"The Next Term After 1, 2, 4, 8, 16" Is Not in the Sequence, and 988 Sequences Begin With the Same Five Terms

— in the encyclopedia of integer sequences 988 sequences begin with 1,2,4,8,16, of which 418 continue with 32 and 72 with 31; the lowest-degree polynomial through the five points returns 31 and the exponential rule returns 32; the rule of the pupil who continues 1000 with 1004 agrees with the correct rule for 500 terms — the separator is whether the rule is read from the sequence or the sequence is made from the rule — [Paper 1031]

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— From thinking to syncing. —

Abstract

In Philosophical Investigations §185 Wittgenstein describes a pupil taught "+2" who continues 1000 with 1004, showing that finite examples do not fix a rule. Kripke restated this with "quus", which agrees with addition below 57.This paper looks at the question in numbers: how many integer sequences in the encyclopedia begin with the same five terms, what the "simplest" rules fitting five points return, and for how many terms two rules agree.No new theorem or law is claimed, and no interpretation of the meaning of rules is entered. First, and this is the core. The "next term" is not in the sequence but in a family of rules chosen outside it——in the On-Line Encyclopedia of Integer Sequences (searched on 18 September 2026), 2742 sequences begin with 1,2,4,8 and 988 with 1,2,4,8,16; of these 418 continue with 32 (0.423077), 72 with 31 (0.072874), and 498 otherwise. The share surviving each added term is 0.360321, 0.423077 and 0.614833, and 257 sequences survive seven terms (Section 2). **Second, there are two "simplest" rules, and they part at the sixth term——the exponential rule 2 to the (n−1) returns 32; the lowest-degree (degree 4) polynomial through the five points returns 31.000000, 57.000000 and 99.000000. The latter equals the number of regions into which the chords among n points on a circle cut it (Moser), C(n,4)+C(n,2)+1, matched for n = 1 to 7 by placing points and counting with Euler's formula for planar graphs. The two rules agree up to n = 5 and part at n = 6** (Section 3). **Third, the pupil's rule is right for 500 terms——the rule "+2" and the rule "+2 up to 1000, then +4" agree for the first 500 terms and part at the 501st (1002 against 1004). Kripke's quus (the sum if both are below 57, else 5) agrees with addition in 57^2 = 3249 of the 10000 pairs from 0 to 99** (Section 4). **Fourth, the encyclopedia is not biased toward "simple" rules either——1568 sequences begin with 2,4,6,8, 564 continue with 10 and 393 with 12; the rule of listing even numbers is not the majority in the encyclopedia** (Section 2). **Fifth, this is the same pattern as three earlier papers——Paper 701 showed that the more data there is the more a penalised criterion prefers the complicated model, Paper 706 that a backtest measures the number of attempts, and Paper 317 that a significance level is a promise per test. Here too, the "next term" cannot be stated without counting the rules that fit** (Section 5). **Sixth, the separator is whether the rule is read from the sequence or the sequence is made from the rule——read from the sequence, any of the 988 will do; made from the rule, the next term is fixed. That "1004 after 1000" is wrong is decided on the side of the rule taught, not of the sequence** (Section 5). **Keywords**: rule-following, integer sequences, OEIS, Moser's circle problem, interpolating polynomial, quus.

Scope of this paper (scope note): **No new theorem or law is claimed——the rule-following paradox (Wittgenstein, Philosophical Investigations, 1953), Kripke's quus (1982), Moser's circle-division formula, the On-Line Encyclopedia of Integer Sequences, and the uniqueness of the interpolating polynomial are all known.Interpretation is not entered ——the meaning of rules, private language and the correctness of Kripke's reading are not judged; only counts of sequences and of agreeing terms are given.The encyclopedia counts move with the date——the OEIS counts are those of a search on 18 September 2026 and change as the encyclopedia grows; what is shown is not the counts themselves but that five terms fix nothing."Simplicity" is not defined——no description length or criterion is brought in; two families, exponential and lowest-degree polynomial, are merely set side by side.Relation to earlier papers**: **Paper 701 showed that the more data there is, the more a penalised criterion prefers the more complicated model——here, before any criterion is placed, it is counted that 988 rules fit a finite sequence.Paper 706 showed that a backtest measures not the quality of a strategy but the number of attempts——here it is counted that the "number" of rules fitting five terms measures the size of the family, not the likelihood of the next term.Paper 317 showed that a significance level is a promise per test, not per study——here it is counted that "fitting" a sequence is a promise per rule, not per sequence.**What is added is **counting in the encyclopedia the sequences beginning with the same prefix and the share surviving each term**, **checking by polynomial and by counting that two "simplest" rules part at the sixth term**, and **giving the number of agreeing terms and pairs for the §185 rule and quus**.

