Program Summary - HW4.sas

Execution Environment

Author:	u64127570
File:	/home/u64127570/sasuser.v94/HW4.sas
SAS Platform:	Linux LIN X64 5.14.0-284.30.1.el9_2.x86_64
SAS Host:	ODAWS01-USW2-2.ODA.SAS.COM
SAS Version:	9.04.01M7P08062020
SAS Locale:	en_US
Submission Time:	3/23/2025, 10:31:42 PM
Browser Host:	C-67-165-187-91.HSD1.IL.COMCAST.NET
User Agent:	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/134.0.0.0 Safari/537.36 Edg/134.0.0.0
Application Server:	ODAMID00-USW2-2.ODA.SAS.COM

Code: HW4.sas

```
 *HW 4;
data rad;
```

Log: HW4.sas

Notes (16)

```
1          OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
68
69          *HW 4;
70         data rad;
71         input soil;
72         datalines;

NOTE: The data set WORK.RAD has 12 observations and 1 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              692.15k
      OS Memory           19364.00k
      Timestamp           03/24/2025 03:31:38 AM
      Step Count                        24  Switch Count  2
      Page Faults                       0
      Page Reclaims                     127
      Page Swaps                        0
      Voluntary Context Switches        9
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


85         ;
86         run;
87
```

```
88          * null- Soil radium-226 levels are not acceptable (over 4.0 pCi/L);
89          * alt- Soil radium-226 levels are acceptable (under 4.0 pCi/L);
90
91          proc ttest data= rad sides = L h0= 4.00 alpha = 0.1;
92          title "Radium-226 levels in soil";
93          var soil;
94          run;

NOTE: PROCEDURE TTEST used (Total process time):
      real time           2.34 seconds
      user cpu time       0.11 seconds
      system cpu time     0.04 seconds
      memory              17390.65k
      OS Memory           36556.00k
      Timestamp           03/24/2025 03:31:41 AM
      Step Count                        25  Switch Count  25
      Page Faults                       0
      Page Reclaims                     16322
      Page Swaps                        0
      Voluntary Context Switches        770
      Involuntary Context Switches      6
      Block Input Operations            0
      Block Output Operations           1000


95
96          */ t = -0.80, p = 0.2213, CI= -infin, 4.3008.
97          the p-value (0.2213) is greater than 0.1, we fail to reject the null hypothesis. at the 0.1 significance level, there is
97        ! insufficient evidence to conclude that the soil's radium-226 levels are less than 4.0 pCi/L. Therefore, the soil
97        ! radium-226 levels are considered unacceptable.
98          90% confidident the true mean is less than or equal to 4.3008. The upper bound is greater than 4.0, supporting the
98        ! decision to fail to reject the null.
99          type 2 error, fail to reject the null when the alt is true. ;
100
101         data snore;
102         infile "/home/u64127570/sasuser.v94/Snoring.txt" dlm='09'x firstobs=2;
103         input presurgery postsurgery;
104         difference = presurgery-postsurgery;
105         run;

NOTE: The infile "/home/u64127570/sasuser.v94/Snoring.txt" is:
      Filename=/home/u64127570/sasuser.v94/Snoring.txt,
      Owner Name=u64127570,Group Name=oda,
      Access Permission=-rw-r--r--,
      Last Modified=11Mar2025:10:29:31,
      File Size (bytes)=111

NOTE: 13 records were read from the infile "/home/u64127570/sasuser.v94/Snoring.txt".
      The minimum record length was 0.
      The maximum record length was 6.
NOTE: SAS went to a new line when INPUT statement reached past the end of a line.
NOTE: The data set WORK.SNORE has 12 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              757.93k
