Course
Programming Using Java

TOPIC: LOOPS

Task 1

Fibonacci numbers are a sequence of numbers, in which the first two numbers of the sequence are 0 and 1, and each successive number is equal to the sum of two preceding ones.

Output all Fibonacci numbers in the range from 0 to 10,000,000 to the screen.

Task 2

A prime number is a natural (positive integer) number that has exactly two varying natural divisors, one and itself. In other words, the number N is prime, if it is greater than 1 and is thus divisible without remainder by only 1 and N (itself).

Write a program that displays all the prime numbers in the range from 2 to 1,000,00. Try not to perform unnecessary actions (for example, after you have found at least one nontrivial divisor, it is already clear that the number is composite and you do not need to continue the check). Also note that the smallest divisor of a natural number n, if there is any, is located in the interval $[2; \sqrt{n}]$.

Task 3

A narcissistic number or an **Armstrong number** is a natural number that is equal to the sum of its own digits each raised to the power of the number of its digits.

Output all *Armstrong numbers* in the range from 10 to 1,000,000 to the screen.

For example:

$153 = 1^3 + 5^3 + 3^3$

Task 4

A perfect number is a natural number that is equal to the sum of all its own divisors (that is, all positive divisors different from the number itself).

Display all the perfect numbers in the range from 0 to 1,000,000. Examples:

The 1st perfect number, **6**, has the following own divisors: 1, 2, 3; their sum is 6.

The 2nd perfect number, **28**, has the following own divisors: 1, 2, 4, 7, 14; their sum is 28.

Task 5

Write a program that will check whether the number entered from the keyboard is a *palindrome* (equally readable in both directions). For example, 123454321 or 221122 is a palindrome. The program should output YES if the number is a palindrome, otherwise NO.

Task 6

Output all eight-digit numbers, in which digits do not repeat, to the console. These numbers should be divisible by 12345 without a remainder. Show the total number of numbers found.

Task 7

Show bit representation of the value of a variable of the int type, using only one loop, a control variable, output to the console, and bit operations.

Do not use strings and any other ready-made functions (methods).

Task 8

The electronic clock shows time in the format from 00:00 to 23:59. Write a program that will output to the console, how many times a day it happens that a symmetrical combination on the left from the colon is shown for the combination on the right from the colon (for example, 02:20, 11:11 or 15:51). Display all symmetrical combinations. Print the total number of combinations.

Task 9

If we list all natural numbers less than 10, multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23.

Find the sum of all numbers that are multiples of 3 or 5 starting from 0 and up to 1000.

Task 10

2520 is the smallest number that can be divided into each of the numbers from 1 to 10 without a remainder. Write a program that calculates the smallest positive number, which is divided by all numbers from 1 to 20.

Task 11

Write a program that displays numbers from 1 to 1000. In this case, instead of numbers that are multiples of three, the program should output the word *fizz*, and instead of numbers that are multiples of five, the word *buzz* should be outputted. If the number is a multiple of fifteen, then the program should output the word *hiss* instead of the number.

Task 12

The first day an athlete ran x kilometers, and then every day he increased the mileage by 10% from the previous value. According to the number y indicated from the keyboard, determine the number of the day, when the athlete's mileage will be at least y kilometers.