```
Two Sample t-test

data:  sheep1 and sheep2
t = -1.4862, df = 12, p-value = 0.163
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -28.183636   5.326493
sample estimates:
mean of x mean of y
 28.57143  40.00000

> t.test(sheep1,sheep2,var.equal=T,a="l")

        Two Sample t-test

data:  sheep1 and sheep2
t = -1.4862, df = 12, p-value = 0.08152
alternative hypothesis: true difference in means is less than 0
95 percent confidence interval:
     -Inf 2.277215
sample estimates:
mean of x mean of y
 28.57143  40.00000

> wilcox.test(sheep1,sheep2,a="l")

        Wilcoxon rank sum test

data:  sheep1 and sheep2
W = 14, p-value = 0.1043
alternative hypothesis: true location shift is less than 0

> wilcox.test(sheep2,sheep1,a="g")

        Wilcoxon rank sum test

data:  sheep2 and sheep1
W = 35, p-value = 0.1043
alternative hypothesis: true location shift is greater than 0

> wilcox.test(sheep1,sheep2,a="l")

        Wilcoxon rank sum test

data:  sheep1 and sheep2
W = 14, p-value = 0.1043
alternative hypothesis: true location shift is less than 0
```

```
> sheep1
[1] 18 43 28 50 16 32 13
> sheep2
[1] 40 54 26 63 21 37 39
> c(sheep1,sheep2)
 [1] 18 43 28 50 16 32 13 40 54 26 63 21 37 39
> rank(c(sheep1,sheep2))
 [1]  3 11  6 12  2  7  1 10 13  5 14  4  8  9
> rank(c(sheep1,sheep2))[1:7]
[1]  3 11  6 12  2  7  1
> sum(rank(c(sheep1,sheep2))[1:7])
[1] 42
> sum(rank(c(sheep1,sheep2))[1:7])-7*8/2
[1] 14
> nonsmokers = c(18,22,21,17,20,17,23,20,22,21)
> smokers = c(16,20,14,21,20,18,13,15,17,21)
> shapiro.test(nonsmokers)

        Shapiro-Wilk normality test

data:  nonsmokers
W = 0.91199, p-value = 0.295

> shapiro.test(smokers)

        Shapiro-Wilk normality test

data:  smokers
W = 0.91941, p-value = 0.3521

> var.test(nonsmokers,smokers)

        F test to compare two variances

data:  nonsmokers and smokers
F = 0.52102, num df = 9, denom df = 9, p-value =
0.3456
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.1294138 2.0976199
sample estimates:
ratio of variances
        0.5210191

> t.test(nonsmokers,smokers,var.equal=T,a="g")
```

```
        Two Sample t-test

data:  nonsmokers and smokers
t = 2.2573, df = 18, p-value = 0.01833
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 0.6026879       Inf
sample estimates:
mean of x mean of y
     20.1      17.5

> wilcox.test(nonsmokers,smokers,a="g")

        Wilcoxon rank sum test with continuity
        correction

data:  nonsmokers and smokers
W = 76.5, p-value = 0.02358
alternative hypothesis: true location shift is greater than 0

Warning message:
In wilcox.test.default(nonsmokers, smokers, a = "g") :
  cannot compute exact p-value with ties
> c(nonsmokers,smokers)
 [1] 18 22 21 17 20 17 23 20 22 21 16 20 14 21 20 18 13
[18] 15 17 21
> rank(c(nonsmokers,smokers))
 [1]  8.5 18.5 15.5  6.0 11.5  6.0 20.0 11.5 18.5 15.5
[11]  4.0 11.5  2.0 15.5 11.5  8.5  1.0  3.0  6.0 15.5
> rank(c(nonsmokers,smokers))[1:10]
 [1]  8.5 18.5 15.5  6.0 11.5  6.0 20.0 11.5 18.5 15.5
> sum(rank(c(nonsmokers,smokers))[1:10])
[1] 131.5
> sum(rank(c(nonsmokers,smokers))[1:10])-10*11/2
[1] 76.5
>  Nd<-New.drug<-c(0,10,-3,15,2,27,19,21,18,10)