      OS Memory           30376.00k
      Timestamp           03/24/2025 03:31:41 AM
      Step Count                        26  Switch Count  2
      Page Faults                       0
      Page Reclaims                     104
      Page Swaps                        0
      Voluntary Context Switches        24
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


106
107         *paired t test is best since we are looking at paired data values pre and post surgery of the same subject. ;
108
109         proc ttest data = snore sides= u h0=0 alpha = 0.05;
110         paired presurgery*postsurgery;
111         run;

NOTE: PROCEDURE TTEST used (Total process time):
      real time           0.47 seconds
      user cpu time       0.15 seconds
      system cpu time     0.04 seconds
      memory              10207.90k
      OS Memory           37580.00k
      Timestamp           03/24/2025 03:31:41 AM
      Step Count                        27  Switch Count  30
      Page Faults                       0
      Page Reclaims                     16895
```

```
      Page Swaps                       0
      Voluntary Context Switches       982
      Involuntary Context Switches     7
      Block Input Operations           0
      Block Output Operations          1224


112
113       /* null: u_pre - u_post = 0
114       alt: u_pre - u_post > 0
115       t= 2.19, p= 0.0254, 95%CI= 0.8738 to infin
116       95% confident that the true mean in difference pre vs post surgery is greater than or equal to 0.8738.
117       The p val (0.0245) is less than 0.05, we reject the null hypothesis. at the 0.05 significance level, there is suffiecent
117     ! evidence to conclude that the difference pre and post surgery is greater than 0;
118       */
119
120       proc univariate data=snore;
121       var difference;
122       run;

NOTE: PROCEDURE UNIVARIATE used (Total process time):
      real time           0.03 seconds
      user cpu time       0.04 seconds
      system cpu time     0.00 seconds
      memory              830.00k
      OS Memory           31400.00k
      Timestamp           03/24/2025 03:31:41 AM
      Step Count                       28  Switch Count  0
      Page Faults                      0
      Page Reclaims                    94
      Page Swaps                       0
      Voluntary Context Switches       3
      Involuntary Context Switches     2
      Block Input Operations           0
      Block Output Operations          0


123
124       /*
125       null: The median decibel volume in pre-surgery and post-surgery patients is the same
126       alt: The median decibel volume in pre-surgery and post-surgery patients is different
127       t=25, p=0.0483/2 = 0.0241, Conclusion: at a=0.05 there is sufficient evidence to demonstrate a difference between the
127     ! decibel level of pre-surgery and post-surgery patients
128
129       According to the histogram, the distribution is skewed to the right when compared to a normal bell curve. The QQ plot
129     ! does follow the diagonal reference line, but the bottom tail shows curvature. Considering both of these things, the
129     ! distributions are likely not normal enough to use the t-test.
130       wilcoxon signed rank is best
131       it's important to justify test choice in this case becuase of the differences in distrubution appropraite for each test,
131     ! t tests are for normal dist, wilcoxon signed rank is for skewed
132       */
133
134       proc import datafile='/home/u64127570/sasuser.v94/SubscriberSurvey.xlsx'
135       out=subsurv
136       DBMS=xlsx
137       Replace;
138       Getnames=yes;
139       run;

