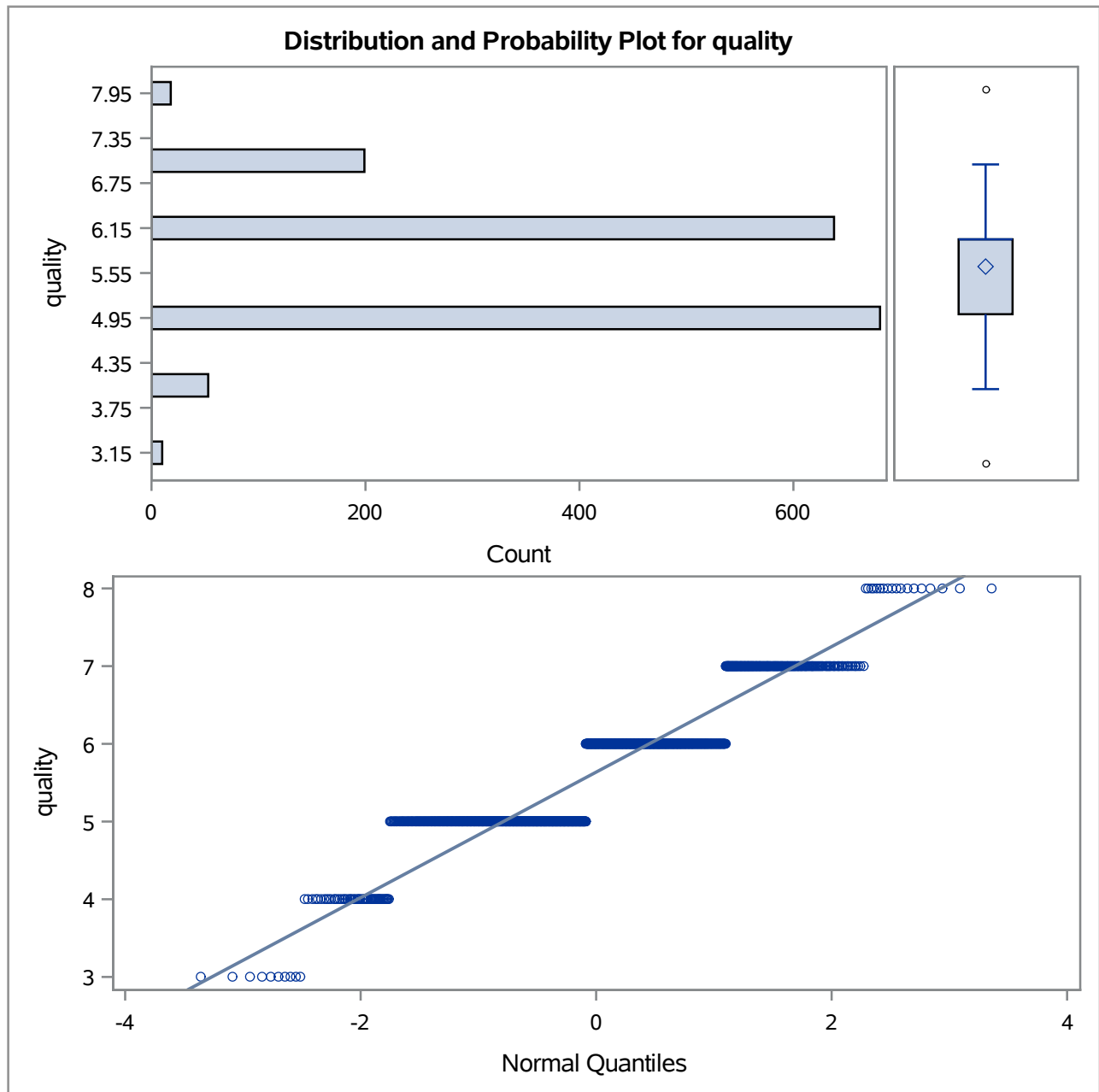
Basic Statistical Measures			
Location		Variability	
Mean	5.636023	Std Deviation	0.80757
Median	6.000000	Variance	0.65217
Mode	5.000000	Range	5.00000
		Interquartile Range	1.00000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	279.0725	Pr > t 	<.0001
Sign	M	799.5	Pr >= M 	<.0001
Signed Rank	S	639600	Pr >= S 	<.0001

Quantiles (Definition 5)	
Level	Quantile
100% Max	8
99%	8
95%	7
90%	7
75% Q3	6
50% Median	6
25% Q1	5
10%	5
5%	5
1%	4
0% Min	3

The UNIVARIATE Procedure
Variable: quality

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
3	1506	8	1203
3	1479	8	1270
3	1470	8	1404
3	1375	8	1450
3	1300	8	1550