> Od<-Old.drug<-c(8,-4,7,5,10,11,9,12,7,8)
> Nd
 [1]  0 10 -3 15  2 27 19 21 18 10
> Od
 [1]  8 -4  7  5 10 11  9 12  7  8
> shapiro.test(Nd)

        Shapiro-Wilk normality test

data:  Nd
W = 0.95553, p-value = 0.7339
```

```
> shapiro.test(od)
Error in stopifnot(is.numeric(x)) : object 'od' not found
> shapiro.test(Od)

        Shapiro-Wilk normality test

data:  Od
W = 0.80515, p-value = 0.01674

> wilcox.test(Nd,Od,a="g")

        Wilcoxon rank sum test with continuity
        correction

data:  Nd and Od
W = 68, p-value = 0.09244
alternative hypothesis: true location shift is greater than 0

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

        Wilcoxon rank sum test with continuity
        correction

data:  Od and Nd
W = 32, p-value = 0.09244
alternative hypothesis: true location shift is less than 0

Warning message:
In wilcox.test.default(Od, Nd, a = "l") :
  cannot compute exact p-value with ties
> VarietyA=c(48.2,44.6,49.7,40.5,54.6,47.1,5 1.4)
Error: unexpected numeric constant in "VarietyA=c(48.2,44.6,49.7,40.5,54.6,47.1,5 1.4"
> VarietyA=c(48.2,44.6,49.7,40.5,54.6,47.1,51.4)
> VarietyB=c(41.5,40.1,44.0,41.2,49.8,41.7,46.8)
> VarietyA
[1] 48.2 44.6 49.7 40.5 54.6 47.1 51.4
> VarietyB
[1] 41.5 40.1 44.0 41.2 49.8 41.7 46.8
> shapiro(VarietyA- VarietyB)
Error in shapiro(VarietyA - VarietyB) : could not find function "shapiro"
> shapiro.test(VarietyA- VarietyB)

        Shapiro-Wilk normality test
```

```
data:  VarietyA - VarietyB
W = 0.75693, p-value = 0.01498

> wilcox.test(VarietyA- VarietyB)

        Wilcoxon signed rank test

data:  VarietyA - VarietyB
V = 27, p-value = 0.03125
alternative hypothesis: true location is not equal to 0

> wilcox.test(VarietyA,VarietyB,paired=T)

        Wilcoxon signed rank test

data:  VarietyA and VarietyB
V = 27, p-value = 0.03125
alternative hypothesis: true location shift is not equal to 0

> VarietyA-VarietyB
[1]  6.7  4.5  5.7 -0.7  4.8  5.4  4.6
> abs(VarietyA-VarietyB)
[1] 6.7 4.5 5.7 0.7 4.8 5.4 4.6
> rank(abs(VarietyA-VarietyB))
[1] 7 2 6 1 4 5 3
> sum(1:7)-1
[1] 27
> rank(abs(VarietyA-VarietyB))*sign(VarietyA-VarietyB)
[1]  7  2  6 -1  4  5  3
> a=rank(abs(VarietyA-VarietyB))*sign(VarietyA-VarietyB)
> a[a>0]
[1] 7 2 6 4 5 3
> sum(a[a>0])
[1] 27
> At<-Above.town<-c(4.8,5.2,5.0,4.9,5.1)
> Bt<-Below.town<-c(5.0,4.7,4.9,4.8,4.9)
> shapiro.test(At)

        Shapiro-Wilk normality test

data:  At
W = 0.98676, p-value = 0.9672

> shapiro.test(Bt)

        Shapiro-Wilk normality test
```

```
data:  Bt
W = 0.96086, p-value = 0.814

> var.test(At,Bt)

        F test to compare two variances

data:  At and Bt
F = 1.9231, num df = 4, denom df = 4, p-value =
0.5421
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
  0.200226 18.470250
sample estimates:
ratio of variances
         1.923077

> t.test(At,Bt,var.equal=T)

        Two Sample t-test

data:  At and Bt
t = 1.6059, df = 8, p-value = 0.147
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.06103278  0.34103278
sample estimates:
mean of x mean of y
     5.00      4.86

> At
[1] 4.8 5.2 5.0 4.9 5.1
> Bt
[1] 5.0 4.7 4.9 4.8 4.9
> sp=(4*var(At)+4*var(Bt))/8
