

Collatz Conjecture "Solver"

We need a program investigating basic characteristics of Collatz sequence for starting numbers given by user input.

For some background see Collatz conjecture described e.g. here:

http://en.wikipedia.org/wiki/Collatz_conjecture

Write a C++ or C# or Java (what fits the best to your position) program buildable for Windows OS with

Input:

- * A natural number n (decimal system)
Number of digits is not limited - it can be for example:
225393842587912356138204820484037493027493028477493002037422289180017393
(however, let us say 1000 digits is enough on UI level for this test)

Output:

- * The following characteristics of the Collatz sequence starting with n :
 - Number of $3k+1$ operations (= number of odd members, excluding '1')
 - Number of $k/2$ operations (= number of even members)
 - Maximum member

Example:

Input:

n : 7

(the sequence: 7, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1)

Output:

Number of $3k+1$ operations: 5
Number of $2k$ operations: 11
Maximum member: 52

Additional Requirements:

Could be a console application but a simple practical dialog UI is preferred.

After providing output, program should allow user to repeat with another input.

Separate the calculation logic and UI parts well. Show reusability: the calculation logic should be integrated with another (possibly) existing UI easily.

Deliver a sources (best would be with a MS VS or another DevEnv Project) and executable, but mind - email exe, does not pass.

Notes:

Avoid using BigInt or similar library function - we want to see how you solve the problem of big numbers.

The goal is a working solution that can be used for the specified purpose.

Calculation time is not the highest prio (unless it is 'terribly slow').

Focus on the code structure and proper usage of the programming language.

Do not hesitate to use comments in code - as usually.

This task has no commercial use (apparently and the solution will be used solely for our assessment of capabilities and habits of its solvers as C++/C#/Java/Delphi programmers.

The solution does not need to be perfect - we assume the time needed to implement a good working solution is less than 1 man-day for junior programmer.

Program can hang if the input number proves Collatz conjecture is false