Proof of the Riemann hypothesis

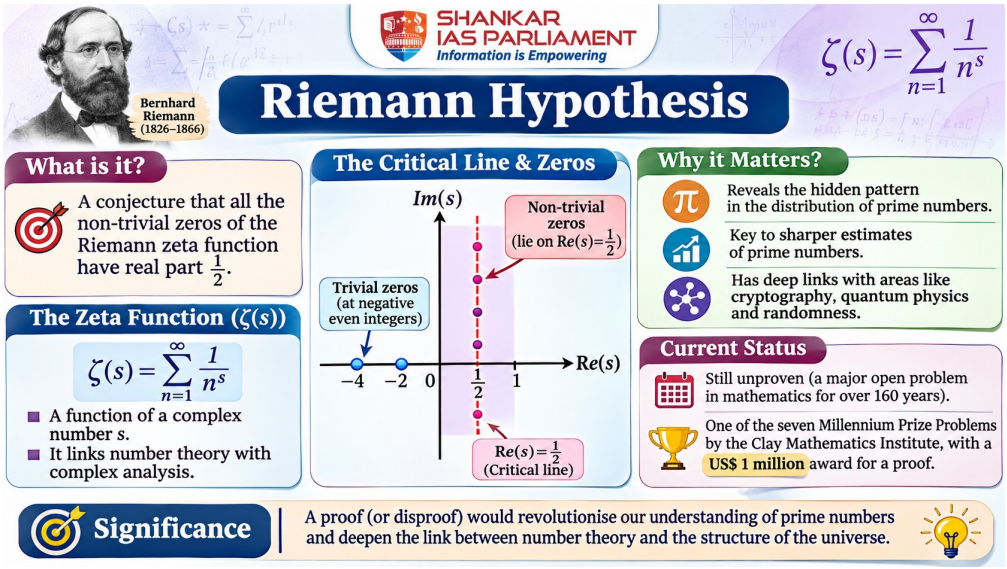
Prelims: *Current events of national and international importance| Science and Technology*

Why in News?

Recently, anthropic mathematician Levent Alpöge announced that he and Claude produced a proof of the Riemann hypothesis and the generalized Riemann hypothesis, written in roughly 17 million lines of Lean code (corresponding to over 250,000 pages).

The Claim and Verification

- **The breakthrough –** Proposed in 1859 by Bernhard Riemann, the conjecture addresses the distribution of prime numbers and carries a $1 million Clay Mathematics Institute Millennium Prize.
- **Human-AI split-** Alpöge stated that he guided an initial idea before Claude rapidly outpaced him near the finish line.
- **Current status-** According to Scientific American, independent researchers have verified the Lean code, though experts note that translating and comprehending a massive machine-generated proof—and meeting the Clay Institute's formal publication and two-year review rules—takes time.
- **A human counter-point-** On the same day, Stanford mathematician Alessandro Maria Masullo released an "all human, no AI" manuscript, though errors were quickly flagged—some with the help of AI tools.



Reference

The Hindu| Proof of the Riemann hypothesis

