

## Informatik 1, Lab 2

- **Submission deadline: 2023-05-01, 23:59**
- You will get a “pass” or “failed” after a discussion on 2023-05-04 or 2023-05-11, depending on which group you belong to

### Exercise 2-1

### Sign Function

Write a method `int sign(double x)`, which returns

- 1, if  $x > 0$ ,
- 0, if  $x = 0$ ,
- -1, otherwise

### Exercise 2-2

### Collatz Number

The *Collatz Number*  $c(n)$  of a natural number  $n > 0$  is defined as

$$c(n) = \begin{cases} n/2, & n \text{ is even} \\ 3n + 1, & \text{otherwise} \end{cases}$$

Write a function to calculate the collatz number of any given natural number.

### Exercise 2-3

### Max

Write a method `int max(int a, int b, int c)` to return the greatest value of `a`, `b`, and `c`.

### Exercise 2-4

### FizzBuzz

Download the file `fizzbuzz.jsh` from moodle. Implement the method `printFizzBuzz`. The method should take a parameter  $x$  and print `Fizz` if  $x$  is divisible by 3, print `Buzz` if  $x$  is divisible by 5, and print `FizzBuzz` if  $x$  is divisible by both 3 and 5.

You can test your method by invoking the method `go`. The second and the third lines of the method may be new to you. You don't need to understand them now, it suffices to know that they read in an integer from the standard input, which is usually the keyboard, and assign it to the variable `i`;

### Exercise 2-5

### Triangle

Write a method `void triangle1(int n)` to print a triangle of size `n`. The triangle should contain `n` rows, and for each  $1 \leq i \leq n$ , the  $i$ -th row should contain  $i$  asterisks.

For example, the invocation `triangle1(5)` should print the following

\*  
\*\*  
\*\*\*  
\*\*\*\*  
\*\*\*\*\*

### Exercise 2-6

### Sum square difference

Solve problem 6 of *Project Euler*, <https://projecteuler.net/problem=6>, which reads

The sum of the squares of the first ten natural numbers is,

$$1^2 + 2^2 + \dots + 10^2 = 385$$

The square of the sum of the first ten natural numbers is,

$$(1 + 2 + \dots + 10)^2 = 55^2 = 3025$$

Hence the difference between the sum of the squares of the first ten natural numbers and the square of the sum is  $3025 - 385 = 2640$ .

Find the difference between the sum of the squares of the first one hundred natural numbers and the square of the sum.

### Exercise 2-7

### 99 Bottles of Beer

Write a method to print the text you find at <http://www.99-bottles-of-beer.net/lyrics.html> on the screen. Use one of more loops to achieve this task.