

Übungen zur Vorlesung  
Einführung in das Programmieren für TM

Serie 2

**Aufgabe 2.1.** Write a program which reads the radius  $r$  of a circle from the keyboard and prints the corresponding area and perimeter on the screen. Save your source code as `circle.c` into the directory `serie02`.

**Aufgabe 2.2.** A Pythagorean triple consists of three natural numbers which can be interpreted as the side lengths of a right triangle. Write a program which reads three natural numbers  $a, b, c \in \mathbb{N}$  from the keyboard and prints on the screen, whether those three numbers are a Pythagorean triple or not. Save your source code as `pythagoras.c` into the directory `serie02`.

**Aufgabe 2.3.** Write a program that, given  $n \in \mathbb{N}$  (to be read from the keyboard), computes and prints out the member  $a_n := (-1)^n / (n + 2)$  of the series  $(a_n)_{n \in \mathbb{N}}$ . Save your source code as `member.c` into the directory `serie02`.

**Aufgabe 2.4.** Write a program which reads three real numbers  $x, y, z \in \mathbb{R}$  from the keyboard and prints the numbers in ascending order on the screen. This means the maximum  $\max\{x, y, z\}$  is printed at first and the minimum  $\min\{x, y, z\}$  at last. Save your source code as `sort3.c` into the directory `serie02`.

**Aufgabe 2.5.** Consider the square with side length  $L > 0$  and vertices  $(0, 0)$ ,  $(L, 0)$ ,  $(L, L)$  and  $(0, L)$ . Moreover, consider a point  $(x, y) \in \mathbb{R}^2$ . Write a program which reads the parameters  $L > 0$  and  $x, y \in \mathbb{R}$  from the keyboard and prints out the position of the point  $(x, y)$  compared to the square. Note that a point can be (strictly) inside the square, on its boundary, or outside of it. Save your source code as `locate.c` into the directory `serie02`.

**Aufgabe 2.6.** Write a program which reads for a given number  $n \in \mathbb{N}$  of exercise sheets, consisting of 8 exercises each, the total number of exercises you have marked as done from the keyboard. Afterwards, it should print both your percentage of marked exercises and whether it allows you to achieve a positive final grade for EPROG or not, on the screen (cf. <http://asc.tuwien.ac.at/eprog>). Save your source code as `exercisegrade.c` into the directory `serie02`.

**Aufgabe 2.7.** Assume that an average of 4 marked exercises per EPROG exercise class yields 22.5 points and an average of 7 yields 37.5 points for the computation of your final grade (without taking the presentations at the blackboard into account). In general, for an average number of marked exercises  $x \in [4, 8]$  the corresponding number of points  $y \in [22.5, 40]$  can be computed via the following formula,

$$y = \min\{40, (5 + x * 10)/2\}.$$

Write a program which reads the average of marked exercises  $x \in [4, 8]$  from the keyboard and prints the corresponding number of points  $y$  on the screen. Save your source code as `exercisepoints.c` into the directory `serie02`.

**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 = 2;
    int y = 5.4;
    double z = 3.6;
```

```
double erg1 = x / y + z;
double erg2 = (double) x / y;
double erg3 = 3 / 5;
int erg4 = (int) z / 2.;

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