NOTE: One or more variables were converted because the data type is not supported by the V9 engine. For more details, run with
      options MSGLEVEL=I.
NOTE: The import data set has 60 observations and 2 variables.
NOTE: WORK.SUBSURV data set was successfully created.
NOTE: PROCEDURE IMPORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              3352.62k
      OS Memory           33788.00k
      Timestamp           03/24/2025 03:31:41 AM
      Step Count                       29  Switch Count  2
      Page Faults                      0
      Page Reclaims                    751
      Page Swaps                       0
      Voluntary Context Switches       25
      Involuntary Context Switches     1
      Block Input Operations           0
      Block Output Operations          272


140
141       proc ttest;
142       class Provider;
143       var QOS;
144       run;
```

```
NOTE: PROCEDURE TTEST used (Total process time):
      real time           0.37 seconds
      user cpu time       0.12 seconds
      system cpu time     0.06 seconds
      memory              9481.50k
      OS Memory           37580.00k
      Timestamp           03/24/2025 03:31:42 AM
      Step Count                        30  Switch Count  48
      Page Faults                       0
      Page Reclaims                     25637
      Page Swaps                        0
      Voluntary Context Switches        1016
      Involuntary Context Switches      7
      Block Input Operations            0
      Block Output Operations           1080


145        /*
146        null: There is no difference in satisfaction rating between cable and satellite
147        alt: There is a difference in satisfaction rating between cable and satellite
148
149        null: The variances are equal
150        alt: The variances are unequal
151        Folded f-stat: 2.83 p=0.0066. At a-0.05, since p<0.05 the difference in variances is significant, use Satterthwaite
152        95% confidence interval: -1.7292 to -0.0703
153        t = -2.18, p=0.0341
154        pval (0.0341) is less than a (0.05), reject the null. there is sufficent evidence of a difference in satisfaction rating
154      ! between cable and satellite
155          */
156
157        proc npar1way wilcoxon;
158        class Provider;
159        var QOS;
160        run;

NOTE: PROCEDURE NPAR1WAY used (Total process time):
      real time           0.12 seconds
      user cpu time       0.04 seconds
      system cpu time     0.01 seconds
      memory              2868.96k
      OS Memory           32820.00k
      Timestamp           03/24/2025 03:31:42 AM
      Step Count                        31  Switch Count  0
      Page Faults                       0
      Page Reclaims                     371
      Page Swaps                        0
      Voluntary Context Switches        263
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           624


161        /*
162        null: med_cable = med_satellite The median satisfaction rating is the same between cable and satellite
163        alt: med_cable =/= med_satellite The median satisfacion rating is different between cable and satellite
164        t= 1045.5, p= 0.0503
165        pval (0.0503) is greater than a (0.05), fail to reject the null. There is insufficent evidence of a difference between
165      ! median satisfaction rating between cable and satellite.
166        histograms are normal-ish, i'd say normal enough, qq plots follow the line.
167        distrubutions are normal enough for a t test to be approprate. t test is the best method.
168         */
169
170
171        OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
181
```