The GLM Procedure

Class Level Information		
Class	Levels	Values
fixed_acidity	96	4.6 4.7 4.9 5 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 6 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 7 7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 8 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 9 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 10 10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 11 11.1 11.2 11.3 11.4 11.5 11.6 11.7 11.8 11.9 12 12.1 12.2 12.3 12.4 12.5 12.6 12.7 12.8 12.9 13 13.2 13.3 13.4 13.5 13.7 13.8 14 14.3 15 15.5 15.6 15.9
volatile_acidity	143	0.12 0.16 0.18 0.19 0.2 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.295 0.3 0.305 0.31 0.315 0.32 0.33 0.34 0.35 0.36 0.365 0.37 0.38 0.39 0.395 0.4 0.41 0.415 0.42 0.43 0.44 0.45 0.46 0.47 0.475 0.48 0.49 0.5 0.51 0.52 0.53 0.54 0.545 0.55 0.56 0.565 0.57 0.575 0.58 0.585 0.59 0.595 0.6 0.605 0.61 0.615 0.62 0.625 0.63 0.635 0.64 0.645 0.65 0.655 0.66 0.665 0.67 0.675 0.68 0.685 0.69 0.695 0.7 0.705 0.71 0.715 0.72 0.725 0.73 0.735 0.74 0.745 0.75 0.755 0.76 0.765 0.77 0.775 0.78 0.785 0.79 0.795 0.8 0.805 0.81 0.815 0.82 0.825 0.83 0.835 0.84 0.845 0.85 0.855 0.86 0.865 0.87 0.875 0.88 0.885 0.89 0.895 0.9 0.91 0.915 0.92 0.935 0.95 0.955 0.96 0.965 0.975 0.98 1 1.005 1.01 1.02 1.025 1.035 1.04 1.07 1.09 1.115 1.13 1.18 1.185 1.24 1.33 1.58
citric_acid	80	0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18 0.19 0.2 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.3 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.4 0.41 0.42 0.43 0.44 0.45 0.46 0.47 0.48 0.49 0.5 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.6 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.7 0.71 0.72 0.73 0.74 0.75 0.76 0.78 0.79 1
residual_sugar	91	0.9 1.2 1.3 1.4 1.5 1.6 1.65 1.7 1.75 1.8 1.9 2 2.05 2.1 2.15 2.2 2.25 2.3 2.35 2.4 2.5 2.55 2.6 2.65 2.7 2.8 2.85 2.9 2.95 3 3.1 3.2 3.3 3.4 3.45 3.5 3.6 3.65 3.7 3.75 3.8 3.9 4 4.1 4.2 4.25 4.3 4.4 4.5 4.6 4.65 4.7 4.8 5 5.1 5.15 5.2 5.4 5.5 5.6 5.7 5.8 5.9 6 6.1 6.2 6.3 6.4 6.55 6.6 6.7 7 7.2 7.3 7.5 7.8 7.9 8.1 8.3 8.6 8.8 8.9 9 10.7 11 12.9 13.4 13.8 13.9 15.4 15.5
chlorides	153	0.012 0.034 0.038 0.039 0.041 0.042 0.043 0.044 0.045 0.046 0.047 0.048 0.049 0.05 0.051 0.052 0.053 0.054 0.055 0.056 0.057 0.058 0.059 0.06 0.061 0.062 0.063 0.064 0.065 0.066 0.067 0.068 0.069 0.07 0.071 0.072 0.073 0.074 0.075 0.076 0.077 0.078 0.079 0.08 0.081 0.082 0.083 0.084 0.085 0.086 0.087 0.088 0.089 0.09 0.091 0.092 0.093 0.094 0.095 0.096 0.097 0.098 0.099 0.1 0.101 0.102 0.103 0.104 0.105 0.106 0.107 0.108 0.109 0.11 0.111 0.112 0.113 0.114 0.115 0.116 0.117 0.118 0.119 0.12 0.121 0.122 0.123 0.124 0.125 0.126 0.127 0.128 0.132 0.136 0.137 0.143 0.145 0.146 0.147 0.148 0.152 0.153 0.157 0.159 0.161 0.165 0.166 0.168 0.169 0.17 0.171 0.172 0.174 0.176 0.178 0.186 0.19 0.194 0.2 0.205 0.213 0.214 0.216 0.222 0.226 0.23 0.235 0.236 0.241 0.243 0.25 0.263 0.267 0.27 0.332 0.337 0.341 0.343 0.358 0.36 0.368 0.369 0.387 0.401 0.403 0.413 0.414 0.415 0.422 0.464 0.467 0.61 0.611
free_sulfur_dioxide	60	1 2 3 4 5 5.5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 37.5 38 39 40 40.5 41 42 43 45 46 47 48 50 51 52 53 54 55 57 66 68 72
total_sulfur_dioxide	144	6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 77.5 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 98 99 100 101 102 103 104 105 106 108 109 110 111 112 113 114 115 116 119 120 121 122 124 125 126 127 128 129 130 131 133 134 135 136 139 140 141 142 143 144 145 147 148 149 151 152 153 155 160 165 278 289

