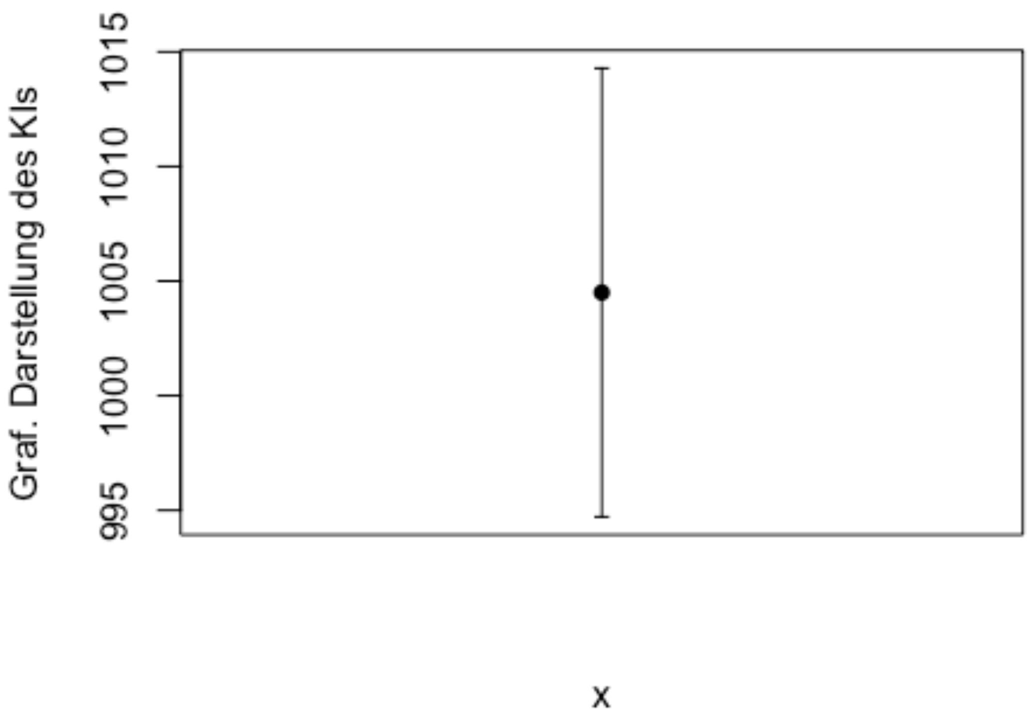
Konfidenintervalle und Tests in R

```r
#Konfidenzintervalle fuer einen Mittelwert

#95%-Konfidenzintervall fuer Mittelwert
x<-c(990,1003,1010,1008,998,1018)
mean(x)

## [1] 1004.5

sd(x)

## [1] 9.792855

t.test(x,mu=1000,conf.level=0.95)

##
##  One Sample t-test
##
## data:  x
## t = 1.1256, df = 5, p-value = 0.3114
## alternative hypothesis: true mean is not equal to 1000
## 95 percent confidence interval:
##   994.223 1014.777
## sample estimates:
## mean of x
##    1004.5

#90%-Konfidenzintervall fuer Mittelwert
t.test(x,mu=1000,conf.level=0.90)

##
##  One Sample t-test
##
## data:  x
## t = 1.1256, df = 5, p-value = 0.3114
## alternative hypothesis: true mean is not equal to 1000
## 90 percent confidence interval:
##   996.444 1012.556
## sample estimates:
## mean of x
##    1004.5
```

```
#Grafische Darstellung: Error Plot
alpha=0.05
se<-function(x) {sd(x)/sqrt(length(x))}
ug<-mean(x)-qt(1-alpha/2,length(x-1))*se(x)
og<-mean(x)+qt(1-alpha/2,length(x-1))*se(x)

#install.packages("Hmisc")
library(Hmisc)
errbar(1,mean(x),ug,og,ylab=c("Graf. Darstellung des KIs"),xlab="x",xaxt="n")
```



```r
#Konfidenzintervalle fuer einen Anteil

#install.packages("binom")
library(binom)
binom.confint(200,4400)

##           method   x    n       mean      lower      upper
## 1  agresti-coull 200 4400 0.04545455 0.03967351 0.05202858
## 2     asymptotic 200 4400 0.04545455 0.03929982 0.05160927
## 3          bayes 200 4400 0.04555783 0.03946444 0.05176732
## 4        cloglog 200 4400 0.04545455 0.03957903 0.05189352
## 5          exact 200 4400 0.04545455 0.03948978 0.05203160
## 6          logit 200 4400 0.04545455 0.03968172 0.05202170
## 7         probit 200 4400 0.04545455 0.03962700 0.05195226
## 8        profile 200 4400 0.04545455 0.03956279 0.05187528
## 9            lrt 200 4400 0.04545455 0.03956185 0.05187456
## 10     prop.test 200 4400 0.04545455 0.03958001 0.05213668
## 11        wilson 200 4400 0.04545455 0.03968624 0.05201585

#exaktes 90% KI
binom.confint(2,10,conf.level=0.9,method="exact")

##   method x  n mean      lower     upper
## 1  exact 2 10  0.2 0.03677144 0.5069013
```

```r
#t-Test Familie

#Einstichproben t-Test gegen Referenzwert 210
x<-c(202,214,245,232,213,210,211,234,212,210)
t.test(x,mu=210,conf.level=0.95)

##
##  One Sample t-test
##
## data:  x
## t = 1.9153, df = 9, p-value = 0.08771
## alternative hypothesis: true mean is not equal to 210
## 95 percent confidence interval:
##  208.497 228.103
## sample estimates:
## mean of x
##     218.3

#unabhaengiger Zweistichproben t-Test
x<-c(130,166,144,119,124,151,127,129,111,120)
y<-c(108,118,134,145,137,112,195)
t.test(x,y, var.equal=TRUE)

##
##  Two Sample t-test
##
## data:  x and y
## t = -0.30957, df = 15, p-value = 0.7611
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -27.37269  20.42983
## sample estimates:
## mean of x mean of y
##  132.1000  135.5714

tt<-t.test(x,y,alternative="two.sided",conf.level=0.95, var.equal=TRUE)
pt(tt$statistic,15)*2 #p-Wert bei Varianzhomogenitaet

##         t
## 0.7611449
```

```r
#einseitiger t-Test
t.test(x,y, var.equal=TRUE,alternative="less")

##
##  Two Sample t-test
##
## data:  x and y
## t = -0.30957, df = 15, p-value = 0.3806
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##     -Inf 16.1866