Results: HW4.sas

Radium-226 levels in soil

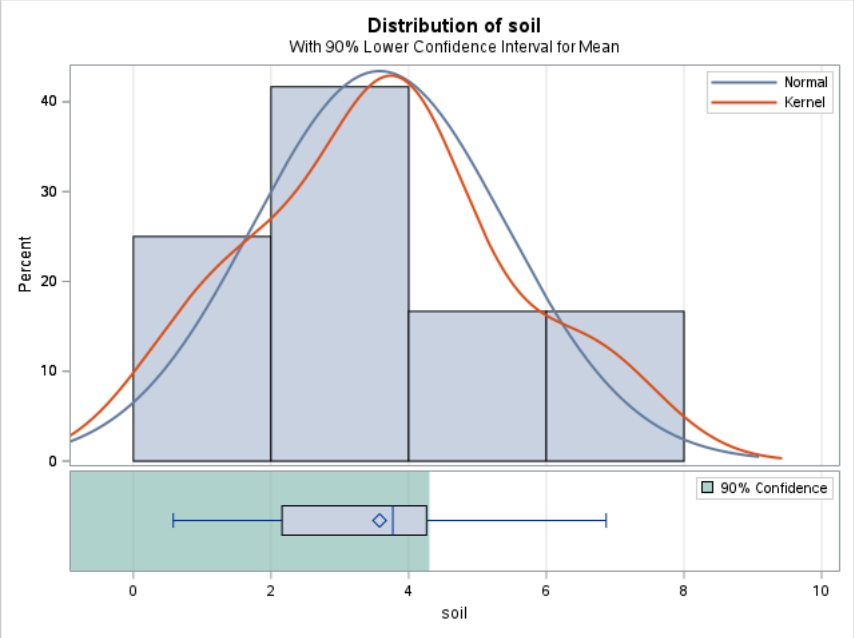
The TTEST Procedure

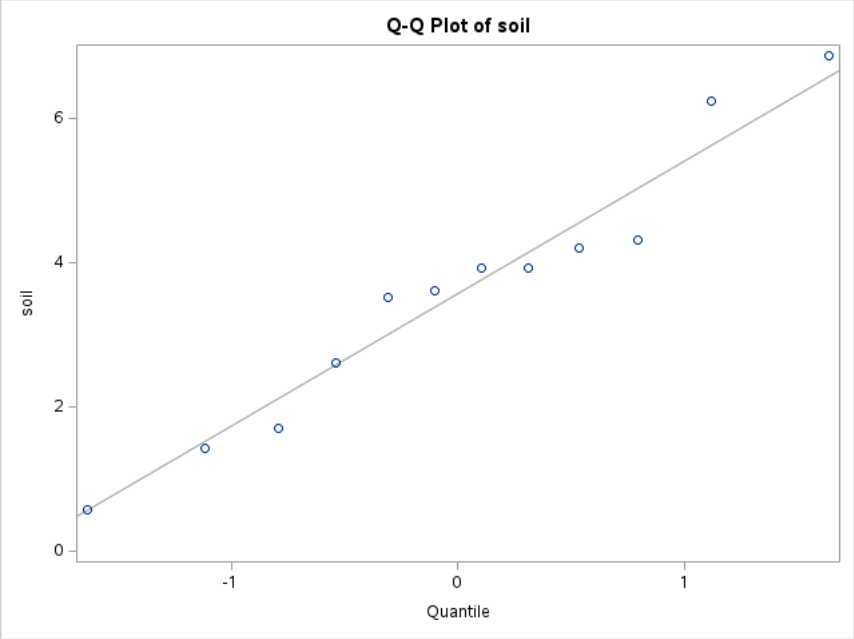
Variable: soil

N	Mean	Std Dev	Std Err	Minimum	Maximum
12	3.5775	1.8376	0.5305	0.5800	6.8700

Mean	90% CL Mean		Std Dev	90% CL Std Dev	
3.5775	-Infty	4.3008	1.8376	1.3740	2.8495

