21 July 2017

Homework Exercises

Exercise H.20

A central consumer organisation would like to verify if a certain milk product triggers nausea in product consumers. In a study with ten people, seven people reported a nausea after the consumption of this milk product.

a) Test the null hypothesis at the significance level $\alpha = 0.05$ that the proportion ϑ of people with nausea symptoms after the consumption of this product in the general population is at most 60%. State als the corresponding test problem.

b) How large is the probability for Type I error of the statistical test that you suggested in part a) if $\vartheta_0 = 0.6$ is the true proportion.

Hint:

```
round(pbinom(0:10, size = 10, prob = 0.4), digits = 4)
```

```
##  [1] 0.0060 0.0464 0.1673 0.3823 0.6331 0.8338 0.9452 0.9877 0.9983 0.9999
## [11] 1.0000
```

```
round(pbinom(0:10, size = 10, prob = 0.6), digits = 4)
```

```
##  [1] 0.0001 0.0017 0.0123 0.0548 0.1662 0.3669 0.6177 0.8327 0.9536 0.9940
## [11] 1.0000
```

Exercise H.21

100 randomly selected students of the TUM were surveyed in December 1997 about their study course and their opinion on the student strikes of 1997
(see `http://de.wikipedia.org/wiki/Studentenstreik_1997`). From this survey the following frequencies were determined:

```
table(studycourse, opinion)
```

```
##                    opinion
## studycourse         negative neutral positive
##   Business Sciences       20      10       10
##   Computer Science         5       5       10
##   Mathematics              5      15       20
```

Test at the significance level 0.01 whether the variables subject of study and opinion on the student strike are independent.

Hint:

(please look for the next page)

```r
c(qchisq(0.99, df = 2), qchisq(0.99, df = 3), qchisq(0.99, df = 4),
  qchisq(0.99, df = 5), qchisq(0.99, df = 6))
```

```
## [1]  9.21034 11.34487 13.27670 15.08627 16.81189
```