The GLM Procedure

Class Level Information		
Class	Levels	Values
density	436	0.99007 0.9902 0.99064 0.9908 0.99084 0.9912 0.9915 0.99154 0.99157 0.9916 0.99162 0.9917 0.99182 0.99191 0.9921 0.9922 0.99235 0.99236 0.9924 0.99242 0.99252 0.99256 0.99258 0.99264 0.9927 0.9928 0.99286 0.9929 0.99292 0.99294 0.99306 0.99314 0.99316 0.99318 0.9932 0.99322 0.99323 0.99328 0.9933 0.99331 0.99332 0.99334 0.99336 0.9934 0.99341 0.99344 0.99346 0.99348 0.9935 0.99352 0.99354 0.99356 0.99357 0.99358 0.9936 0.99362 0.99364 0.9937 0.99371 0.99374 0.99376 0.99378 0.99379 0.9938 0.99384 0.99385 0.99386 0.99387 0.99388 0.99392 0.99394 0.99395 0.99396 0.99397 0.994 0.99402 0.99408 0.9941 0.99414 0.99416 0.99417 0.99418 0.99419 0.9942 0.99425 0.99426 0.99428 0.9943 0.99434 0.99437 0.99438 0.99439 0.9944 0.99444 0.99448 0.99451 0.99454 0.99456 0.99458 0.99459 0.9946 0.99462 0.99464 0.99467 0.99468 0.9947 0.99471 0.99472 0.99473 0.99474 0.99476 0.99478 0.99479 0.9948 0.99483 0.99484 0.99486 0.99488 0.99489 0.9949 0.99491 0.99492 0.99494 0.99495 0.99496 0.99498 0.99499 0.995 0.99501 0.99502 0.99504 0.99506 0.99508 0.99509 0.9951 0.99512 0.99514 0.99516 0.99517 0.99518 0.99519 0.9952 0.99521 0.99522 0.99523 0.99524 0.99525 0.99526 0.99528 0.99529 0.9953 0.99531 0.99532 0.99533 0.99534 0.99536 0.99538 0.9954 0.99541 0.99542 0.99543 0.99544 0.99545 0.99546 0.99547 0.99549 0.9955 0.99551 0.99552 0.99553 0.99554 0.99555 0.99556 0.99557 0.99558 0.9956 0.99562 0.99564 0.99565 0.99566 0.99568 0.99569 0.9957 0.99572 0.99573 0.99574 0.99575 0.99576 0.99577 0.99578 0.9958 0.99581 0.99582 0.99584 0.99585 0.99586 0.99587 0.99588 0.99589 0.9959 0.99592 0.99593 0.99594 0.99596 0.99598 0.99599 0.996 0.99603 0.99604 0.99605 0.99606 0.99608 0.99609 0.9961 0.99612 0.99613 0.99614 0.99615 0.99616 0.99617 0.99619 0.9962 0.99621 0.99622 0.99623 0.99624 0.99625 0.99627 0.99628 0.99629 0.9963 0.99631 0.99632 0.99633 0.99634 0.99635 0.99636 0.99638 0.99639 0.9964 0.99641 0.99642 0.99643 0.99645 0.99646 0.99647 0.99648 0.99649 0.9965 0.99651 0.99652 0.99654 0.99655 0.99656 0.99658 0.99659 0.9966 0.99661 0.99664 0.99665 0.99666 0.99667 0.99668 0.99669 0.9967 0.99672 0.99674 0.99675 0.99676 0.99677 0.99678 0.9968 0.99682 0.99683 0.99684 0.99685 0.99686 0.99688 0.99689 0.9969 0.99692 0.99693 0.99694 0.99695 0.99697 0.99698 0.99699 0.997 0.99701 0.99702 0.99704 0.99705 0.99706 0.99708 0.99709 0.9971 0.99712 0.99713 0.99714 0.99716 0.99717 0.99718 0.99719 0.9972 0.99721 0.99722 0.99724 0.99725 0.99726 0.99727 0.99728 0.99729 0.9973 0.99732 0.99733 0.99734 0.99735 0.99736 0.99738 0.99739 0.9974 0.99743 0.99744 0.99745 0.99746 0.99747 0.99748 0.9975 0.99752 0.99754 0.99756 0.99758 0.9976 0.99761 0.99764 0.99765 0.99768 0.99769 0.9977 0.99772 0.99774 0.99779 0.9978 0.99782 0.99783 0.99784 0.99785 0.99786 0.99787 0.99788 0.9979 0.99791 0.99796 0.99798 0.998 0.99801 0.99803 0.99808 0.9981 0.99814 0.99815 0.99817 0.99818 0.9982 0.99822 0.99823 0.99824 0.99828 0.9983 0.99832 0.99834 0.99836 0.9984 0.99842 0.99845 0.9985 0.99852 0.99854 0.99855 0.99859 0.9986 0.99864 0.99865 0.9987 0.99878 0.9988 0.99888 0.9989 0.99892 0.999 0.99901 0.9991 0.99914 0.99915 0.99918 0.9992 0.99922 0.99925 0.9993 0.99935 0.99938 0.99939 0.9994 0.9995 0.9996 0.99965 0.9997 0.99974 0.99975 0.99976 0.9998 0.9999 1 1.00005 1.0001 1.00012 1.00015 1.0002 1.00024 1.00025 1.0003 1.0004 1.0006 1.0008 1.001 1.0014 1.0015 1.0018 1.0021 1.0022 1.00242 1.0026 1.00289 1.00315 1.0032 1.00369
pH	89	2.74 2.86 2.87 2.88 2.89 2.9 2.92 2.93 2.94 2.95 2.98 2.99 3 3.01 3.02 3.03 3.04 3.05 3.06 3.07 3.08 3.09 3.1 3.11 3.12 3.13 3.14 3.15 3.16 3.17 3.18 3.19 3.2 3.21 3.22 3.23 3.24 3.25 3.26 3.27 3.28 3.29 3.3 3.31 3.32 3.33 3.34 3.35 3.36 3.37 3.38 3.39 3.4 3.41 3.42 3.43 3.44 3.45 3.46 3.47 3.48 3.49 3.5 3.51 3.52 3.53 3.54 3.55 3.56 3.57 3.58 3.59 3.6 3.61 3.62 3.63 3.66 3.67 3.68 3.69 3.7 3.71 3.72 3.74 3.75 3.78 3.85 3.9 4.01