DF	t Value	Pr < t
11	-0.80	0.2213





Radium-226 levels in soil

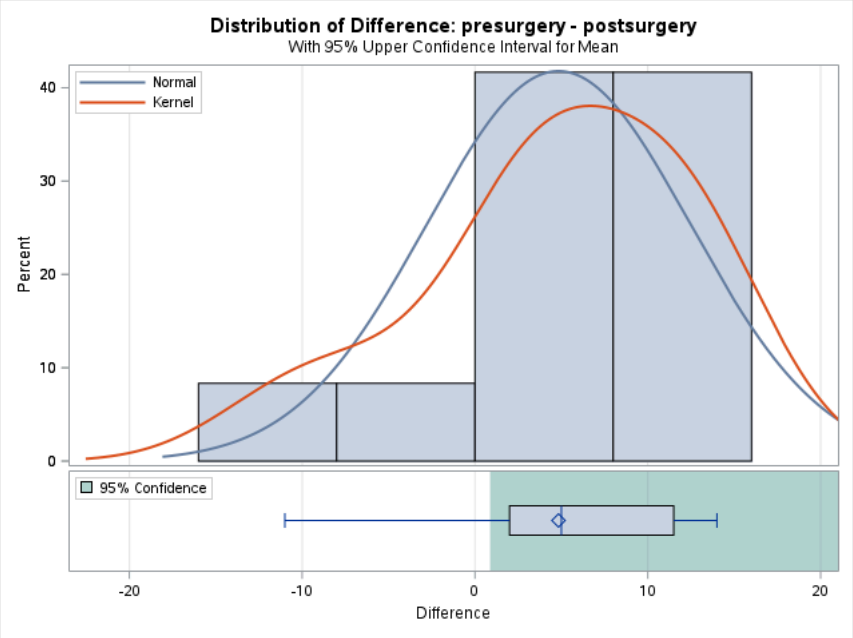
The TTEST Procedure

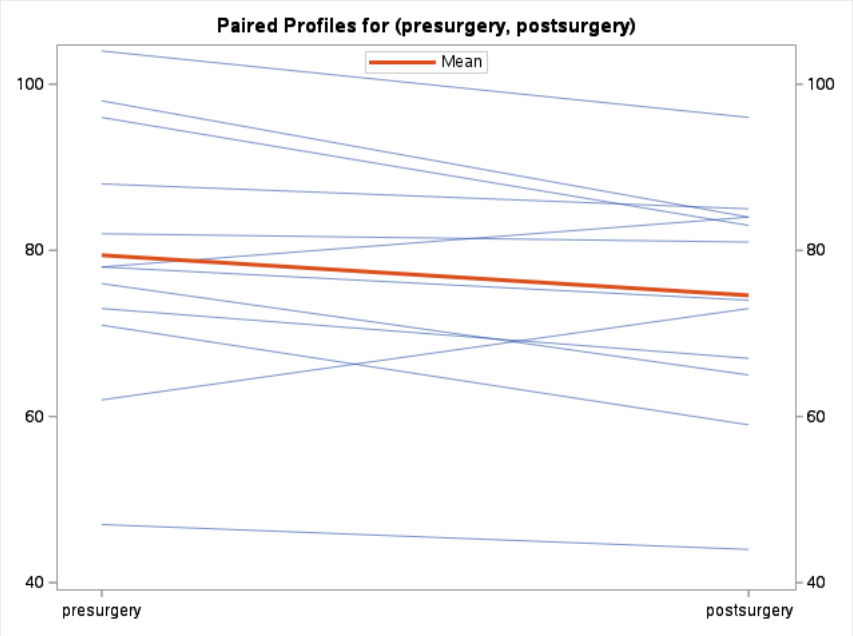
Difference: presurgery - postsurgery

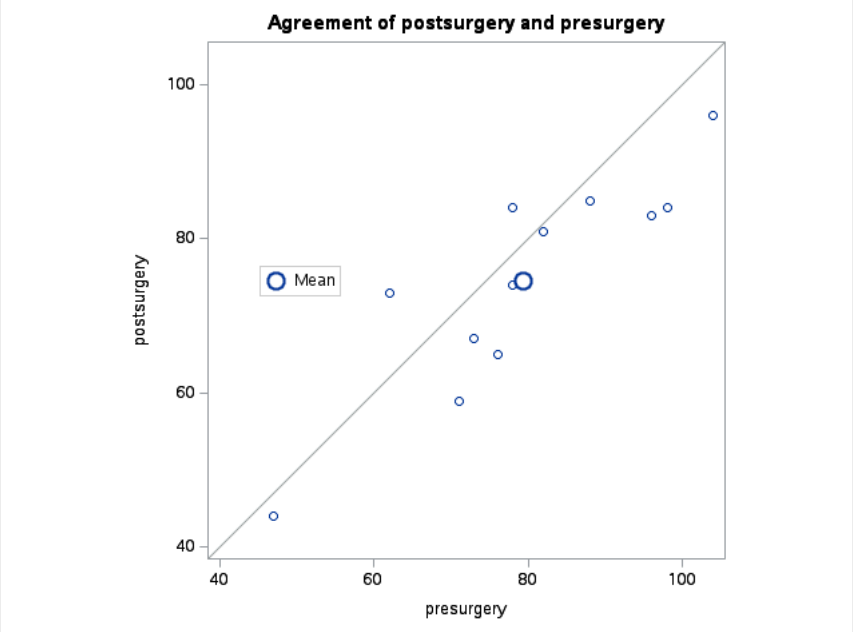
N	Mean	Std Dev	Std Err	Minimum	Maximum
12	4.8333	7.6376	2.2048	-11.0000	14.0000

