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AMS 394

3.1:

```
stocks <-
read.table("http://www.ams.sunysb.edu/~xing/statfinbook/_BookData/Chap03/d_logret_6stocks.txt",
header=T)
```

(1)

```
> t.test(stocks[,5],mu = 0)

        One Sample t-test


data:  stocks[, 5]

t = 0.18782, df = 63, p-value = 0.8516

alternative hypothesis: true mean is not equal to 0

95 percent confidence interval:

 -0.006792534  0.008201838

sample estimates:

   mean of x

0.0007046519
```

(2)

```
> wilcox.test(stocks[,5],mu = 0)


        Wilcoxon signed rank test with continuity correction


data:  stocks[, 5]

V = 1153, p-value = 0.3225

alternative hypothesis: true location is not equal to 0
```

(3)

```
> t.test(stocks[,2],stocks[,5])

        Welch Two Sample t-test

data:  stocks[, 2] and stocks[, 5]
t = -1.0028, df = 118.21, p-value = 0.318
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.014118044  0.004626111
sample estimates:
    mean of x     mean of y
-0.0040413145  0.0007046519
```

(4)

```
> wilcox.test(stocks[,2],stocks[,5],mu = 0)

        Wilcoxon rank sum test with continuity correction

data:  stocks[, 2] and stocks[, 5]
W = 1757, p-value = 0.1662
alternative hypothesis: true location shift is not equal to 0
```

(5)

```
> var.test(stocks[,2],stocks[,5])

        F test to compare two variances

data:  stocks[, 2] and stocks[, 5]
F = 0.5914, num df = 63, denom df = 63, p-value = 0.03896
alternative hypothesis: true ratio of variances is not equal to 1
```

95 percent confidence interval:

 0.3592924 0.9734621

sample estimates:

ratio of variances

0.591403

3.2:

```
> rats = matrix(c(152,157,179,182,176,149,384,369,354,375,366,423),nrow = 6,ncol = 2)
> shapiro.test(rats[,1])

	Shapiro-Wilk normality test

data:  rats[, 1]
W = 0.85134, p-value = 0.1614
> shapiro.test(rats[,2])

	Shapiro-Wilk normality test

data:  rats[, 2]
W = 0.8694, p-value = 0.2238
> var.test(rats[,1],rats[,2])

	F test to compare two variances

data:  rats[, 1] and rats[, 2]
F = 0.38015, num df = 5, denom df = 5, p-value = 0.3121
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.0531944 2.7166794
sample estimates:
```

ratio of variances

0.3801475

> grubbs.test(rats[,2])

Grubbs test for one outlier

data: rats[, 2]

G = 1.85760, U = 0.17188, p-value = 0.03535

alternative hypothesis: highest value 423 is an outlier

> wilcox.test(rats[,1],rats[,2],paired = FALSE, var.equal = TRUE,conf.level = .05)

Wilcoxon rank sum test

data: rats[, 1] and rats[, 2]

W = 0, p-value = 0.002165

alternative hypothesis: true location shift is not equal to 0Response: Was told by a TA that shapiro test should be used instead of qqplot test, which results in different conclusions as to whether or not data distribution is normal. Using Shapiro test, data distribution is assumed to be normal since normal distribution cannot be rejected. The variances do not have a significant difference, as denoted by var.test. The data is unpaired. Grubbs test concludes there is an outlier in the data set for 5 degrees Celsius. A non parametric test should be used. Since the p-value is less than .05, we should conclude that rats exposed to a 5 degree Celsius environment have a higher mean blood pressure than rats exposed to a 26 degree Celsius environment.

3.3:

(a)

