1 Tasks

Create a new Java project in Eclipse. Create a new package for each new task block. You can now create a new class for each new program. This keeps everything organized and together.

1.1 Output

Write a program that outputs "'Hello Fin"'.

1.2 Variables

Write a program which...

1. creates an int variable n, assigns it a value specified in the source code and then outputs it.
2. calculates the square of a variable. Stores the result in a new variable and then outputs it.
3. creates a float variable fahrenheit and converts it to Celsius. The result should be output. The conversion formula is as follows:
   $C = 0.5556 * (F - 32)$
4. the variables: hours, minutes and seconds. Now the time is to be calculated from a variable millisecond specified in the source code. To do this, you need the modulo operator %.

1.3 Branching

Write a program which...

1. checks whether a variable is even or odd. The result should be output.
2. tests whether a number is between 100 and 500.
3. that outputs whether a variable is divisible by 2 or by 3.
4. evaluates a censoring. It is intended for the grade:

   1 Very good
   2 Good
   3 Satisfactory
   4 Sufficient
   5 Poor
   6 Unsatisfactory

   output. Otherwise it should output "This is not a grade". Use a switch-case for this.
5. creates the variables a, b and c and assigns them a value. Now the program should output these in descending order according to their values. statement.

1.4 Loops

Write a program which...

1. outputs "'Hello Fin"' 10 times. Try to solve this task with the 3 known disk types. (while, do while, for)
2. first counts up the numbers from 1 to 10 and then counts them down again.
3. makes the output 0:1000, 1:999, 2:998 to 1000:0.
4. outputs n asterisks. The variable "'n"' is assigned a value in the source code.
5. calculates the sum of all numbers up to 100
6. outputs a sawtooth of asterisks. As follows:
   *
   **
   ***
   Try to determine the size of the tooth using a variable.

1.5 Arrays

Write a program that...

1. declares an int array of length four. Let the user enter four numbers, which you store in the store the array. The sum of the numbers should then be calculated. You can use a loop to read in the numbers.
2. to create an int array with 10 random numbers. You can use Math.random() to generate a random float between 0 and 1.
3. outputs the largest number of a randomly generated array and the corresponding index.
4. receives a word, stores it in a char array and now outputs it in reverse order. You can use the String.charAt() method for this.

1.6 methods

Write a method which...

1. takes two parameters, adds them and returns the result.
2. takes no parameters, asks the user for their name and then returns it as a return value.
3. tests whether a variable is even and returns this truth value.
4. creates a random int array and returns it.
5. is passed two parameters min, max and calculates and returns the sum of all numbers in between and outputs them.
6. returns the largest number of 3 parameters.
7. is passed an int array as a parameter and returns the sum of the elements it contains.
8. tests whether a parameter is a prime number and returns the result as a truth value.
9. receives two numbers and a basic arithmetic operator (+, *, -, /) as parameters and calculates the two parameters according to these and returns the result.

10. calculates the area of a circle. Only the radius should be passed.
11. converts a natural number into a binary representation. This should be returned as a string.
12. tests whether an int parameter is a perfect number. A number is perfect if it is equal to the sum of its divisors other than itself is. Check your method with the numbers 6, 14, 28, 100, 496 and 8128.

1.7 recursion

Write a recursive method which...

1. recursively calculates the function plus(x,y) = x+y. Just use +1 or -1.
2. calculates the function minus(x,y) = x-y recursively. Just use +1 or -1.
3. calculates the function mult(x,y) = x*y recursively. Just use +1 or -1. You can use the previous methods to do this. You will probably need a helper function.
4. that calculates exponent(x,y) = x^y. Just use +1 or -1 for this.
5. calculates the function mod(x,y) = x modulo y. Just use +1 or -1.
6. calculates the factorial fak(n) = n! Only use +1 or -1 for this.
7. calculates and returns the greatest common divisor (ggT) of two parameters.
8. plays the towers of Hanoi. The function should be passed the number of disks as a parameter. You have 3 bars, which are labeled A, B and C. At the beginning, all disks are on rod A. You should move them step by step to C. Output each individual step.
   System.out.println("Move disk from bar ' + from + ' to bar " + to);
   Count the number of steps required.

1.8 Java API

1. Read the current time and date from the system and output it in readable form.
2. Output an array created by you using the Arrays.toString() method.
3. Write a Java program that calculates the solution of a quadratic equation

$$ax^2 + bx + c = 0$$

   . The program should be given a, b and c as parameters. If the discriminant is < 0, the program should output that there is no solution to the problem. Use the Java Math class for this.
4. Remove all spaces from a string. Use the methods provided by the String class.
5. Find the first occurrence of the character 'e' in a given string.
6. Divide a given sentence into its words.
7. Sort an array of random int values in ascending order. Use the Arrays.sort() function.