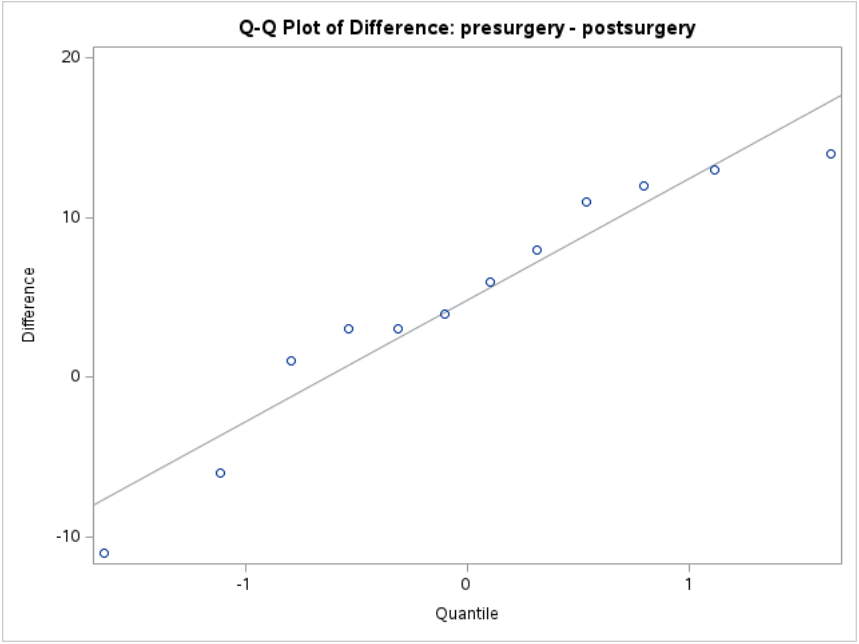
Mean	95% CL Mean		Std Dev	95% CL Std Dev	
4.8333	0.8738	Infty	7.6376	5.4105	12.9678

DF	t Value	Pr > t
11	2.19	0.0254


Distribution of Difference: presurgery - postsurgery
With 95% Upper Confidence Interval for Mean
Normal
Kernel
Percent
40
30
20
10
0
95% Confidence
-20
-10
0
10
20
Difference


Paired Profiles for (presurgery, postsurgery)
Mean
100
80
60
40
presurgery
postsurgery


Agreement of postsurgery and presurgery
Mean
postsurgery
100
80
60
40
presurgery



Radium-226 levels in soil

The UNIVARIATE Procedure
Variable: difference

Moments			
N	12	Sum Weights	12
Mean	4.83333333	Sum Observations	58
Std Deviation	7.63762616	Variance	58.3333333
Skewness	-0.8225035	Kurtosis	0.25273113
Uncorrected SS	922	Corrected SS	641.666667
Coeff Variation	158.019852	Std Error Mean	2.20479276

Basic Statistical Measures			
Location		Variability	
Mean	4.833333	Std Deviation	7.63763
Median	5.000000	Variance	58.33333
Mode	3.000000	Range	25.00000
		Interquartile Range	9.50000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	2.192194	Pr > |t|	0.0508
Sign	M	4	Pr >= |M|	0.0386
Signed Rank	S	25	Pr >= |S|	0.0483

Quantiles (Definition 5)	
Level	Quantile
100% Max	14.0
99%	14.0
95%	14.0
90%	13.0
75% Q3	11.5
50% Median	5.0
25% Q1	2.0
10%	-6.0
5%	-11.0
1%	-11.0
0% Min	-11.0

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
-11	9	8	3
-6	4	11	10
1	7	12	2
3	8	13	1
3	5	14	11