## sample estimates:
## mean of x mean of y
##  132.1000  135.5714

t.test(x,y, var.equal=TRUE,alternative="greater")

##
##  Two Sample t-test
##
## data:  x and y
## t = -0.30957, df = 15, p-value = 0.6194
## alternative hypothesis: true difference in means is greater than 0
## 95 percent confidence interval:
##  -23.12946       Inf
## sample estimates:
## mean of x mean of y
##  132.1000  135.5714
```

```r
#t-Test bei Varianzheterogenitaet
#F-Test der Varianz
x<-c(108,118,134,145,137,112,395)
y<-c(130,166,144,119,124,151,127,129,111,12)
var(x)

## [1] 10551.14

var(y)

## [1] 1736.456

var.test(x,y)

##
##  F test to compare two variances
##
## data:  x and y
## F = 6.0763, num df = 6, denom df = 9, p-value = 0.01719
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##   1.406631 33.561615
## sample estimates:
## ratio of variances
##           6.076253

var.test(y,x)

##
##  F test to compare two variances
##
## data:  y and x
## F = 0.16458, num df = 9, denom df = 6, p-value = 0.01719
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.02979594 0.71091872
## sample estimates:
## ratio of variances
##          0.1645751

t.test(x,y,var.equal=FALSE)

##
##  Welch Two Sample t-test
##
## data:  x and y
## t = 1.045, df = 7.3966, p-value = 0.329
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -53.0614 138.7471
## sample estimates:
## mean of x mean of y
##  164.1429  121.3000
```

```r
#gepaarter t-Test
x<-c(4.7,4.9,5,4.3,7.8)
y<-c(5.7,5.6,5.9,5.3,7.9)
diff=x-y
t.test(diff,mu=0)
```

```
##
##  One Sample t-test
##
## data:  diff
## t = -4.3757, df = 4, p-value = 0.01191
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  -1.2095395 -0.2704605
## sample estimates:
## mean of x
##     -0.74
```

```r
t.test(x,y,paired=TRUE)
```

```
##
##  Paired t-test
##
## data:  x and y
## t = -4.3757, df = 4, p-value = 0.01191
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.2095395 -0.2704605
## sample estimates:
## mean of the differences
##                   -0.74
```

```r
#Tests bei kategorialen Daten

#Chi-Quadrat-Test bei einer Stichprobe
o<-c(20,15,15)
pe<-c(0.5,0.2,0.3)
chisq.test(o,p=pe)

##
##  Chi-squared test for given probabilities
##
## data:  o
## X-squared = 3.5, df = 2, p-value = 0.1738

#Chi-Quadrat-Test bei mehr als einer Stichprobe
m<-matrix(c(8,25,17,22,42,26),3,2)
m

##      [,1] [,2]
## [1,]    8   22
## [2,]   25   42
## [3,]   17   26

chisq.test(m)$expected

##          [,1]     [,2]
## [1,] 10.71429 19.28571
## [2,] 23.92857 43.07143
## [3,] 15.35714 27.64286

chisq.test(m)

##
##  Pearson's Chi-squared test
##
## data:  m
## X-squared = 1.4176, df = 2, p-value = 0.4922
```

```r
#Fisher's Exakter Test
m<-matrix(c(2,8,7,3),2,2)
m
```

```
##      [,1] [,2]
## [1,]    2    7
## [2,]    8    3
```

```r
fisher.test(m)
```

```
##
##  Fisher's Exact Test for Count Data
##
## data:  m
## p-value = 0.06978
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.007870555 1.133635839
## sample estimates:
## odds ratio
##  0.1226533
```

```r
chisq.test(m,correct=FALSE)
```

```
## Warning in chisq.test(m, correct = FALSE): Chi-squared approximation may
## be incorrect
```

```
##
##  Pearson's Chi-squared test
##
## data:  m
## X-squared = 5.0505, df = 1, p-value = 0.02462
```