The Riemann Hypothesis Fell. Here's What Falls With It.

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On Friday, November 20, 2026, Anthropic mathematician Levent Alpöge announced that he and Claude had proved the Riemann Hypothesis (RH) and, by the same method, the Generalized Riemann Hypothesis (GRH) for Dirichlet L-functions. The proof exists only as ~17 million lines of Lean 4 across 175,187 files.

Verification State (Nov 21, 2026): The Lean FRO and Mathlib Initiative jointly certified the statement and proof; MIT's Andrew Sutherland independently recompiled it with only the three standard axioms; and the comparator run called for by Kevin Buzzard confirmed the formal statement matches the real RH. Meanwhile, the Clay Mathematics Institute still lists RH as unsolved, and no human-readable proof exists.

Axis 1 — The Primes Themselves (RH)

• Prime Number Theorem error term: pi(x) = Li(x) + O(sqrt(x) log x) (von Koch, 1901).

• Schoenfeld's explicit bounds (1976) become unconditional.

• The Lindelöf hypothesis follows, settling zeta growth on the critical line.

• Consecutive prime gaps are bounded by O(sqrt(p) log p).

Axis 2 — Progressions, L-Functions, Number Fields (GRH)

• Artin's primitive root conjecture (Hooley, 1967) becomes unconditional.

• Least prime in an arithmetic progression: O((phi(q) log q)^2) (Lamzouri–Li–Soundararajan).

• Least quadratic non-residue at Ankeny–Montgomery strength.

• Effective Chebotarev density (Lagarias–Odlyzko); Landau–Siegel zeros ruled out entirely.

• Goldfeld's class-number program (with Gross–Zagier and Oesterlé) becomes effective; Miller's primality test is unconditional (though AKS 2002 already settled primality).

Axis 3 — What Does NOT Fall

• Twin primes conjecture — not implied.

• Strong Goldbach conjecture — not implied (weak Goldbach fell to Helfgott in 2013).

• Legendre's conjecture — not implied (the log factor in RH's gap bound is too fat).

• Cramér's conjecture, abc conjecture, P vs NP, BSD, Navier–Stokes — untouched.

• Cryptography: RSA and ECC are NOT broken. Factoring and discrete logarithms stand where they stood.

Axis 4 — The Form of the Proof

A proof no human can read, verified by a kernel resting on three standard axioms, certified before it is understood. Bottom-up checking—every step compiled, the statement comparator-checked against redefinition—settled what 167 years of top-down genius could not.

Scope Caveat: The GRH claim covers Dirichlet L-functions. Whether the method extends to automorphic L-functions remains an open question.

Page 5 — Tear-Out Reference Card: RH + GRH Impact Map

Axis	Key Outcomes	Status (Nov 21, 2026)
1. Primes (RH)	von Koch O(sqrt(x) log x), Schoenfeld, Lindelöf	Lean-certified; Clay pending
2. Progressions (GRH)	Artin (Hooley), Chebotarev, Goldfeld, no Siegel zeros	Dirichlet L-functions only
3. What Holds	Twin primes, Goldbach, P vs NP, RSA/ECC	Untouched / NOT broken
4. Proof Form	~17M lines Lean 4, 3 axioms, >250k pp. est.	Certified before understood