

Übungen zur Vorlesung
Einführung in das Programmieren für TM

Serie 2

Aufgabe 2.1. Write a function `dabs` that computes the modulus $|x|$ of a given number $x \in \mathbb{R}$. Moreover, write a main program that computes x and prints out $|x|$. The mathematical library `libm.so` must not be used. Save your source code as `dabs.c` into the directory `serie02`.

Aufgabe 2.2. Write a function `radian`, which, given the magnitude of an angle $\theta \in \mathbb{R}^+$ measured in degrees, computes the measure in radians. The computed value ψ must be in reduced form, i.e., $\psi \in [0, 2\pi)$. Save your source code as `radian.c` into the directory `serie02`.

Aufgabe 2.3. Write a function `member` that computes for given $n \in \mathbb{N}$ the member $a_n := (-1)^n/n$ of the series $(a_n)_{n \in \mathbb{N}}$. Moreover, write a main program that reads in n and prints out a_n . Save your source code as `member.c` into the directory `serie02`.

Aufgabe 2.4. Write a function `rounding`, which, given $x \in \mathbb{R}$, computes the number $n \in \mathbb{Z}$ which is closest to x . If x is exactly in the middle between two integers n and $n + 1$, the function chooses the biggest one, i.e., $n + 1$. Then, write a main program which reads the number x from the keyboard, calls the function and displays the rounded value. Save your source code as `rounding.c` into the directory `serie02`.

Aufgabe 2.5. Write a void-function `date` computes for a given number $z \in \mathbb{N}$ the corresponding date. The date can be obtained from z under consideration of the formatting `DDMMYYYY`. Hence, $z = 10102014$ is the 10th October 2014. Note that leading zeros will not be stored, e.g., the first of October 2014 is represented by $z = 1102014$ (5 digits). Moreover, write a main program that reads in z and calls the function. Save your source code as `date.c` into the directory `serie02`.

Aufgabe 2.6. A circle C is given by its center (x, y) and its radius $r > 0$. Write a function `locate` which should return -1 if a given point (u, v) is in the circle, 0 if (u, v) is on its boundary and 1 otherwise. Additionally write a main program which reads in the parameters u, v, x, y, r and prints out the position of (u, v) compared to C . Save your source code as `locate.c` into the directory `serie02`.

Aufgabe 2.7. Let the three points (x, y) , (u, v) , and (a, b) in \mathbb{R}^2 be given. Write a function `points` which checks if the three points lie on the same line. Additionally, write a main program which reads in the six values and prints out the result on the monitor.

Aufgabe 2.8. What is *Type-Casting*? Which types do exist? What is the output of the following code lines? Explain why!

```
#include <stdio.h>

main() {
    int x = 1;
    int y = 5;

    double erg1 = x / y;
    double erg2 = (double) x / y;
    double erg3 = 1. / 5;
    int erg4 = (double) x / y;

    printf("erg1 = %f\n", erg1);
    printf("erg2 = %f\n", erg2);
    printf("erg3 = %f\n", erg3);
    printf("erg4 = %d\n", erg4);
}
```