The GLM Procedure

Class Level Information		
Class	Levels	Values
Sulphates	96	0.33 0.37 0.39 0.4 0.42 0.43 0.44 0.45 0.46 0.47 0.48 0.49 0.5 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.6 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.7 0.71 0.72 0.73 0.74 0.75 0.76 0.77 0.78 0.79 0.8 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.9 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.1 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.2 1.22 1.26 1.28 1.31 1.33 1.34 1.36 1.56 1.59 1.61 1.62 1.95 1.98 2
alcohol	65	8.4 8.5 8.7 8.8 9 9.05 9.1 9.2 9.2333333333 9.25 9.3 9.4 9.5 9.55 9.5666666667 9.6 9.7 9.8 9.9 9.95 10 10.0333333333 10.1 10.2 10.3 10.4 10.5 10.55 10.6 10.7 10.75 10.8 10.9 11 11.0666666667 11.1 11.2 11.3 11.4 11.5 11.6 11.7 11.8 11.9 11.95 12 12.1 12.2 12.3 12.4 12.5 12.6 12.7 12.8 12.9 13 13.1 13.2 13.3 13.4 13.5 13.5666666667 13.6 14 14.9

Number of Observations Read	1599
Number of Observations Used	1599

The GLM Procedure

Dependent Variable: quality

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1346	1037.918334	0.771113	45.76	<.0001
Error	252	4.246770	0.016852		
Corrected Total	1598	1042.165103			

R-Square	Coeff Var	Root MSE	quality Mean
0.995925	2.303331	0.129816	5.636023

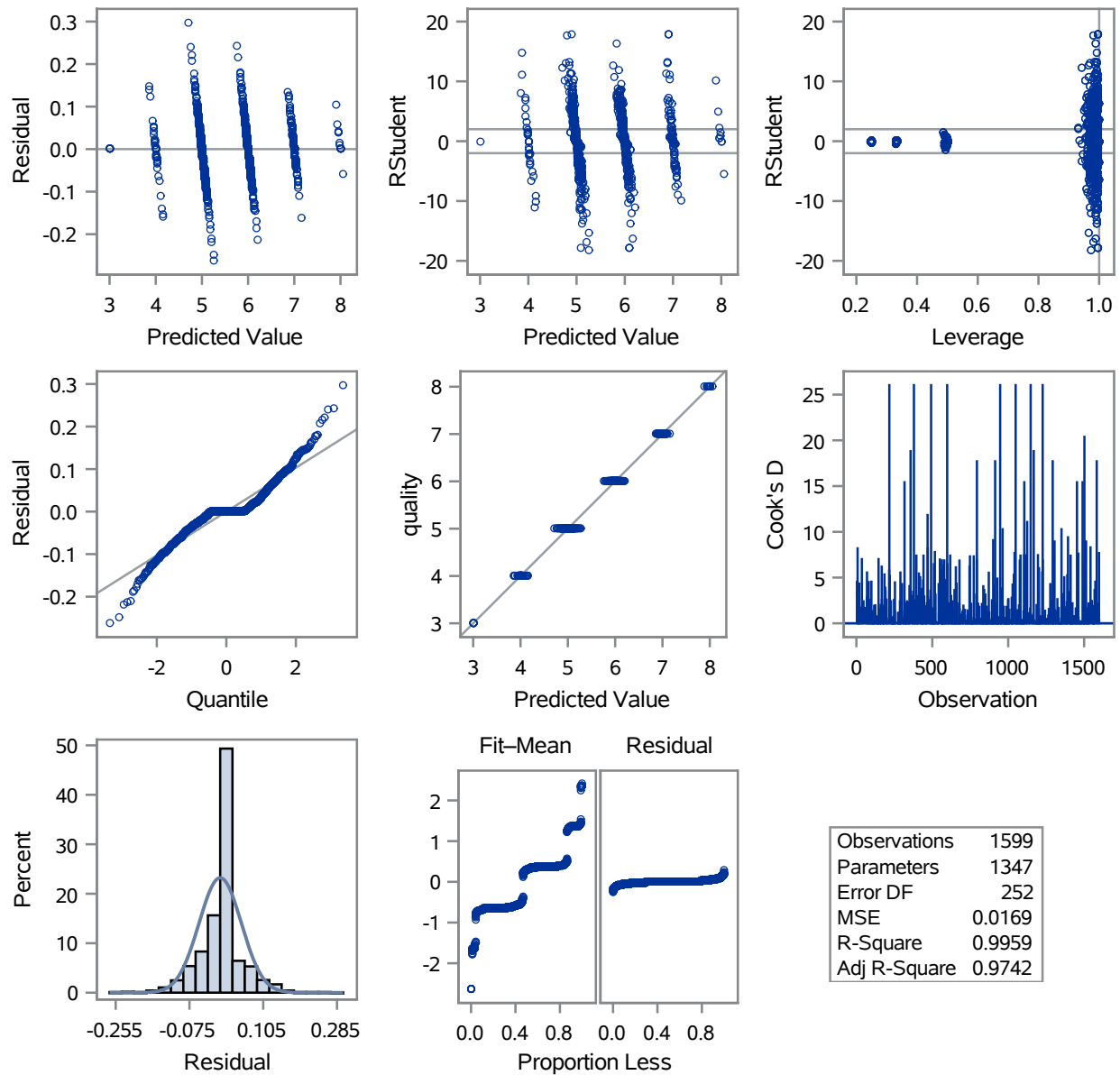
Source	DF	Type I SS	Mean Square	F Value	Pr > F
fixed_acidity	95	117.7097632	1.2390501	73.52	<.0001
volatile_acidity	142	225.1392509	1.5854877	94.08	<.0001
citric_acid	77	71.4109145	0.9274145	55.03	<.0001
residual_sugar	86	78.5238962	0.9130686	54.18	<.0001
chlorides	147	103.2821462	0.7025996	41.69	<.0001
free_sulfur_dioxide	53	23.0872343	0.4356082	25.85	<.0001
total_sulfur_dioxide	139	99.9853350	0.7193190	42.68	<.0001
density	398	218.9244769	0.5500615	32.64	<.0001
pH	76	36.1796761	0.4760484	28.25	<.0001
Sulphates	80	34.1571337	0.4269642	25.34	<.0001
alcohol	53	29.5185067	0.5569530	33.05	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
fixed_acidity	80	25.8697819	0.3233723	19.19	<.0001
volatile_acidity	129	54.4132291	0.4218080	25.03	<.0001
citric_acid	72	30.8091718	0.4279052	25.39	<.0001
residual_sugar	67	29.4788359	0.4399826	26.11	<.0001
chlorides	120	47.7381738	0.3978181	23.61	<.0001
free_sulfur_dioxide	49	21.0407311	0.4294027	25.48	<.0001
total_sulfur_dioxide	135	54.4924785	0.4036480	23.95	<.0001
density	384	154.9038420	0.4033954	23.94	<.0001
pH	74	28.7081761	0.3879483	23.02	<.0001
Sulphates	80	32.2284857	0.4028561	23.91	<.0001
alcohol	53	29.5185067	0.5569530	33.05	<.0001

