FUNDAMENTALS OF ALGORITHMS AND PROGRAMMING

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02 – Java – Basics, if, loops

Before you start

Prepare the appropriate IDE (integrated development environment), e.g. IntelliJ IDEA provided by JetBrains: https://www.jetbrains.com/idea/.

Installation guide: https://www.jetbrains.com/help/idea/installation-guide.html#toolbox

BASICS

Exercise 1.

Display „Object-oriented programming”.

Exercise 2.

Declare two integers `a,b` and assign values to them, then display their sum, difference and product.

Exercise 3.

Declare variables `name`, `surname`, `yearOfBirth` and assign values to it. Then display name, surname, year of birth and (calculated) age.

Exercise 4.

Display your business card. Include name, surname, job (or student), job (or university) address, phone number, email address. All data should be stored in variables.

Exercise 5.

Display information about an example student: age, semester, last semester average, total average, faculty name, (constant integer) year of birth. All data should be stored in variables.

Exercise 6.

Write a program that exchanges the amount of money (integer) to the smallest number of coins and banknotes (1, 2, 5, 10 PLN). E.g. if you want to exchange 188 PLN the output should be equal to 18 banknotes 10 PLN, 1 coin 5 PLN, 1 coin 2 PLN, 1 coin 1 PLN.

IF ELSE

Exercise 1.

Declare two integers `a,b` and assign values to them, then display their sum, difference, product and (if it is possible) their quotient. Display also a messeage which one is bigger.

Exercise 2.

Declare two floating-point numbers and display them in the decreasing order.

Exercise 3.

Declare an integer `month` and assign value to it. Then display information whether the number represents a month of a year. If so, display its corresponding month name (e.g. if `month`=3 the program displays „`March`").

Exercise 4.

Declare an integer that represents the amout of points a student got during exam and assign value to it. The program should display the corresponding grade according to the points below:

0 – 50 points: „`2 unsatisfactory`"

51 – 70 points: „`3 satisfactory`"

71 – 90 points: „`4 good`"

91 – 100 points: „`5 very good`"

Exercise 5.

Write a program that for a given integer (which represents a year) displays information „`the current year`", „`past`", or „`future`" depending on the value.

Exercise 6.

Write a program that for number `x` (`x` is declared and assigned in the program) displays value of the function `y = 3x` at the point `x` if the number is in the interval from 0 to 10, or displays the value of the function `y = 2x` at the point `x` if the number is outside of the interval [0,10].

Exercise 7.

Write a program that based on the values in the integer variables `zloty`, `groszy` creates a variable that stores the total amount of Polish Zloty. Before you create the variable, make sure that `zloty` and `groszy` are correct (`zloty` is a positive number and `groszy` is in the interval 0-99). If not, display the appropriate messages.

LOOPS

Exercise 1.

Write a program that for numbers `x` from 0 to 10 displays value of the function `y = 3x` at the every point `x` using `for` and then value of the function `y = 2x` at the every point `x` using `while`.

Exercise 2.

Use loop to display integers from 1 to 20. Use both: while and for.

Exercise 3.

Use loops to display a rectangle (width 4, height 2) made of the first letter of your name.

Exercise 4.

Declare variable `n` and assign a value to it. Then display all odd numbers from 1 to `n`.

Exercise 5.

Write a program that keeps taking in integers until a negative integer is given to stop. Then take all the positive integers and get the average of them all. Display also how many numbers have been entered.

Exercise 6.

Write a program that displays character ' * ' n-times (Take n from user).

Exercise 7.

The price of one cinema ticket is 7 Euro for standard ticket and 5 Euro for discount ticket. Write a program that takes from user how many cinema tickets he wants to buy, and then asks for every ticket if it is a standard ticket (user presses S) or discount (user presses any other character). Displays the total cost of buying the tickets entered.

Exercise 8.

Write a program allows to calculate the sum and the average of the bills from the previous year. The program should keep entering floating-point numbers from user that represent subsequent bills. It keeps taking in numbers until a negative value is given to stop. Then take all the positive numbers that have been entered and calculate the sum of and the average of all bills. E.g.

```
Enter the first bill:
120.7
Enter the next bill:
45.5
Enter the next bill:
12
Enter the next bill:
-1
The sum of all spendings: 178.2
The average bill amount: 59.4
```

Exercise 9.

Write a program that calculates the area of a square. We expect a positive number to calculate the area of a square, so the program should continue to asks the user to enter a number as long as a negative number is given.

Exercise 10.

Write a function, that takes as a parameter a non-negative integer and returns the sum of its digits. If this sum contains more than one digit, program calculates the sum again, and again. For example: for the given number n=7895, program prints: 29, 11, 2.

Exercise 11.

Display a triangle (height 6) made of the first letter of your surname.

Exercise 12.

Declare variable `m` and assign a value to it. Then display all numbers from 1 to `m` divisible by 3.