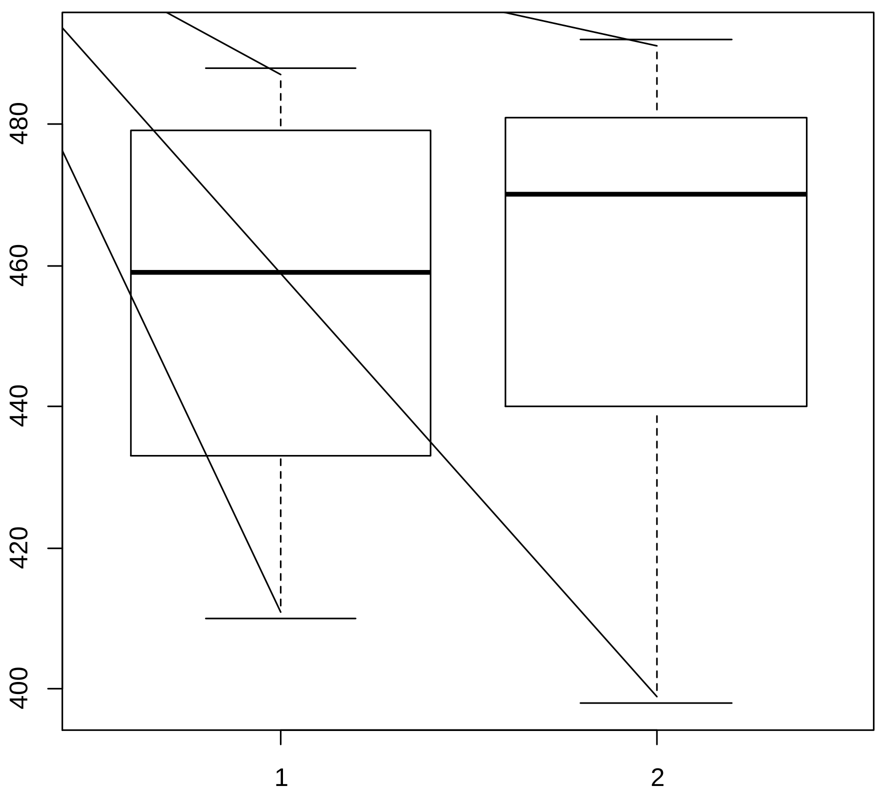
> cornea = matrix(c(488,484,478,478,480,492,426,444,440,436,410,398,458,464,460,476),nrow = 2, ncol = 8)

> cornea

```
     [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]
[1,]  488  478  480  426  440  410  458  460
[2,]  484  478  492  444  436  398  464  476
```

#Beginning of test for outliers

> boxplot(t(cornea))



#End of test for outliers

#Beginning of test for distribution type

> shapiro.test(cornea[1,])

Shapiro-Wilk normality test

data: cornea[1,]

```
W = 0.9402, p-value = 0.6131

> shapiro.test(cornea[2,])


	Shapiro-Wilk normality test


data:  cornea[2, ]

W = 0.90211, p-value = 0.3018

#End of test for distribution type

#Beginning of test for significant difference in variance

> var.test(cornea[1,],cornea[2,])


	F test to compare two variances


data:  cornea[1, ] and cornea[2, ]

F = 0.78205, num df = 7, denom df = 7, p-value = 0.7539

alternative hypothesis: true ratio of variances is not equal to 1

95 percent confidence interval:

 0.1565697 3.9062752

sample estimates:

ratio of variances

        0.7820513

#End of test for significant difference in variance
```

Note: The data has no outliers, is normally distributed, and has no significant difference in variance. Therefore, the paired t test should be used.

```
> t.test(cornea[1,],cornea[2,],paired = TRUE,mu = 0, conf.int = TRUE, conf.level = .9,var.equal = TRUE)


	Paired t-test
```

data: cornea[1,] and cornea[2,]

t = -1.053, df = 7, p-value = 0.3273

alternative hypothesis: true difference in means is not equal to 0

90 percent confidence interval:

-11.196549   3.196549

sample estimates:

mean of the differences

-4

Response: At a significance level of .1, you cannot conclude the corneal thickness is not equal for affected versus unaffected eyes.

(b)

90 percent confidence interval:

-11.196549   3.196549

3.4:

```
> pt <- c(28, 25, 27, 31, 10, 26, 30, 15, 55, 12, 24, 32, 28 ,42 ,38)
> shapiro.test(pt)
```

Shapiro-Wilk normality test

data: pt

W = 0.94167, p-value = 0.4038

Note: While qqplot might be the better way to determine if data is normally distributed, was told to use shapiro test. They yield different conclusions on whether or not the data is normally distributed.

The data is normally distributed according to the shapiro test.

```
> t.test(pt, mu = 25, conf.level = .95, alternative = c("greater"))
```

One Sample t-test

data: pt

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

Response: The current processing time is not significantly greater than 25.