The GLM Procedure

Dependent Variable: quality

Fit Diagnostics for quality



The GLMSELECT Procedure

Data Set	WORK.TRAIN
Test Data Set	WORK.TEST
Dependent Variable	quality
Selection Method	LASSO
Stop Criterion	Cross Validation
Choose Criterion	Cross Validation
Cross Validation Method	Random
Cross Validation Fold	5
Effect Hierarchy Enforced	None
Random Number Seed	1

Observation Profile for Analysis Data	
Number of Observations Read	1209
Number of Observations Used	1209
Number of Observations Used for Training	1209

Observation Profile for Test Data	
Number of Observations Read	390
Number of Observations Used	390

Dimensions	
Number of Effects	12
Number of Parameters	12

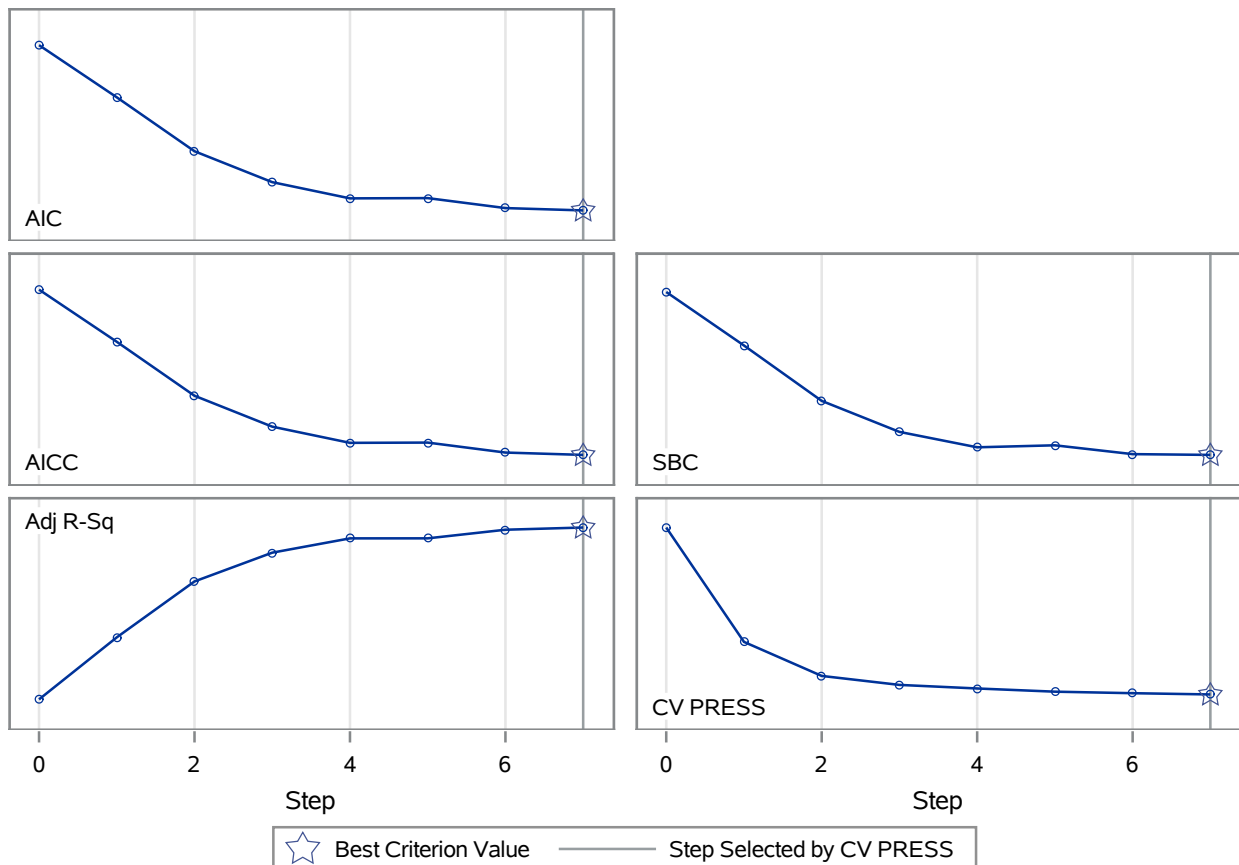
The GLMSELECT Procedure

LASSO Selection Summary						
Step	Effect Entered	Effect Removed	Number Effects In	ASE	Test ASE	CV PRESS
0	Intercept		1	0.6432	0.6784	779.3159
1	alcohol		2	0.5610	0.6053	593.4372
2	volatile_acidity		3	0.4871	0.5225	538.1349
3	Sulphates		4	0.4489	0.4786	523.5442
4	total_sulfur_dioxide		5	0.4297	0.4582	517.7061
5	chlorides		6	0.4293	0.4577	512.5177
6	pH		7	0.4177	0.4429	510.0394
7	free_sulfur_dioxide		8	0.4144	0.4407	508.0059*
* Optimal Value of Criterion						

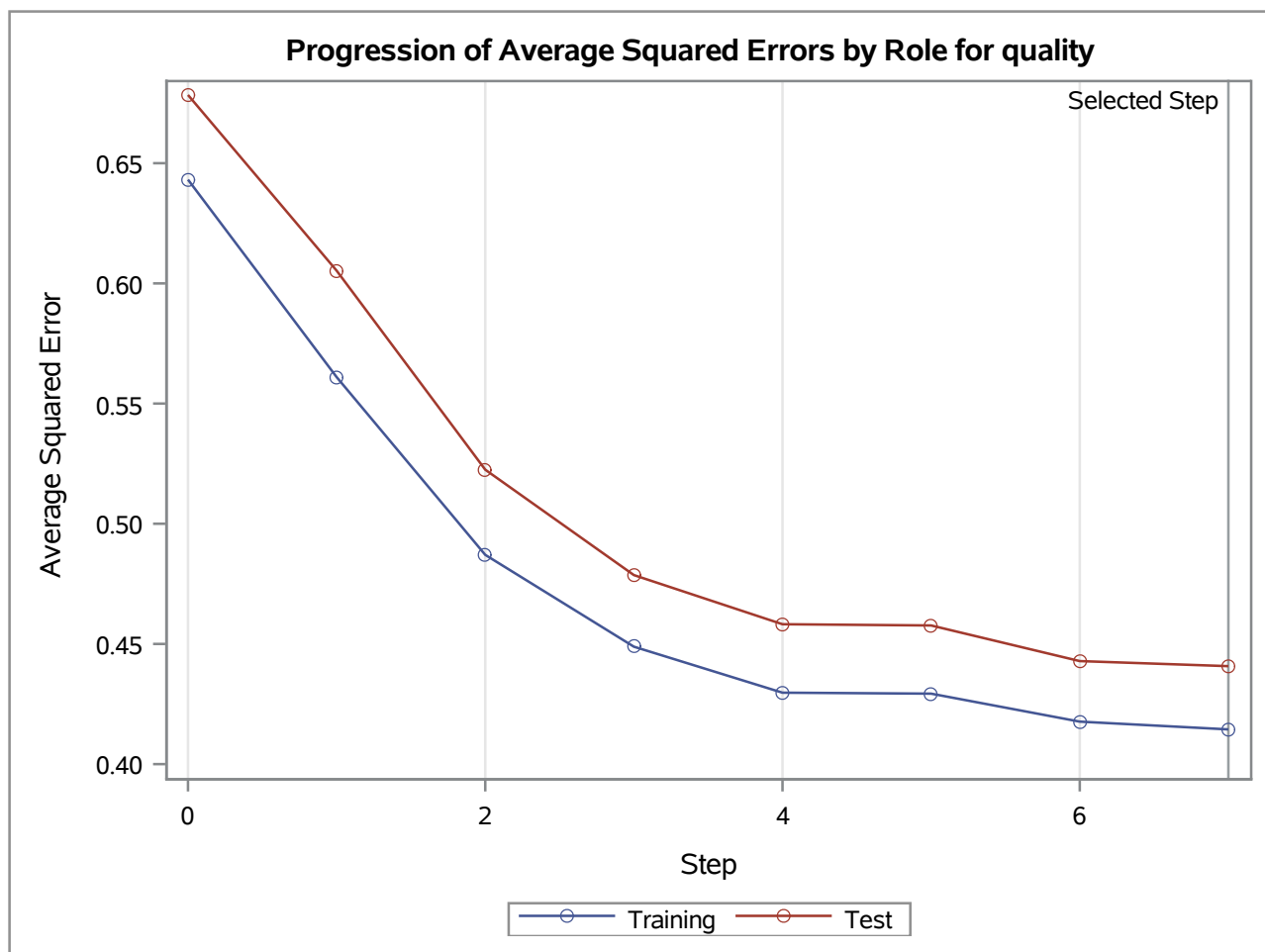
Selection stopped at a local minimum of the cross validation PRESS.