> sp=sqrt((4*var(At)+4*var(Bt))/8)
> sp
[1] 0.1378405
> (mean(At)-mean(Bt))/sp*sqrt(2/5)
[1] 0.6423641
> (mean(At)-mean(Bt))/(sp*sqrt(2/5))
[1] 1.60591
> pt(1.6059,8)
[1] 0.9265184
> 1-pt(1.6059,8)
[1] 0.07348158
```

```
> (1-pt(1.6059,8))*2
[1] 0.1469632
> (mean(At)-mean(Bt))+qt(0.025,8)*sp*sqrt(2/5)
[1] -0.06103278
> (mean(At)-mean(Bt))-qt(0.025,8)*sp*sqrt(2/5)
[1] 0.3410328
> data(energy)
> energy
   expend stature
1    9.21   obese
2    7.53    lean
3    7.48    lean
4    8.08    lean
5    8.09    lean
6   10.15    lean
7    8.40    lean
8   10.88    lean
9    6.13    lean
10   7.90    lean
11  11.51   obese
12  12.79   obese
13   7.05    lean
14  11.85   obese
15   9.97   obese
16   7.48    lean
17   8.79   obese
18   9.69   obese
19   9.68   obese
20   7.58    lean
21   9.19   obese
22   8.11    lean
> attach(energy)
> t.test(expend~stature)

        Welch Two Sample t-test

data:  expend by stature
t = -3.8555, df = 15.919, p-value = 0.001411
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -3.459167 -1.004081
sample estimates:
 mean in group lean mean in group obese
          8.066154           10.297778

> wilcox.test(expend~stature)
```

```
        Wilcoxon rank sum test with continuity
        correction

data:  expend by stature
W = 12, p-value = 0.002122
alternative hypothesis: true location shift is not equal to 0

Warning message:
In wilcox.test.default(x = c(7.53, 7.48, 8.08, 8.09, 10.15, 8.4,  :
  cannot compute exact p-value with ties
> energy
   expend stature
1    9.21   obese
2    7.53    lean
3    7.48    lean
4    8.08    lean
5    8.09    lean
6   10.15    lean
7    8.40    lean
8   10.88    lean
9    6.13    lean
10   7.90    lean
11  11.51   obese
12  12.79   obese
13   7.05    lean
14  11.85   obese
15   9.97   obese
16   7.48    lean
17   8.79   obese
18   9.69   obese
19   9.68   obese
20   7.58    lean
21   9.19   obese
22   8.11    lean
> expend[stature=="lean"]
 [1]  7.53  7.48  8.08  8.09 10.15  8.40 10.88  6.13
 [9]  7.90  7.05  7.48  7.58  8.11
> expend[stature=="obese"]
[1]  9.21 11.51 12.79 11.85  9.97  8.79  9.69  9.68
[9]  9.19
> t.test(expend[stature=="lean"]
+ ,expend[stature=="obese"])

        Welch Two Sample t-test

data:  expend[stature == "lean"] and expend[stature == "obese"]
t = -3.8555, df = 15.919, p-value = 0.001411
```

```
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -3.459167 -1.004081
sample estimates:
mean of x mean of y
 8.066154 10.297778

> wilcox.test(expend[stature=="lean"],expend[stature=="obese"])

        Wilcoxon rank sum test with continuity
        correction

data:  expend[stature == "lean"] and expend[stature == "obese"]
W = 12, p-value = 0.002122
alternative hypothesis: true location shift is not equal to 0

Warning message:
In wilcox.test.default(expend[stature == "lean"], expend[stature ==  :
  cannot compute exact p-value with ties
> wilcox.test(expend~stature)

        Wilcoxon rank sum test with continuity
        correction

data:  expend by stature
W = 12, p-value = 0.002122
alternative hypothesis: true location shift is not equal to 0

Warning message:
In wilcox.test.default(x = c(7.53, 7.48, 8.08, 8.09, 10.15, 8.4,  :
  cannot compute exact p-value with ties
> var.test(expend[stature=="lean"],expend[stature=="obese"])

        F test to compare two variances

data:  expend[stature == "lean"] and expend[stature == "obese"]
F = 0.78445, num df = 12, denom df = 8, p-value
= 0.6797
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.1867876 2.7547991
sample estimates:
ratio of variances
          0.784446

> var.test(expend~stature)
```

F test to compare two variances

data: expend by stature
F = 0.78445, num df = 12, denom df = 8, p-value
= 0.6797
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
0.1867876 2.7547991
sample estimates:
ratio of variances
0.784446

```
> a=read.table("~/Desktop/d_logret_6stocks.txt",header=T)
> a
       Date       Pfizer        Intel    Citigroup
1  1-Aug-00 -0.001438612  0.049981263  0.044275101
2  1-Sep-00  0.017489274 -0.255619266 -0.033536503
3  2-Oct-00 -0.017046116  0.034546736 -0.011645582
4  1-Nov-00  0.012012934 -0.072550667 -0.022674793
5  1-Dec-00  0.016278701 -0.102497868  0.010708311
6  2-Jan-01 -0.008063083  0.090223122  0.039900620
7  1-Feb-01 -0.000422980 -0.112194230 -0.055096146
8  1-Mar-01 -0.040906294 -0.035702138 -0.038726816
9  2-Apr-01  0.024190228  0.069994483  0.038511978
10 1-May-01 -0.002978787 -0.058260610  0.019333184
11 1-Jun-01 -0.029781389  0.034634870  0.013258067
12 2-Jul-01  0.012504432  0.008168789 -0.022187219
13 1-Aug-01 -0.030663200 -0.027529477 -0.038475736
14 4-Sep-01  0.019815480 -0.135934121 -0.053479798
15 1-Oct-01  0.019063731  0.077211653  0.050835509
16 1-Nov-01  0.015543895  0.126580684  0.023566060
17 3-Dec-01 -0.036145791 -0.016421934  0.022871285
18 2-Jan-02  0.019356687  0.046876533 -0.025940517
19 1-Feb-02 -0.006050198 -0.088680731 -0.020151007
20 1-Mar-02 -0.013187975  0.027384065  0.039197815
21 1-Apr-02 -0.038640426 -0.026448085 -0.058277811
22 1-May-02 -0.020012226 -0.014900615  0.000481346
23 3-Jun-02  0.004989620 -0.179572434 -0.046948457
24 1-Jul-02 -0.034159152  0.012261550 -0.062746165
25 1-Aug-02  0.011452067 -0.051537916  0.022330581
26 3-Sep-02 -0.056822917 -0.079127863 -0.043102044
27 1-Oct-02  0.039382501  0.095369960  0.097624046
28 1-Nov-02 -0.001620779  0.082000518  0.022127194
29 2-Dec-02 -0.013493147 -0.127500953 -0.043258124
30 2-Jan-03 -0.000914625  0.002562217 -0.008110182
31 3-Feb-03 -0.007697729  0.042681011 -0.012956568
32 3-Mar-03  0.018994390 -0.025156666  0.014203546
```

33	1-Apr-03	-0.005686915	0.053056729	0.056727624
34	1-May-03	0.005686915	0.054144721	0.021322255
35	2-Jun-03	0.041784483	-0.000213046	0.018444872
36	1-Jul-03	-0.010109859	0.077829522	0.023189447
37	1-Aug-03	-0.045266311	0.060434430	-0.014198430
38	2-Sep-03	0.006546894	-0.016587184	0.021075597
39	1-Oct-03	0.017184425	0.078321576	0.020888904
40	3-Nov-03	0.028255616	0.007861351	-0.003462108
41	1-Dec-03	0.022153888	-0.019719492	0.013782077
42	2-Jan-04	0.015748075	-0.021237664	0.011862818
43	2-Feb-04	0.002115176	-0.018679024	0.006780909
44	1-Mar-04	-0.019288230	-0.030753805	0.012267738
45	1-Apr-04	0.008607804	-0.024068646	-0.027843588
46	3-May-04	-0.003063819	0.045791862	-0.015263851
