

ZACKARY LOEVSETH

SELECTED RESEARCH PORTFOLIO

SpaceX Customer Operations | Independent Research | AI-Assisted Verification

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PROFILE

Current SpaceX Customer Support Associate I (Norwegian) working on billing, shipping, and fulfillment with AI-enabled issue analysis, repeatable documentation, and teammate training. Independently directs evidence-bound mathematical and human-AI research with reproducible code and explicit correction boundaries. SpaceX has not sponsored, reviewed, or endorsed the research below.

SELECTED PUBLIC GITHUB PREPRINT RELEASES

[Explicit Counterexample Families to Five Finite-Group Inequalities from Graffiti3](#) | *Finite-group theory / exact computation*

Result: Proves exact counterexample families for C20, C21, C22, C27, and C28 only: U7(q) for the first three and dihedral families for the latter two. SmallGrp first-failure statements are database/version/range scoped.

Methods: Symbolic family proofs, exact GAP/C checks, implementation-independent checking, mutation tests, and reproducibility replay.

Status: PUBLIC GITHUB PREPRINT RELEASE - EXTERNAL SPECIALIST REVIEW PENDING; NOT JOURNAL/ARXIV SUBMITTED. [Release](#) | [Repository](#)

[Largest-Index Zonotope Bounds for Planar Projections of Semiorder Ideals](#) | *Combinatorial optimization / order theory*

Result: Proves instance-sensitive bounds for represented semiorders and planar projections of their ideal hulls, including $h(P,v) \leq 1+n+\text{inc}(P)$, $f(P,v) \leq 1+n+2\text{inc}(P)$, and $O(nr)$ upper-hull complexity. Unrestricted parametric closure remains open.

Methods: Combinatorial proof and exact rational verification. The 318,667-case replay corroborates the proof; it is not the proof.

Status: PUBLIC GITHUB PREPRINT RELEASE - EXTERNAL SPECIALIST REVIEW PENDING; NOT JOURNAL/ARXIV SUBMITTED. [Release](#) | [Repository](#)

[Excess-Degree Bounds for Minimal Counterexamples to the Erdős-Gyárfás Conjecture](#) | *Graph theory*

Result: For a hypothetical lexicographically minimal counterexample, proves $|A| \geq 2b+s+4$ and only its proved refinements and consequences. The global Erdős-Gyárfás conjecture remains open.

Methods: Definition-level proof reconstruction, suppression-graph analysis, independent implementations, mutation testing, and a 21-gate reproducibility package. Finite computation is corroborative.

Status: PUBLIC GITHUB PREPRINT RELEASE - EXTERNAL SPECIALIST REVIEW PENDING; NOT JOURNAL/ARXIV SUBMITTED. [Release](#) | [Repository](#)

PORTFOLIO STATUS: 3 public GitHub preprint releases; external specialist review pending; none journal/arXiv submitted or peer reviewed. No absolute historical-priority claim is made.

BOUNDED PUBLIC CERTIFICATE

[Erdős Problem #409 - Public F=104 certificate](#)

Public scope is exactly $F(400000287233629)=104$ and therefore $\sup_n F(n) \geq 104$. No priority, unboundedness, global maximality, basin infinitude, density, inverse-tree completeness, or solution claim. Further #409 research is stopped and not active.

[Release](#) | [Repository](#)

SELECTED EVIDENCE HIGHLIGHTS

3 public GitHub preprint releases | 318,667 exact semiorder cases replayed | 21 Erdős #64 publication gates | $F(400000287233629)=104$

ZACKARY LOEVSETH | RESEARCH PROGRAMS & METHODS

BOUNDED RESEARCH PROGRAMS

RR-ETI

Working technical program. The 37-page v2 manuscript is a working manuscript, not a peer-reviewed publication. Finite additive results are assumption-bound; closure-constrained continuous-cost compression remains open; no comparative or causal superiority claim.

Study 14

Preregistered with zero pilot or held-out outcome data and no comparative model results. 40/40 public-safe parity-scaffold checks and 208/208 broader authored-gold/adversarial development checks are development integrity checks, not efficacy evidence. Confirmatory execution is not authorized.

Riemann Hypothesis

RH remains UNSOLVED / IN PROGRESS. v2 was rejected at N06; v3 is stopped at a frozen dependency-schema obstruction. No accepted EvalW certificate, negative Weil entry, off-line zero, or global positivity theorem. Equation A.1 is a source-formula label; the A.1-to-Weil bridge remains an unformalized, unreviewed internal candidate.

Unrestricted parametric closure

The represented-semiorder theorem is public. The unrestricted mixed-sign closure problem remains open; there is no theorem-level RR-ETI bridge.

Autonomous Scientific Director

The workflow supported three public preprint releases and the F=104 certificate with typed checks and corrections. That deployment history is process evidence, not causal validation of RR-ETI or AI superiority.

TECHNICAL METHODS

Python, Ruby, C, shell, Git/GitHub, LaTeX, GAP/SmallGrp, Lean, FLINT/Arb, SymPy; exact rational and interval arithmetic; graph and combinatorial enumeration; producer-checker separation; mutation/corruption testing; SHA-256 manifests; deterministic archives; clean-checkout replay.

ROLE, AI USE & PUBLIC BOUNDARY

My role includes target selection, research-contract design, route and resource decisions, verification standards, correction adjudication, evidence preservation, and publication boundaries. AI systems substantially assisted literature search, proof derivation, computation, checking, recovery, and drafting. Internal implementation diversity is not external review. All manuscripts disclose AI use; final legal, authorship, license, conflict, funding, email-send, and journal/arXiv submission actions remain human-only.

TARGET ROLES

AI research and evaluation | Research engineering | Scientific computing | Reproducibility and verification | Research operations | Technical writing and evidence synthesis

PUBLIC PORTFOLIO: [Research Portfolio](#) | [GitHub](#) | zloevseth@gmail.com