```
> daily.intake <- c(5260,5470,5640,6180,6390,6515,6805,7515,7515,
8230,8770)
> mean(daily.intake)
[1] 6753.636
> sd(daily.intake)
[1] 1142.123
> quantile(daily.intake)
  0%  25%  50%  75% 100%
5260 5910 6515 7515 8770
> quantile(daily.intake,c(0.1,0.3))
 10%  30%
5470 6180
> daily.intake
 [1] 5260 5470 5640 6180 6390 6515 6805
 [8] 7515 7515 8230 8770
> t.test(daily.intake,mu=7725)

        One Sample t-test

data:  daily.intake
t = -2.8208, df = 10, p-value =
0.01814
alternative hypothesis: true mean is not equal to 7725
95 percent confidence interval:
 5986.348 7520.925
sample estimates:
mean of x
 6753.636

> qt(0.025,10)
[1] -2.228139
> qt(0.975,10)
[1] 2.228139
> #p-value<5%, reject h0, the true mean is not 7725
> #7725 not in CI, reject h0, not 7725
> t.test(daily.intake,mu=7725)

        One Sample t-test

data:  daily.intake
t = -2.8208, df = 10, p-value = 0.01814
alternative hypothesis: true mean is not equal to 7725
95 percent confidence interval:
 5986.348 7520.925
sample estimates:
mean of x
 6753.636

> mean(daily.intake)
[1] 6753.636
```

```
> (mean(daily.intake)-7725)/(sd(daily.intake)/
sqrt(length(daily.intake)))
[1] -2.820754
> length(daily.intake)-1
[1] 10
> pt(-2.8208, 10)
[1] 0.009067903
> pt(-2.8208, 10)*2
[1] 0.01813581
> mean(daily.intake)+qt(0.025,10)*sd(daily.intake)/
sqrt(length(daily.intake))
[1] 5986.348
> mean(daily.intake)-qt(0.025,10)*sd(daily.intake)/
sqrt(length(daily.intake))
[1] 7520.925
> t.test(daily.intake,mu=7725)

        One Sample t-test

data:  daily.intake
t = -2.8208, df = 10, p-value = 0.01814
alternative hypothesis: true mean is not equal to 7725
95 percent confidence interval:
 5986.348 7520.925
sample estimates:
mean of x
 6753.636

> a=t.test(daily.intake,mu=7725)
> a

        One Sample t-test

data:  daily.intake
t = -2.8208, df = 10, p-value = 0.01814
alternative hypothesis: true mean is not equal to 7725
95 percent confidence interval:
 5986.348 7520.925
sample estimates:
mean of x
 6753.636

> names(a)
[1] "statistic"   "parameter"   "p.value"
[4] "conf.int"    "estimate"    "null.value"
[7] "alternative" "method"      "data.name"
> a$statistic
        t
-2.820754
> a$parameter
```

```
df
10
> a$p.value
[1] 0.01813724
> a$conf.int
[1] 5986.348 7520.925
attr(,"conf.level")
[1] 0.95
> a$statistic
        t
-2.820754
> a$st
        t
-2.820754
> a$s
        t
-2.820754
> a$e
mean of x
 6753.636
> a$p
NULL
> a$pa
df
10
> a$p.
[1] 0.01813724
> a$p.value
[1] 0.01813724
> t.test(daily.intake,mu=7725)$p.value
[1] 0.01813724
>
> ?t.test
starting httpd help server ... done
> t.test(daily.intake,mu=7725,conf=.9)

        One Sample t-test

data:  daily.intake
t = -2.8208, df = 10, p-value = 0.01814
alternative hypothesis: true mean is not equal to 7725
90 percent confidence interval:
 6129.492 7377.781
sample estimates:
mean of x
 6753.636

> qt(0.05,10)
[1] -1.812461
> qt(0.025,10)
```

```
[1] -2.228139
> t.test(daily.intake,mu=7725,conf=.99)

        One Sample t-test

data:  daily.intake
t = -2.8208, df = 10, p-value = 0.01814
alternative hypothesis: true mean is not equal to 7725
99 percent confidence interval:
 5662.256 7845.017
sample estimates:
mean of x
 6753.636

> qt(0.005,10)
[1] -3.169273
> t.test(daily.intake,mu=7725,conf=.99)

        One Sample t-test

data:  daily.intake
t = -2.8208, df = 10, p-value = 0.01814
alternative hypothesis: true mean is not equal to 7725
99 percent confidence interval:
 5662.256 7845.017
sample estimates:
mean of x
 6753.636

> t.test(daily.intake-7725,mu=0,conf=.99)

        One Sample t-test

data:  daily.intake - 7725
t = -2.8208, df = 10, p-value = 0.01814