47	1-Jun-04	-0.013135825	-0.014787260	0.000692103
48	1-Jul-04	-0.030491723	-0.053760665	-0.019188415
49	2-Aug-04	0.011876253	-0.058250748	0.023904782
50	1-Sep-04	-0.028332050	-0.025811490	-0.023595125
51	1-Oct-04	-0.024200939	0.045251691	0.006452318
52	1-Nov-04	-0.015356644	0.003157084	0.003644451
53	1-Dec-04	-0.014084690	0.019040089	0.032148678
54	3-Jan-05	-0.046516472	-0.017862074	0.007701610
55	1-Feb-05	0.039975516	0.030472706	-0.008076244
56	1-Mar-05	-0.000338104	-0.013929818	-0.026065490
57	1-Apr-05	0.014633051	0.005252870	0.023245386
58	2-May-05	0.014630589	0.060803225	0.001318328
59	1-Jun-05	-0.005088825	-0.015344193	-0.008162243
60	1-Jul-05	-0.017295755	0.018252426	-0.022110024
61	1-Aug-05	-0.014040733	-0.022132340	0.002713407
62	1-Sep-05	-0.008682706	-0.018343450	0.016994806
63	3-Oct-05	-0.060303366	-0.020818266	0.002497608
64	1-Nov-05	0.002411637	0.058709923	0.038299120

	AmerExp	Exxon	GenMotor
1	0.017410003	0.0102248940	0.093294017
2	0.012656982	0.0379890200	-0.032209239
3	-0.004897625	0.0003305550	-0.019602167
4	-0.038275870	-0.0036500200	-0.094891600
5	0.000000000	-0.0052520490	0.012461253
6	-0.066129678	-0.0141692430	0.022971579
7	-0.030733152	-0.0140468950	0.000824088
8	-0.026380545	-0.0002400080	-0.012105099
9	0.011868735	0.0388974880	0.024082196
10	-0.002446047	0.0028442560	0.020148775
11	-0.035641970	-0.0068134640	0.053440295
12	0.017739418	-0.0194814020	-0.005100405
13	-0.044368019	-0.0146074300	-0.061635162
14	-0.098043942	-0.0082241460	-0.105946472

15 0.006689711 0.0006100500 -0.016274333
16 0.048543672 -0.0207262340 0.085210960
17 0.035242521 0.0215788660 -0.009657415
18 0.002871379 -0.0028078170 0.022139216
19 0.007237226 0.0269480740 0.019672220
20 0.050683167 0.0258072640 0.057331233
21 0.001375340 -0.0378280050 0.025768635
22 0.015691714 -0.0001183520 -0.010495544
23 -0.068454444 0.0106401330 -0.065487824
24 -0.011860070 -0.0465282000 -0.060041503
25 0.009740522 -0.0130506960 0.016998701
26 -0.063162423 -0.0457869330 -0.090010126
27 0.067951966 0.0233571050 -0.068058029
28 0.029514688 0.0172318270 0.083238291
29 -0.040869439 0.0017395890 -0.032155007
30 0.002151752 -0.0098600090 -0.006417575
31 -0.024428147 0.0012277850 -0.025617995
32 -0.004565156 0.0116929920 -0.001942487
33 0.057647618 0.0031710110 0.030362391
34 0.041490099 0.0176708400 -0.002801910
35 0.001579917 -0.0059815860 0.008214181
36 0.024870758 -0.0039908770 0.016906014
37 0.008620388 0.0281661160 0.046380496
38 0.000112293 -0.0129172300 -0.001791893
39 0.018572284 -0.0002498100 0.018169063
40 -0.011445240 -0.0015018840 0.006155458
41 0.024270976 0.0541511150 0.096343714
42 0.031325870 -0.0022191900 -0.031390331
43 0.013019280 0.0171231800 -0.009458693
44 -0.012145545 -0.0060304690 -0.007941261
45 -0.024949111 0.0098634440 0.001620126
46 0.015239967 0.0099553100 -0.014176433
47 0.006594513 0.0114509890 0.011337234
48 -0.009580051 0.0180838070 -0.033399340
49 -0.002001822 0.0007736270 -0.013614662
50 0.012265109 0.0204755860 0.012073829
51 0.014388280 0.0079454680 -0.042109935
52 0.021085951 0.0198988810 0.006031965
53 0.005093112 0.0000864354 0.016341604
