technische universität dortmund

Department of Computer Science
Chair 11 / Algorithm Engineering

Dr. Carsten Gutwenger

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Object-oriented Programming
Assignment Sheet No. 2

Date: October 25

Exercise 2.1 (Integer Expressions and Loops)

Write a program that asks the user for a non-negative integer n, and then prints the Fibonacci numbers $F_0, \ldots, F_n$. The Fibonacci numbers are recursively defined as follows:

$$\begin{aligned} F_0 &= 0 \\ F_1 &= 1 \\ F_n &= F_{n-1} + F_{n-2} \quad \text{for } n \geq 2 \end{aligned}$$

Up to which number can the data type int calculate the sequence correctly? How can this be handled in the program?

Exercise 2.2 (Nested Loops)

Write a program that asks the user for a positive integer n, and then prints a right-aligned triangle of stars `'*'` consisting of n rows. You are not allowed to use **if**-statements in your program.

Example: For $n = 10$, the output shall look as in the figure below.

```
**********
 *********
  ********
   *******
    ******
     *****
      ****
       ***
        **
         *
```

Exercise 2.3 (Strings)

Write a program that simulates a very simple calculator. It should ask the user for two integers a and b, and then request an operation: addition (+), subtraction (-), multiplication (*), division (/), or modulo (%). Then it shall print the result according to the operation entered by the user ($a+b$, $a-b$, $a*b$, a/b, $a\%b$, respectively).

Finally, the program should allow the user to enter a new set of numbers, a new operation, or to quit the program (`New set of numbers? / New operation? / Quit? (n/o/q)`) and proceed accordingly.

Make sure that your program handles potential division by zero errors correctly.