alternative hypothesis: true mean is not equal to 0
99 percent confidence interval:
 -2062.744   120.017
sample estimates:
mean of x
-971.3636

> t.test(daily.intake-7725)

        One Sample t-test

data:  daily.intake - 7725
t = -2.8208, df = 10, p-value = 0.01814
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
```

```
 -1738.6525  -204.0748
sample estimates:
mean of x
-971.3636

> data_cans<-c(270,273,258,204,254,228,282)
> t.test(data_cans,mu=165,al="g")

        One Sample t-test

data:  data_cans
t = 8.3984, df = 6, p-value = 7.761e-05
alternative hypothesis: true mean is greater than 165
95 percent confidence interval:
 232.4193      Inf
sample estimates:
mean of x
 252.7143

> ?t.test
> pt( 8.3984,6)
[1] 0.9999224
> 1-pt( 8.3984,6)
[1] 7.761148e-05
> t.test(data_cans,mu=165,al="g")

        One Sample t-test

data:  data_cans
t = 8.3984, df = 6, p-value = 7.761e-05
alternative hypothesis: true mean is greater than 165
95 percent confidence interval:
 232.4193      Inf
sample estimates:
mean of x
 252.7143

> t.test(data_cans-165,al="g")

        One Sample t-test

data:  data_cans - 165
t = 8.3984, df = 6, p-value = 7.761e-05
alternative hypothesis: true mean is greater than 0
95 percent confidence interval:
 67.41929      Inf
sample estimates:
mean of x
 87.71429
```

```
> t.test(data_cans,mu=170,a="l")

        One Sample t-test

data:  data_cans
t = 7.9196, df = 6, p-value = 0.9999
alternative hypothesis: true mean is less than 170
95 percent confidence interval:
     -Inf 273.0093
sample estimates:
mean of x
 252.7143

> H0: u=25   Ha:u>25
Error: unexpected symbol in "H0: u=25   Ha"
> #H0: u=25   Ha:u>25
> Exercise<-c(28,25,27,31,10,26,30,15,55,12,24,32,28,42,38)
> shapiro.test(Exercise)

        Shapiro-Wilk normality test

data:  Exercise
W = 0.94167, p-value = 0.4038

> t.test(Exercise,mu=25,a="g")

        One Sample t-test

data:  Exercise
t = 1.0833, df = 14, p-value = 0.1485
alternative hypothesis: true mean is greater than 25
95 percent confidence interval:
 22.99721      Inf
sample estimates:
mean of x
     28.2

> mean(Exercise)+q(0.05,14)*sd(Exercise)/sqrt(15)
Error in q(0.05, 14) : 'save' must be a character vector of length
one.
> mean(Exercise)+qt(0.05,14)*sd(Exercise)/sqrt(15)
[1] 22.99721
> t.test(Exercise,mu=25,a="l")

        One Sample t-test

data:  Exercise
t = 1.0833, df = 14, p-value = 0.8515
alternative hypothesis: true mean is less than 25
95 percent confidence interval:
```

```
     -Inf 33.40279
sample estimates:
mean of x
     28.2

> pt(1.0833,14)
[1] 0.8515098
> 1-pt(1.0833,14)
[1] 0.1484902
> t.test(Exercise,mu=25)

        One Sample t-test

data:  Exercise
t = 1.0833, df = 14, p-value = 0.297
alternative hypothesis: true mean is not equal to 25
95 percent confidence interval:
 21.86445 34.53555
sample estimates:
mean of x
     28.2

> 1-pt(1.0833,14)
[1] 0.1484902
> (1-pt(1.0833,14))*2
[1] 0.2969804
> wilcox.test(Exercise,mu=25)

        Wilcoxon signed rank test with continuity
        correction

data:  Exercise
V = 72, p-value = 0.2326
alternative hypothesis: true location is not equal to 25

Warning messages:
1: In wilcox.test.default(Exercise, mu = 25) :
  cannot compute exact p-value with ties
2: In wilcox.test.default(Exercise, mu = 25) :
  cannot compute exact p-value with zeroes
> t.test(daily.intake,mu=7725)

        One Sample t-test

data:  daily.intake
t = -2.8208, df = 10, p-value = 0.01814
alternative hypothesis: true mean is not equal to 7725
95 percent confidence interval:
 5986.348 7520.925
sample estimates:
```

```
mean of x
 6753.636

> wilcox.test(daily.intake,mu=7725)

        Wilcoxon signed rank test with continuity