1. Notation and the Question

Setting: **given a finite sequence $a_1, \ldots, a_n$, consider rules that return the "next term" a_{n+1}. The number of integer sequences beginning with the same prefix is counted in the On-Line Encyclopedia of Integer Sequences (OEIS), and the lowest-degree polynomial through five points is compared with the exponential rule.**

Question: **is the next term after 1, 2, 4, 8, 16 equal to 32? Does the sequence fix its next term?**

2. Counts in the Encyclopedia

Computation 2.1: **the counts returned by OEIS on 18 September 2026 for each prefix are as follows.**

prefix	count	share surviving from one term earlier
$1, 2, 4, 8$	2742	—
$1, 2, 4, 8, 16$	988	0.360321
$1, 2, 4, 8, 16, 32$	418	0.423077
$1, 2, 4, 8, 16, 32, 64$	257	0.614833
$1, 2, 4, 8, 16, 31$	72	0.072874
$2, 4, 6, 8$	1568	—
$2, 4, 6, 8, 10$	564	0.359694
$2, 4, 6, 8, 10, 12$	393	0.696809
$1, 1, 2, 3, 5, 8$	399	—
$1, 4, 9, 16, 25$	208	—

Of the 988 sequences beginning $1, 2, 4, 8, 16$, 418 continue with 32, 72 with 31, and 498 otherwise.

> **Observation 2.2**
>
> this is the core. The "next term" is not in the sequence but in a family of rules chosen outside it.Five terms leave 988 sequences, and seven still leave 257——the encyclopedia count measures not the likelihood of the next term but the size of the family of rules beginning that way. As with the backtest results of Paper 706, what is measured is not the sequence but the number of rules tried.

3. Two "Simplest" Rules

Computation 3.1: the degree-4 polynomial through the five points $(1, 1), (2, 2), (3, 4), (4, 8), (5, 16)$ is $(n^4 - 6n^3 + 23n^2 - 18n + 24)/24$; it reproduces the five points within 10^{-9} and returns 31.000000, 57.000000 and 99.000000 at $n = 6, 7, 8$. The exponential rule 2^{n-1} returns 32, 64 and 128. The two agree up to $n = 5$ and part at $n = 6$.

Computation 3.2: this polynomial equals the number of regions into which the chords among n points on a circle cut it, $\binom{n}{4} + \binom{n}{2} + 1$ (Moser). Placing points on a circle at random, counting the intersections of the chords, and

counting regions by Euler's formula for planar graphs gave $1, 2, 4, 8, 16, 31, 57$ for $n = 1$ to 7, matching the formula.

> **Observation 3.3**
>
> there are two "simplest" rules, and which is simpler is decided by the choice of family.In the exponential family the answer is 32, in the polynomial family 31, and five terms exclude neither——as Paper 701 showed, a criterion that penalises complexity changes its answer with the amount of data. Here, before any criterion, it is counted that two families give two answers.

4. The Pupil of §185, and quus

Computation 4.1: the rule "+2" and the rule "+2 up to 1000, then +4" agree for the first 500 terms and part at the 501st (1002 against 1004). Kripke's quus (the sum if both arguments are below 57, else 5) agrees with addition in $57^2 = 3249$ of the 10000 pairs from 0 to 99.

> **Observation 4.2**
>
> the pupil's rule is right for 500 terms.No finite set of examples excludes a rule that bends at 1000——as Paper 317 showed, "fitting" is a promise per test, and 500 fits do not promise the 501st.

5. The Separator and What Is Not Said

> **Observation 5.1**
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> the separator is whether the rule is read from the sequence or the sequence is made from the rule.Read from the sequence, any of the 988 will do; made from the rule, the next term is fixed——that "1004 after 1000" is wrong is decided on the side of the rule taught, not of the sequence.

> **Observation 5.2**
>
> what is not said.The meaning of rules and private language are not interpreted, and "simplicity" is not defined——the encyclopedia counts are those of the search date and change as it grows.

6. Census and Closing

1. **988 sequences begin 1, 2, 4, 8, 16; 418 continue with 32 (0.423077), 72 with 31 (0.072874)** (Computation 2.1): **the core.**
2. **surviving shares 0.360321, 0.423077, 0.614833** (Computation 2.1): **257 remain at seven terms.**
3. **polynomial continuation 31.000000, 57.000000, 99.000000** (Computations 3.1 and 3.2): **two simplicities.**
4. **agreeing terms 500, parting at 501, agreeing pairs 3249** (Computation 4.1): **the finite promises nothing.**
5. **2, 4, 6, 8: 1568, 564, 393** (Computation 2.1): **even the even rule is no majority.**
6. **read from the sequence or made from the rule** (Observation 5.1): **the separator; Papers 701, 706 and 317.**

Closing: **"The next term after 1, 2, 4, 8, 16" is not in the sequence, and 988 sequences begin with the same five terms.In the encyclopedia 988 sequences begin 1,2,4,8,16, 418 continue with 32 and 72 with 31; the lowest-degree polynomial through the five points returns 31, 57 and 99 while the exponential rule returns 32, 64 and 128. The rule "1004 after 1000" agrees with the correct rule for 500 terms, and quus agrees with addition in 3249 pairs——what fixes the next term is not the sequence but a family of rules chosen outside it.The separator is whether the rule is read from the sequence or the sequence is made from the rule.Placed among the earlier papers——Paper 701 showed that a penalised criterion changes its answer with data, Paper 706 that a backtest measures attempts, and Paper 317 that a significance level is a promise per test. Here the number of rules fitting a sequence was counted in the encyclopedia.To be honest——nothing has been said about which rule is "right".**

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