

Reviewer Overview: Active-Route Collatz Proof Package

This archive contains a review package for a proposed active-route constructive proof of the Collatz conjecture. The package reduces the proof obligation to five explicit bridge targets: global entry / Lemma 1a, finite launch menu, finite splice menu, bounded-tail splice, and (R, λ) determinism / finiteness / stock splice. No infinite mechanism remains outside this finite structure. The purpose of this overview is not to replace the proof files, but to give reviewers a short map of what to check.

Core Idea

All theorem-relevant trajectories are forced into a finite audited structure. On the cheap-side, Lemma 1a gives global entry: every live branch reaches a canonical continuation object $\text{Sigma}(q_*)$, or enters admitted downstream stock. On the core-side, terminal, continuation, and feeder contributions are absorbed by a finite stock/splice system through Appendices C, D, and E. On the standard side, the final bridge uses negation conjugacy, low-valued re-entry, finite launch/splice stock, and strict descent to close the ordinary Collatz dynamics.

One central active-route splice is:

13-bank \rightarrow 125 (mod 512) \rightarrow 486w + 121 \rightarrow 13122t + 1333 \rightarrow finite closure.

Thus every trajectory is either terminated, absorbed into finite stock, or reduced to a strictly smaller odd integer, and no trajectory can avoid this classification.

Proof Architecture

Reachability \rightarrow Identification \rightarrow Input A \rightarrow Input B \rightarrow Lemma 1a \rightarrow core-side global closure \rightarrow standard-side strict descent \rightarrow Collatz theorem.

The review package is organized so that each arrow is tied to a named carrier file or finite verification artifact. The main proof-stock file is:

ACTIVE/foundation/active_route_proof_stack.md

The main review entry point is:

ACTIVE/review/README_FOR_REVIEW.md

Key Features

- Finite-state projection $K = (C, t \bmod 2, p)$ for active live branches.
- Explicit terminal lift-menu FSM eliminating infinite all-D terminal lifts.
- Exhaustive residual menu classification for terminal splice branches.
- Exact feeder splice route with finite reducer verification.
- Separation between theorem-facing proof carriers and audit certificates.
- A dependency matrix that asks reviewers to attack five bridge targets rather than reading the archive as one undifferentiated file tree.

Finite Verification Boundary

Finite scripts and JSON artifacts are included as reproducible verification boundaries for bounded ledgers and certificates. They do not replace the theorem-facing proof carriers. In particular, terminal K coverage is recorded as verified under the manuscript terminal lift-menu interface, not as a claim that the script alone proves full branch exhaustiveness. Independent audit of

the computer-assisted components is a separate validation step.

Recommended Reading Order

1. ACTIVE/review/README_FOR_REVIEW.md
2. ACTIVE/review/dependency_matrix.md
3. ACTIVE/review/final_review_manuscript.md
4. ACTIVE/foundation/active_route_proof_stack.md
5. ACTIVE/review/modules/lemma1a_active_line.md
6. ACTIVE/review/modules/core_side_global_closure.md
7. ACTIVE/review/modules/appendix_C_feeder_splice.md
8. ACTIVE/review/modules/appendix_D_suffix_pullback.md
9. ACTIVE/review/modules/appendix_E_3939_package.md
10. Named imports, proved_lemmas, scripts, and certificates as cited.

Reviewer Challenge

Please try to break one of the five bridge targets:

1. global entry / Lemma 1a
2. finite launch menu
3. finite splice menu
4. bounded-tail splice
5. (R, λ) determinism / finiteness / stock splice

The proof is complete if and only if all five bridge targets are correct.

If all five bridge targets withstand review, the package's assembled route gives the Collatz theorem through the standard minimal-counterexample descent argument.