1 MATLAB Basics

1.1 Variables

a) Assign the value 10 to the variable `skalar`!

b) Multiply `skalar` by π!

c) Now assign the value of the default answering variable `ans` to the variable `skalar`!

d) How does the `log`-function work and what arguments and parameters can be used with the `log`-function? Call the MATLAB-Help in the command window and the help browser.

e) Calculate $1/0$ and $0/0$ in MATLAB.
What differences show the results?

f) Assign the value of the function $\sin(t)e^{-t}$ at $t = 2$ to to the variable `skalar`!

g) Show which variables are held in the workspace.

h) Delete all variables held in the workspace.

1.2 Vectors und matrizes

a) Define a row vector `v` from 0 to 10 with step size 2!

b) Define a column vector `w` from 0 to -5 with step size 1!

c) Add and subtract `v` and `w`. The result should be a row vector!

d) Multiply `v+w` with `v-w` element-by-element. The result should be a row vector!

e) Generate a matrix `m` with `v` as first row and `w` as second row!

f) Generate a 2x3-matrix `mm` containing the last three columns of matrix `m`!

g) Show the dimension of matrix `mm`!

h) Interchange the first and the second column of `mm`!

i) Generate a vector from 0 to 10 with 5 elements!

j) Generate a logarithmic vector from 0.01 to 100 with 5 elements!

k) Generate an identity matrix of dimension 3!

1.3 Structures

a) Generate a structure `student` with the fields `name`, `christianname` und `age` and assign your corresponding data to student!

b) Generate a second data entry of structure `student` with the data of the student to your left or right. Do not overwrite your own data entry of structure `student`!

1.4 Relational and logical operators

a) Generate variables a=0 and b=1.

Calculate NOT(NOT(a) AND NOT(b))!

b) Calculate NOT(NOT(a) OR NOT(b))!

c) Check your results from a) and b) with column vectors a=(0 0 1 1) and b=(0 1 0 1) with the help of a matrix containing a, b and the results of a) and b)!

d) Check if a variable c exists in the workspace.

e) What kind of variable, file, directory etc is bode?

f) Generate a vector v from -3 to 3 with step size 1 and multiply all values of the vector lower zero by 2!

g) Output the vector-indices for all values of v greater or equal to zero.

1.5 Control and loop statements

a) Generate a for-loop from 1 to 10 which outputs a + for each even and a – for each odd number (use command disp('+'))!

b) Generate a while-loop generating two random numbers between 0 and 1 in each loop iteration, whereby the loop will be stopped if the absolute difference between the current loop iterations random numbers is smaller than 0.2.

1.6 MATLAB scripts und functions

a) Generate a function basic_calc.m returning the results of the basic arithmetics +, -, * and / for two scalars.

b) Amend basic_calc.m in such a way that it can be used for operating on vectors and matrices. Test the amended function with b=[1 2 3] and c=[1 1/2 1/3].

c) Generate a function minmax.m returning fr a vector the element with the greatest and the smallest value and the average value over all vector elements. Test the function with a vector from 1 to 100 step size 1.