Application test

This application test is to be solved without the need for interactive assistance by other persons (neither on site or in forums, etc.).

Please implement the following tasks as a console application in your favorite programming or scripting language.

Please note that you must output a graph for part 3, which is based on part 1. You can convert your console application into a graphical application, such as a JavaScript program with an HTML5 canvas, but you can also output this graph as console text in the size 80x24.

Tasks

Part 1 Develop a term calculator that can handle (), *, /, +, and -. For example, if the user enters the term (5 + 8) * 3/8 +3, the term calculator shall calculate and output the result according to the school rules of term calculations.

These rules are: () before * and /, * and / before + and -. Several * and / are calculated from left to right, several + and - also from left to right.

Important: The actual algorithm must be implemented itself. The use of functions like eval in JavaScript are not permitted.

Part 2 Peter likes numbers. As a meditation exercise, he likes to write down all the numbers starting with 1 whose digits are sorted in ascending order. For example, 11235888 is such a number. After a while, he stops.

Write an efficiently designed program which, after entering a number between 1 and 10^{18}, represents the last number checked by Peter, outputs the last number written down by Peter.

Examples:
Input: 23245	Output: 22999
Input: 11235888	Output: 11235888
Input: 111110	Output: 99999
Input: 33245	Output: 29999

Tip: Going through the numbers one by one and testing them is not efficient enough.

Part 3, based on Part 1 Allow the term calculator to accept lines in the form y = <TERM> with x as an additional possible character in the term. If such a complete equation is given, you display a simple x / y graph. For each value on the x axis, calculate y and plot the point (a continuous line is even better).

How to submit

You can submit each partial task individually. Please send it to hr@audio-cc.com. Both the quality of your work and the time required take part in our evaluation.

The result should contain all the source files to compile and then execute your task (if necessary). Project files or makefiles do not have to be sent. Binary files / minimized files are not taken into account.

The audio CC team wishes you success, and have fun!