Hochschule für Technik und Wirtschaft Berlin
Internationaler Studiengang Medieninformatik
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Informatik 1, Lab 03

- **Submission deadline: 2023-05-22, 23:59**
- You will get a "pass" or "failed" after a discussion on 2023-05-25 or 2023-06-01, depending on which group you belong to

Exercise 3-1 Special Pythagorean Triplet

Solve problem 9 of *Project Euler*, `https://projecteuler.net/problem=9`, which reads

> A Pythagorean triplet is a set of three natural numbers, $a < b < c$, for which $a^2 + b^2 = c^2$
>
> For example, $3^2 + 4^2 = 9 + 16 = 25 = 5^2$.
>
> There exists exactly one Pythagorean triplet for which $a + b + c = 1000$. Find the product abc.

After registration and login, you can ask Project Euler to check if your answer is correct.

Exercise 3-2 Send more money

In the addition shown in Fig. 1, each of the letters `S`, `E`, `N`, `D`, `M`, `O`, `R`, `Y` represents a digit between 0 and 9, and different letters represent different digits.

Which digits do the letters represent?

```
    S E N D
+   M O R E
-----------
= M O N E Y
```

Figure 1: Send more money

Exercise 3-3 Chinese Remainder

An ancient Chinese problem reads, according to Wikipedia[1], as follows

> There are certain things whose number is unknown. If we count them by threes, we have two left over; by fives, we have three left over; and by sevens, two are left over. How many things are there?

[1] `https://en.wikipedia.org/w/index.php?title=Chinese_remainder_theorem&oldid=866914034`

That is, there are integers `x`, such that `x % 3 == 2`, `x % 5 == 3` and `x % 7 == 2`. Find the smallest `x > 0`.

Exercise 3-4 **Palindrome**

Palindromes are strings that reads the same forwards as backwards. For example, `madam` and `racecar` are two palindromes. Write a method `isPalindrome(String s)` to return `true` if parameter `s` is a palindrome and otherwise return `false`.

Attention: You cannot use any built-in Java method of the class `String` besides `charAt` .

Exercise 3-5 **Guessing Number**

a) Download the file `guess_number.jsh`. The method `enterInteger` prompts the user to input an integer and returns it. You don't need to understand the mechanism of how the method works right now. Just try it out and get familiar with using the method.

b) Implement the method `getRandomNumber`, which returns a random integer $1 \leq x \leq 100$.

c) Implement the method `play` to play the following game:

1. The computer generates a random number x between 1 and 100
2. The computer prompts the user to enter an integer
3. If the number equals to x, then the computer prints "You won!" and the game is terminated.
4. Otherwise, if the number is less than x, then the computer prints "Your guess is too small". If the number is greater than x, then the computer prints "Your guess is too large".
5. Go to step 2

d) What is the best strategy to guess the number as fast as possible?

Exercise 3-6 **ASCII Table**

Write a Java method `void printAsciiTable()` to produce the following table (which was also presented in the lecture). Use loops to achieve this task.

```
     0 1 2 3 4 5 6 7 8 9
------------------------
30 |       ! " # $ % & '
40 | ( ) * + , - . / 0 1
50 | 2 3 4 5 6 7 8 9 : ;
60 | < = > ? @ A B C D E
70 | F G H I J K L M N O
80 | P Q R S T U V W X Y
90 | Z [ \ ] ^ _ ` a b c
100| d e f g h i j k l m
110| n o p q r s t u v w
120| x y z { | } ~
```

Exercise 3-7 **Scores of Names**[2]

In this exercise, we suppose English words contain only capital letters.

The *order* of an English letter is its position in the alphabet. For example, the order of the letter `A` is 1, the order of `C` is 3, the order of `N` is 14, and the order of `Z` is 26. We define the *score* of an English word to be the sum of the letters' order contained in the word. For example,

[2]Inspired by `https://projecteuler.net/problem=22`

- the score of the word `ANNA` is $1 + 14 + 14 + 1 = 30$, and
- the score of the word `COLIN` is $3 + 15 + 12 + 9 + 14 = 53$.

a) Write a method `int getNameScore(String s)` to get the score of a given String `s`. You can assume that `s` contains only capital English letters

b) Use this method to calculate the sum of the scores of the following names: `MARY`, `PATRICIA`, `LINDA`, `BARBARA`, `ELIZABETH`, `JENNIFER`, `MARIA`, `SUSAN`;