Tutorial Business Analytics

Homework 1

Exercise 1: Game of dice with R

a) Have a look at the methods *sample()* and *table()* using the embedded help of R Studio or this tutorial: http://www.cyclismo.org/tutorial/R/tables.html
Describe the functionality of above-named methods.

b) Generate a random sample of 1000 observations in a fair die experiment and store it in a variable called *w1*. Find the absolute and relative frequency of the random sample and construct a bar chart for the relative frequency of the numbers 1 to 6. Additionally calculate the mean and variance of the numbers 1 to 6.

c) Generate a random sample of 1000 observations in a fair die experiment and store it in a variable called *w2*. Is *w1* exactly identical to *w2*?

d) On the R-command line, type *w12 <- w1 + w2*. Interpret the data from the vector *w12*.
What are the mean and variance of the sum of the face values? Construct a suitable graph to illustrate the relative frequency of the face values.

Note:
The command *sample(…)* can be used to generate random numbers. In order for the results to be comparable it needs to be initialized with the command *set.seed(10)*.

Exercise 2: Import the data from the file „E1-3-data.csv“. It holds 3 columns of data, each contains 100 samples and each has a different distribution.

a) Which sample was taken from a normally distributed population?

b) Find the corresponding normal distribution for the sample referred to above by calculating mean and standard deviation

c) Construct a histogram from the same normally distributed sample from above and overlay it with its density curve. In order to do so, create a vector x with a suitable range: x <- seq(from, to, length=1000). Then overlay the histogram with the density function: lines(x, dnorm(x, mean, sd)).

d) The sampling process was simulated with a N(10,80)-distribution. Add the true density function to the chart.