Stop Details			
Candidate For	Effect	Candidate CV PRESS	Compare CV PRESS
Entry	residual_sugar	509.8558	> 508.0059

Fit Criteria for quality



The GLMSELECT Procedure



The GLMSELECT Procedure Selected Model

The selected model, based on Cross Validation, is the model at Step 7.

Effects:	Intercept volatile_acidity chlorides free_sulfur_dioxide total_sulfur_dioxide pH Sulphates alcohol
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Analysis of Variance				
Source	DF	Sum of Squares	Mean Square	F Value
Model	7	276.53347	39.50478	94.69
Error	1201	501.06123	0.41720	
Corrected Total	1208	777.59471		

Root MSE	0.64591
Dependent Mean	5.63689
R-Square	0.3556
Adj R-Sq	0.3519
AIC	162.08797
AICC	162.23810
SBC	-1008.13164
ASE (Train)	0.41444
ASE (Test)	0.44075
CV PRESS	508.00589

Cross Validation Details			
Index	Observations		CV PRESS
	Fitted	Left Out	
1	970	239	98.3769
2	984	225	80.9260
3	974	235	105.1491
4	932	277	122.3368
5	976	233	101.2170
Total			508.0059

**The GLMSELECT Procedure
Selected Model**

Parameter Estimates		
Parameter	DF	Estimate
Intercept	1	3.822152
volatile_acidity	1	-0.850480
chlorides	1	-1.257276
free_sulfur_dioxide	1	0.002263
total_sulfur_dioxide	1	-0.002718
pH	1	-0.324482
Sulphates	1	0.829378
alcohol	1	0.287234

Model Averaging for LASSO with 95% CL on the regressors

The GLMSELECT Procedure

Data Set	WORK.TRAIN
Test Data Set	WORK.TEST
Dependent Variable	quality
Selection Method	Adaptive LASSO
Stop Criterion	None
Choose Criterion	SBC
Effect Hierarchy Enforced	None

Model Averaging Information	
Sampling Method	Unrestricted (with replacement)
Sample Percentage	100
Number of Samples	100

Observation Profile for Analysis Data	
Number of Observations Read	1209
Number of Observations Used	1209
Number of Observations Used for Training	1209

