Course
Programming Using Java

TOPIC: RECURSION

> ***ATTENTION!!!***
> **All tasks in this work are aimed at studying recursion, so all solutions should be based on recursion. All solutions should be based on one method.**
> To solve these tasks, you cannot use:
> - cycles;
> - arrays;
> - lists;
> - lines.
>
> There may also be other limitations in specific tasks.

Task 1

Two integers A and B are given. Output all numbers from A to B inclusive, in ascending order, if A <B, or otherwise in descending order.

Input: 5 1
Output: 5 4 3 2 1

Task 2. Exact power of two

A natural number N is given. Output the word YES if N is an exact power of two or the word NO otherwise.

You cannot use the exponential operation!

Input: 3 8
Output: NO YES

Task 3. The sum of digits of the number

A natural number N is given. Calculate the sum of its digits.

Input: 179

Output: 17

Task 4. Digits of the number from right to left

Given a natural number N. Output all its digits one by one in the reverse order, separating them by spaces. Only recursion and integer arithmetic are allowed.

Input: 179

Output: 9 7 1

Task 5. Digits of the number from left to right

A natural number N is given. Output all its digits one by one in the usual order, separating them by spaces or new strings. You cannot use strings, lists, arrays, or loops to solve this task. Only recursion and integer arithmetic are allowed.

Input: 179

Output: 1 7 9

Task 6. Reversal of the number

Enter the number n from the keyboard, the decimal entry of which does not contain zeros. Get the number written down by the same digits, but in reverse order. Only recursion and integer arithmetic are allowed when solving this task. The method should return an integer that is the result of the program's operation; you cannot output a number by one digit.

Input: 179

Output: 971

Task 7. Palindrome

Given a sentence, consisting only of lowercase Latin letters. Check if the words in the sentence are a palindrome. Output YES or NO.

Input: *radar yes*

Output: *YES NO*

Task 8. Power of the number

Calculate the result of raising the number m to the power of n using recursion. Two parameters, number and power, are passed to the static method.

Task 9. Sum of numbers in the range

Calculate the sum of numbers in a certain range. The beginning and the end of the range is specified by the parameters.

Input: 5 9

Output: 35

Task 10. НОД

Write a recursive static method of finding the greatest common divisor of two integers.

Input: 10 15

Output: 5

Task 11. Knight's tour

There is an 8x8 chessboard, and a chess knight. The program should ask the user for coordinates of the chessboard square and put the knight there. The task of the program is to brute-force the knight's path so that it will visit all squares of the chessboard only once.

Task 12. Turtle

> Random positive integers are placed on a square board of size NxN.
> The turtle in the upper left corner dreams of getting into the lower right corner. At the same time, it can crawl only into the square on the right or into the square from below (not obliquely) and wants the sum of all the numbers that it finds on the way to be as large as possible.

Output this sum to the console screen. Display the turtle's path. Show the source array as a table.