        correction

data:  daily.intake
V = 8, p-value = 0.0293
alternative hypothesis: true location is not equal to 7725

Warning message:
In wilcox.test.default(daily.intake, mu = 7725) :
  cannot compute exact p-value with ties
> a=wilcox.test(daily.intake,mu=7725)
Warning message:
In wilcox.test.default(daily.intake, mu = 7725) :
  cannot compute exact p-value with ties
> names(a)
[1] "statistic"   "parameter"   "p.value"
[4] "null.value"  "alternative" "method"
[7] "data.name"
> a$st
V
8
> a$p.va
[1] 0.0293025
> a$pa
NULL
> a$null
location
    7725
> a$al
[1] "two.sided"
> a

        Wilcoxon signed rank test with continuity
        correction

data:  daily.intake
V = 8, p-value = 0.0293
alternative hypothesis: true location is not equal to 7725

> wilcox.test(daily.intake,mu=7725)

        Wilcoxon signed rank test with continuity
        correction

data:  daily.intake
```

```
V = 8, p-value = 0.0293
alternative hypothesis: true location is not equal to 7725

Warning message:
In wilcox.test.default(daily.intake, mu = 7725) :
  cannot compute exact p-value with ties
> wilcox.test(daily.intake-7725)

        Wilcoxon signed rank test with continuity
        correction

data:  daily.intake - 7725
V = 8, p-value = 0.0293
alternative hypothesis: true location is not equal to 0

Warning message:
In wilcox.test.default(daily.intake - 7725) :
  cannot compute exact p-value with ties
> wilcox.test(daily.intake-7725,a="g")

        Wilcoxon signed rank test with continuity
        correction

data:  daily.intake - 7725
V = 8, p-value = 0.9883
alternative hypothesis: true location is greater than 0

Warning message:
In wilcox.test.default(daily.intake - 7725, a = "g") :
  cannot compute exact p-value with ties
> daily.intake
 [1] 5260 5470 5640 6180 6390 6515 6805 7515 7515
[10] 8230 8770
> daily.intake-7725
 [1] -2465 -2255 -2085 -1545 -1335 -1210  -920
 [8]  -210  -210   505  1045
> abs(daily.intake-7725)
 [1] 2465 2255 2085 1545 1335 1210  920  210  210
[10]  505 1045
> rank(abs(daily.intake-7725))
 [1] 11.0 10.0  9.0  8.0  7.0  6.0  4.0  1.5  1.5
[10]  3.0  5.0
> sign(daily.intake-7725)
 [1] -1 -1 -1 -1 -1 -1 -1 -1 -1  1  1
> sign(daily.intake-7725)*rank(abs(daily.intake-7725))
 [1] -11.0 -10.0  -9.0  -8.0  -7.0  -6.0  -4.0
 [8]  -1.5  -1.5   3.0   5.0
> k=sign(daily.intake-7725)*rank(abs(daily.intake-7725))
> k
 [1] -11.0 -10.0  -9.0  -8.0  -7.0  -6.0  -4.0
```

```
 [8]  -1.5  -1.5   3.0   5.0
> k>0
 [1] FALSE FALSE FALSE FALSE FALSE FALSE FALSE
 [8] FALSE FALSE  TRUE  TRUE
> k[k>0]
[1] 3 5
> k[k<0]
[1] -11.0 -10.0  -9.0  -8.0  -7.0  -6.0  -4.0
[8]  -1.5  -1.5
> sum(k[k>0])
[1] 8
> a<-3
> a
[1] 3
> (a<-3)
[1] 3
>  data(intake)
Warning message:
In data(intake) : data set ‘intake’ not found
> library(ISwR)
> data(intake)
> intake
    pre post
1  5260 3910
2  5470 4220
3  5640 3885
4  6180 5160
5  6390 5645
6  6515 4680
7  6805 5265
8  7515 5975
9  7515 6790
10 8230 6900
11 8770 7335
> attach(intake)
> t.test(pre,post,paired=T)

        Paired t-test

data:  pre and post
t = 11.941, df = 10, p-value = 3.059e-07
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 1074.072 1566.838
sample estimates:
mean of the differences
               1320.455

> t.test(pre-post)
```

```
        One Sample t-test

data:  pre - post
t = 11.941, df = 10, p-value = 3.059e-07
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 1074.072 1566.838
sample estimates:
mean of x
 1320.455

> pre
 [1] 5260 5470 5640 6180 6390 6515 6805 7515 7515
[10] 8230 8770
> post
 [1] 3910 4220 3885 5160 5645 4680 5265 5975 6790
[10] 6900 7335
> pre-post
 [1] 1350 1250 1755 1020  745 1835 1540 1540  725
[10] 1330 1435