54 -0.022982941 0.0028427590 -0.036824626
55 0.006507102 0.0909272820 -0.007985210
56 -0.021854120 -0.0261940260 -0.083992068
57 0.011111802 -0.0191303460 -0.042013994
58 0.009356124 -0.0041946140 0.079608491
59 -0.004091884 0.0097251450 0.032753690
60 0.014246467 0.0095867970 0.034619924
61 0.001894712 0.0105471960 -0.025993870

```
62  0.016950229  0.0256082320 -0.047977476
63 -0.003389887 -0.0538313140 -0.048092196
64  0.024183203  0.0319235510 -0.070676054
> head(a)
      Date       Pfizer       Intel   Citigroup
1 1-Aug-00 -0.001438612  0.04998126  0.04427510
2 1-Sep-00  0.017489274 -0.25561927 -0.03353650
3 2-Oct-00 -0.017046116  0.03454674 -0.01164558
4 1-Nov-00  0.012012934 -0.07255067 -0.02267479
5 1-Dec-00  0.016278701 -0.10249787  0.01070831
6 2-Jan-01 -0.008063083  0.09022312  0.03990062
       AmerExp        Exxon    GenMotor
1  0.017410003  0.010224894  0.09329402
2  0.012656982  0.037989020 -0.03220924
3 -0.004897625  0.000330555 -0.01960217
4 -0.038275870 -0.003650020 -0.09489160
5  0.000000000 -0.005252049  0.01246125
6 -0.066129678 -0.014169243  0.02297158
> attach(a)
> wilcox.test(Pfizer,Intel)

        Wilcoxon rank sum test with continuity
        correction

data:  Pfizer and Intel
W = 2019, p-value = 0.892
alternative hypothesis: true location shift is not equal to 0

> t.test(Pfizer,Intel)

        Welch Two Sample t-test

data:  Pfizer and Intel
t = 0.21707, df = 77.394, p-value = 0.8287
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.01588991  0.01977844
sample estimates:
   mean of x    mean of y
-0.004041315 -0.005985579

> t.test(Pfizer,Intel,var.equal=T)

        Two Sample t-test

data:  Pfizer and Intel
t = 0.21707, df = 126, p-value = 0.8285
```

```
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.01578133  0.01966986
sample estimates:
   mean of x    mean of y
-0.004041315 -0.005985579

> t.test(Pfizer,Intel,var.equal=T,a="l")

        Two Sample t-test

data:  Pfizer and Intel
t = 0.21707, df = 126, p-value = 0.5857
alternative hypothesis: true difference in means is less than 0
95 percent confidence interval:
      -Inf 0.01678631
sample estimates:
   mean of x    mean of y
-0.004041315 -0.005985579

> var.test(Pfizer,Intel)

        F test to compare two variances

data:  Pfizer and Intel
F = 0.11577, num df = 63, denom df = 63, p-value =
3.703e-15
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.07033263 0.19055829
sample estimates:
ratio of variances
         0.115769

> wilcox.test(Pfizer,Intel)

        Wilcoxon rank sum test with continuity correction

data:  Pfizer and Intel
W = 2019, p-value = 0.892
alternative hypothesis: true location shift is not equal to 0

> t.test(Pfizer,Intel)

        Welch Two Sample t-test

data:  Pfizer and Intel
```

```
t = 0.21707, df = 77.394, p-value = 0.8287
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.01588991  0.01977844
sample estimates:
   mean of x    mean of y
-0.004041315 -0.005985579

> w1=var(Pfizer)/length(Pfizer)
> w1
[1] 8.324173e-06
> w2=var(Intel)/length(Intel)
> w2
[1] 7.190328e-05
> (w1+w2)^2/(w1^2/(length(Pfizer)-1)+w2^2/(length(Pfizer)-1))
[1] 77.39398
>
```