Conjecture about the Solution of the Collatz Conjecture

INTRODUCTION

Aa	Ab
S $\rightarrow$ E $\xleftrightarrow{/2}$ E	The Collatz (1937) conjecture (CC) formulation: Start with any positive integer. Calculation rules: 1) the number is even: divide by two. 2) The number is odd: triple it and add one. A sequence by performing these computations repeatedly will eventually lead to the number one.
/2 ↓↑ x3+1	
S $\rightarrow$ O	
↓ x3+1	
S $\rightarrow$ EB $\rightarrow$ 1	S= start, E=even, O= odd, B= binary positional system

Remark 1 The CC formulation does not specify a number system to work in.

Ba	2^n binary	GSQ	2, q= 2	1, 2, 4, 8, 16, 32, 64, 128, 256	G= geometric
Bb	4^n	GSQ	4, q= 4	4 16 64 256	A= arithmetic
Bc	/2	GSQ	1/2^n	1/2, 1/4, 1/8, 1/16	
Bd	[(2n+1) x 3] +1	ASQ	4, d= 6	4, 10, 16, 22, 28, 34, 40, 46, 52, 58, 64	

Remark 2 The sequences (SQ) Ba, Bb, and Bd are divergent rows – the sum of their terms is infinite. The Bc SQ is a convergent row with a resulting value of 1.

Remark 3 The result of /2 computation is an even or odd number. An even number is the result of /2 or x3 + 1 computation.

Remark 4 An odd number triggers the x3 + 1 operator, transforming it into an even number; the value shifts toward infinity.

Remark 5 An even number triggers the /2 operator, which acts once or multiple times in succession (/2 divisibility); the value shifts toward 1.

Fact 1: The millennium problem. Hundreds of articles in the renowned journals. The effort goes on.

SOLUTION The only way to prove CC is to show directly that every positive integer goes to 1. In terms of CC, two SQs lead to 1 with the only calculation /2: a) the binary positional system (Leibniz 1703). b) The 4^n row. Note: The summation rows 2^n and 4^n generate all natural numbers.

Ca

4^0	4^1	4^2	4^3	4^4	4^5	4^6	4^7	row 4^n {1, infinity}
0	***0***	0	0	0	0	0	0	0; 1; 2= coefficients
1	1	***1***	***1***	1	1	1	1	in the designated area are values of the 4^n positional
2	2	2	2	2	2	*2*	2	system 27 x3+1= 82 = (2, 0, 1, 1)

Cb

82=	2x 4^0	+ 0x 4^1	+	1x 4^2	+	1x 4^3	Procedure description: a) Write an even decimal number
82=	2	+ 0	+	16	+	64	on 4^n base. b) Divide by two the maximal element
	/2			/2		/2	(64 in this illustration). c) Repeat /2 until the result
	1			/2		/2	corresponds to the value of the next lower position with
				/2		16	non-zero occurrence. d) The process continues to the
				2			last division 2/2= 1.

Fact 2: 27//82 $\rightarrow$ 1 = 7 steps, 6 iterations /2. Note: There are no cycles.

CONCLUSION

The results prove that using the 4^n row, the Collatz conjecture is a decidable problem in the interval {1, infinity}.

Juraj Pavlasek MD., PhD., ScD., Bratislava, SR, EU juraj.pavlasek@chello.sk