> mean(pre-post)/(sd(pre-post)/sqrt(length(pre-post))
+ )
[1] 11.94139
> length(pre-post)-1
[1] 10
> pt(11.94139, 10)
[1] 0.9999998
> 1-pt(11.94139, 10)
[1] 1.529514e-07
> (1-pt(11.94139, 10))*2
[1] 3.059028e-07
> wilcox.test(pre,post,paired=T)

        Wilcoxon signed rank test with continuity
        correction

data:  pre and post
V = 66, p-value = 0.00384
alternative hypothesis: true location shift is not equal to 0

Warning message:
In wilcox.test.default(pre, post, paired = T) :
  cannot compute exact p-value with ties
>
> wilcox.test(pre-post)

        Wilcoxon signed rank test with continuity
        correction

data:  pre - post
```

```
V = 66, p-value = 0.00384
alternative hypothesis: true location is not equal to 0

Warning message:
In wilcox.test.default(pre - post) : cannot compute exact p-value with
ties
> pre
 [1] 5260 5470 5640 6180 6390 6515 6805 7515 7515 8230
[11] 8770
> post
 [1] 3910 4220 3885 5160 5645 4680 5265 5975 6790 6900
[11] 7335
> pre-post
 [1] 1350 1250 1755 1020  745 1835 1540 1540  725 1330
[11] 1435
> abs(pre-post)
 [1] 1350 1250 1755 1020  745 1835 1540 1540  725 1330
[11] 1435
> rank(abs(pre-post))
 [1]  6.0  4.0 10.0  3.0  2.0 11.0  8.5  8.5  1.0  5.0
[11]  7.0
> sum(1:11)
[1] 66
> Before=c(12.1,10.6,13.4,13.8,15.5)
> After=c(12.0,11.0,14.1,11.2,15.3)
> diff=Before-After
> diff
[1]  0.1 -0.4 -0.7  2.6  0.2
> shapiro.test(diff)

        Shapiro-Wilk normality test

data:  diff
W = 0.80253, p-value = 0.08496

> t.test(diff)

        One Sample t-test

data:  diff
t = 0.61685, df = 4, p-value = 0.5707
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 -1.26036  1.98036
sample estimates:
mean of x
     0.36

> wilcox.test(diff)
```

```
        Wilcoxon signed rank test

data:  diff
V = 8, p-value = 1
alternative hypothesis: true location is not equal to 0

> t.test(Diff)
Error in t.test(Diff) : object 'Diff' not found
> t.test(diff)

        One Sample t-test

data:  diff
t = 0.61685, df = 4, p-value = 0.5707
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 -1.26036  1.98036
sample estimates:
mean of x
     0.36

> t.test(Before,After,paired=T)

        Paired t-test

data:  Before and After
t = 0.61685, df = 4, p-value = 0.5707
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -1.26036  1.98036
sample estimates:
mean of the differences
                  0.36

> wilcox.test(Before, After, paired = TRUE)

        Wilcoxon signed rank test

data:  Before and After
V = 8, p-value = 1
alternative hypothesis: true location shift is not equal to 0

> wilcox.test(diff)

        Wilcoxon signed rank test

data:  diff
V = 8, p-value = 1
alternative hypothesis: true location is not equal to 0
```

```
> diff
[1]  0.1 -0.4 -0.7  2.6  0.2
> abs(diff)
[1] 0.1 0.4 0.7 2.6 0.2
> rank(abs(diff))
[1] 1 3 4 5 2
> 1+5+2
[1] 8
> sheep1<-Drug.treated.sheep<-c(18,43,28,50,16,32,13)
> sheep2<-Untreated.sheep<-c(40,54,26,63,21,37,39)
> sheep1
[1] 18 43 28 50 16 32 13
> sheep2
[1] 40 54 26 63 21 37 39
> shapiro.test(sheep1)

        Shapiro-Wilk normality test

data:  sheep1
W = 0.9256, p-value = 0.5142

> shapiro.test(sheep2)

        Shapiro-Wilk normality test

data:  sheep2
W = 0.9524, p-value = 0.7515

> var.test(sheep1,sheep2)

        F test to compare two variances

data:  sheep1 and sheep2
F = 0.92238, num df = 6, denom df = 6, p-value =
0.9244
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.1584911 5.3680240
sample estimates:
ratio of variances
         0.9223795

> var(sheep1)
[1] 198.619
> var(sheep1)/var(sheep2)
[1] 0.9223795
> pf(0.9223795,6,6)
[1] 0.4621874
> pf(0.9223795,6,6)*2
[1] 0.9243748
```

```
> t.test(sheep1,sheep2,var.equal=T)
```