Radium-226 levels in soil

The TTEST Procedure

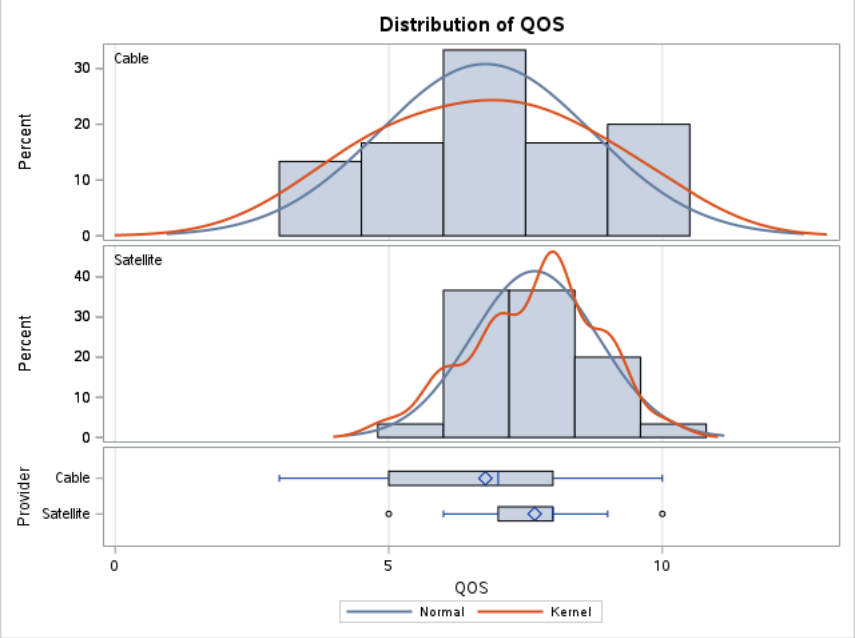
Variable: QOS (QOS)

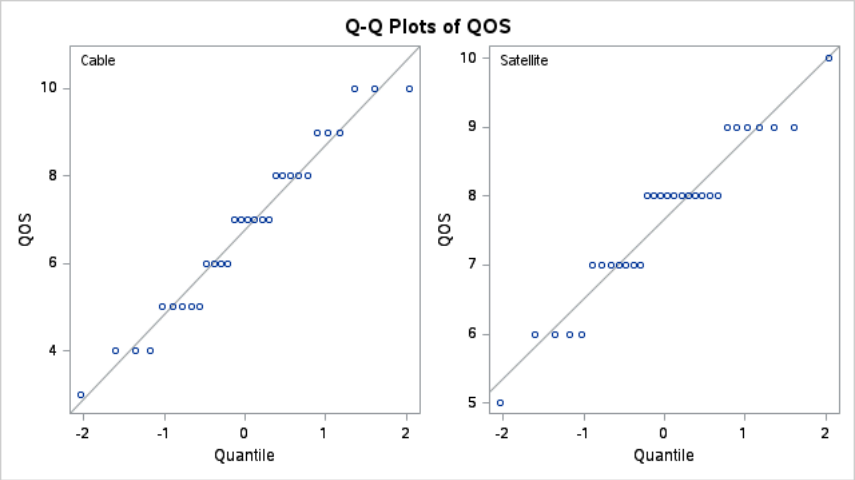
Provider	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
Cable		30	6.7667	1.9420	0.3546	3.0000	10.0000
Satellite		30	7.6667	1.1547	0.2108	5.0000	10.0000
Diff (1-2)	Pooled		-0.9000	1.5976	0.4125		
Diff (1-2)	Satterthwaite		-0.9000		0.4125		

Provider	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
Cable		6.7667	6.0415	7.4918	1.9420	1.5466	2.6106
Satellite		7.6667	7.2355	8.0978	1.1547	0.9196	1.5523
Diff (1-2)	Pooled	-0.9000	-1.7257	-0.0743	1.5976	1.3524	1.9522
Diff (1-2)	Satterthwaite	-0.9000	-1.7297	-0.0703			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	58	-2.18	0.0332
Satterthwaite	Unequal	47.228	-2.18	0.0341

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	29	29	2.83	0.0066





Radium-226 levels in soil

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable QOS Classified by Variable Provider					
Provider	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score

Wilcoxon Scores (Rank Sums) for Variable QOS Classified by Variable Provider					
Provider	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Satellite	30	1045.50	915.0	66.408788	34.850
Cable	30	784.50	915.0	66.408788	26.150
Average scores were used for ties.					

Wilcoxon Two-Sample Test					
				t Approximation	
Statistic	Z	Pr > Z	Pr > |Z|	Pr > Z	Pr > |Z|
1045.500	1.9576	0.0251	0.0503	0.0275	0.0550
Z includes a continuity correction of 0.5.					

Kruskal-Wallis Test		
Chi-Square	DF	Pr > ChiSq
3.8616	1	0.0494