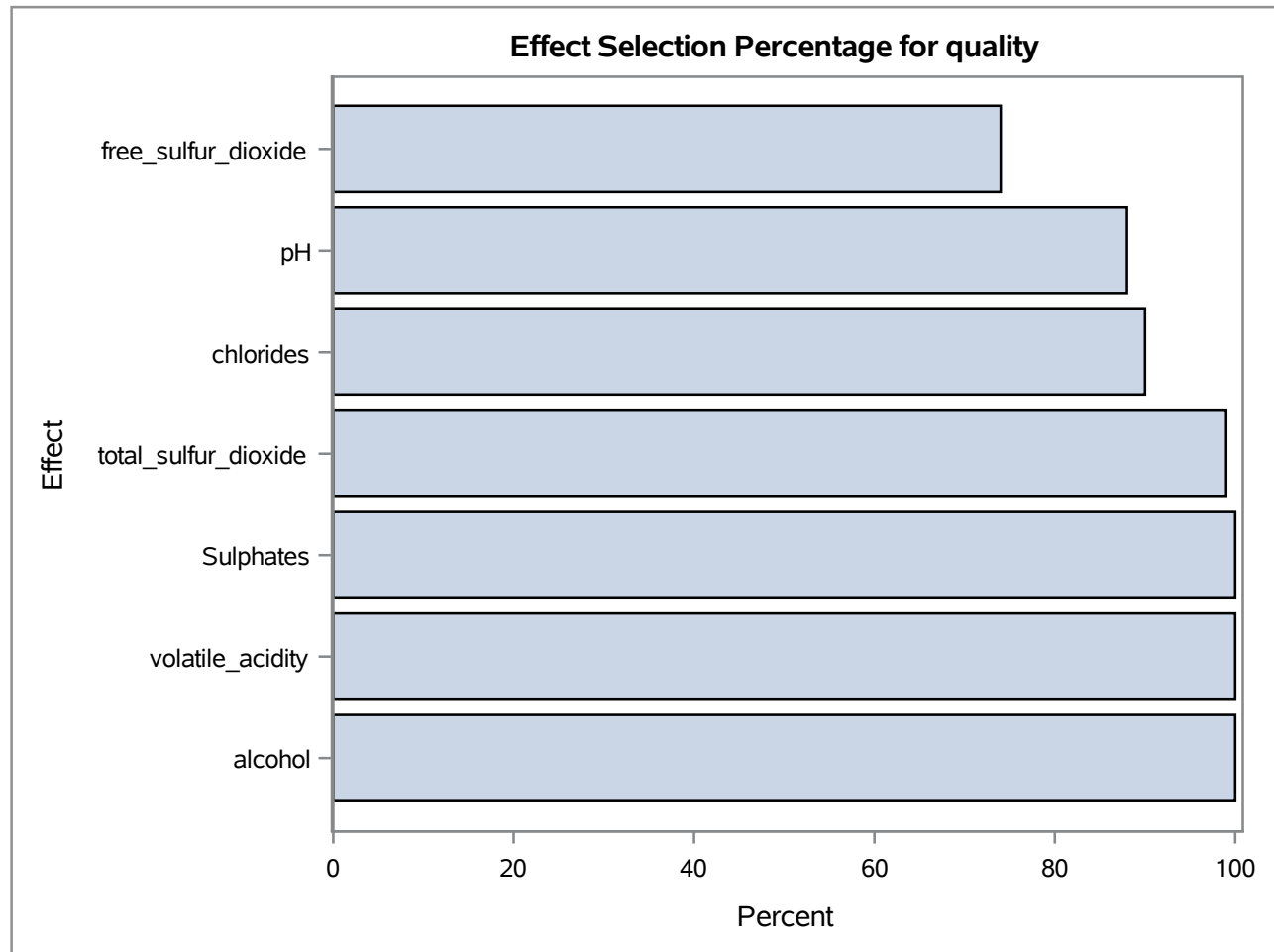
Observation Profile for Test Data	
Number of Observations Read	390
Number of Observations Used	390

Dimensions	
Number of Effects	8
Number of Parameters	8

Effect Selection Percentage	
Effect	Selection Percentage
alcohol	100.0
volatile_acidity	100.0
Sulphates	100.0
total_sulfur_dioxide	99.00
chlorides	90.00
pH	88.00
free_sulfur_dioxide	74.00

Model Averaging for LASSO with 95% CL on the regressors

The GLMSELECT Procedure



Model Selection Frequency				
Times Selected	Selection Percentage	Number of Effects	Frequency Score	Effects in Model
69	69.00	8	69.94	Intercept alcohol volatile_acidity Sulphates total_sulfur_dioxide chlorides pH free_sulfur_dioxide
16	16.00	7	16.97	Intercept alcohol volatile_acidity Sulphates total_sulfur_dioxide chlorides pH
6	6.00	5	7.00	Intercept alcohol volatile_acidity Sulphates total_sulfur_dioxide
4	4.00	7	4.95	Intercept alcohol volatile_acidity Sulphates total_sulfur_dioxide chlorides free_sulfur_dioxide
2	2.00	6	2.98	Intercept alcohol volatile_acidity Sulphates total_sulfur_dioxide pH
1	1.00	4	2.00	Intercept alcohol volatile_acidity Sulphates
1	1.00	6	1.98	Intercept alcohol volatile_acidity Sulphates total_sulfur_dioxide chlorides
1	1.00	7	1.94	Intercept alcohol volatile_acidity Sulphates total_sulfur_dioxide pH free_sulfur_dioxide

Model Averaging for LASSO with 95% CL on the regressors

The GLMSELECT Procedure

Average Parameter Estimates							
Parameter	Number Non-zero	Non-zero Percentage	Mean Estimate	Standard Deviation	Estimate Quantiles		
					2.5%	Median	97.5%
Intercept	100	100.00	4.113083	0.706065	2.438685	4.317446	5.147742
alcohol	100	100.00	0.296298	0.020441	0.260276	0.296430	0.339167
volatile_acidity	100	100.00	-0.839313	0.145175	-1.100127	-0.837901	-0.559051
Sulphates	100	100.00	0.947026	0.167063	0.614270	0.952610	1.296312
total_sulfur_dioxide	99	99.00	-0.003777	0.001260	-0.005768	-0.004094	-0.001297
chlorides	90	90.00	-1.619657	0.679162	-2.619269	-1.723010	0
pH	88	88.00	-0.457885	0.213983	-0.810820	-0.492585	0
free_sulfur_dioxide	74	74.00	0.005724	0.003762	0	0.006620	0.011306

Parameter Estimate Distributions for quality

Number of Samples = 100

