

Proofs in `openai/math` and their Lean formalisations

Repository at commit `adc7f1241b` (6 October 2026).

235 of the 372 result families have a Lean formalisation (63%). The repository groups 722 manuscripts into 372 result families, which its overview describes and sorts by subject. A family counts as formalised when the repository’s manuscript map, `CONTENTS.md`, links it to a scope page in `lean/docs/`. That page says exactly what the Lean development proves, which can be less than every result in the family’s papers, and the *Comparator* files it names state the formalised results for independent checking. The formalisation catalogue, `lean/formalization.yaml`, records that the formalisations were produced by an agent and that their review status is *unchecked*.

Subject	Families	Formalised	Share
Number theory	31	16	52%
Algebraic and complex geometry	36	7	19%
Real and complex analysis	16	9	56%
Convex and metric geometry	15	13	87%
Theoretical computer science	40	32	80%
Dynamical systems and ergodic theory	12	9	75%
Combinatorics	37	33	89%
Algebra	18	9	50%
Probability and statistical mechanics	29	19	66%
Mathematical logic	6	6	100%
Group theory	14	12	86%
Mathematical physics	25	17	68%
Operator algebras	19	14	74%
Topology	18	3	17%
Functional analysis	11	10	91%
Differential geometry	29	15	52%
Partial differential equations	16	11	69%
All subjects	372	235	63%

Number theory

16 of 31 families formalised

No.	Result family	Lean formalisation
001	Milne’s rationality conjecture 1 manuscript	No
002	The full Birch–Swinnerton-Dyer formula in Selmer coranks zero and one 3 manuscripts	No
003	The quasi-Riemann hypothesis 3 manuscripts	Yes scope Comparator: <code>QuasiRiemannHypothesis</code> , <code>DirichletSevenEighths</code> , <code>HeckeSevenEighths</code> , <code>SiegelZeros</code>
004	Hilbert’s tenth problem over $\mathbb{Q}$ 2 manuscripts	No
005	Irrationality of Catalan’s constant 1 manuscript	Yes scope Comparator: <code>Catalan</code>
006	Goldfeld’s conjecture 2 manuscripts	No

No.	Result family	Lean formalisation
007	Two-point Chowla and the corrected binary Elliott conjecture 1 manuscript	Yes scope Comparator: OrdinaryElliott, OrdinaryTwoPointCorrelations
008	The Deligne–Drinfeld conjecture 1 manuscript	Yes scope Comparator: DeligneDrinfeld
009	Bogomolov–Pop and Milnor K -theoretic reconstruction 3 manuscripts	Yes scope Comparator: BogomolovPopInjectivity
010	Fontaine–Mazur modularity at the prime 2 and 2-adic pro-modularity 3 manuscripts	No
011	The Ford–Konyagin–Luca conjecture on prime predecessors 3 manuscripts	No
012	Independent largest prime factors of consecutive integers 1 manuscript	Yes scope Comparator: JointDickman
013	Ostmann’s inverse Goldbach conjecture 1 manuscript	Yes scope Comparator: OstmannComplete, OstmannPrimes
014	Restricted geometric Langlands, generic Ramanujan and Arthur parameters 8 manuscripts	No
015	Torus-packet equidistribution in prime, quartic, and sextic degrees 3 manuscripts	Yes scope Comparator: DukePrimeDegree
016	Zilber–Pink in abelian varieties and the Siegel threefold 4 manuscripts	No
017	The irrationality exponent of π is 2 1 manuscript	Yes scope Comparator: PiExponent
018	The Margulis–Platonov conjecture over global fields 2 manuscripts	No
019	The p -adic section conjecture 2 manuscripts	No
020	Squarefree quartics and power-free polynomial values 1 manuscript	Yes scope Comparator: PowerFreeValues
021	A quadratic bound for Jacobsthal’s function 1 manuscript	Yes scope Comparator: Jacobsthal, JacobsthalImproved
022	The weak inhomogeneous Duffin–Schaeffer conjecture 1 manuscript	No
023	Patterson’s first moment for cubic Gauss sums 1 manuscript	Yes scope Comparator: PattersonFirstMoment
024	An asymptotic formula for the number of totients 1 manuscript	Yes scope Comparator: TotientAsymptotic, TotientCompanionZero
025	Erdős’s short Egyptian-fraction conjecture 1 manuscript	Yes scope Comparator: EgyptianFractions, ShortEgyptianFractions

No.	Result family	Lean formalisation
026	Positive lower density of large prime gaps 1 manuscript	Yes scope Comparator: PrimeGaps
027	Integral density on curve character varieties 1 manuscript	No
028	The Gaussian moat conjecture 1 manuscript	Yes scope Comparator: GaussianMoat
029	Artin's primitive root conjecture: infinitude for every base 2 manuscripts	No
030	Modularity over imaginary quadratic fields 1 manuscript	No
031	Uchida's conjecture for open Galois homomorphisms 1 manuscript	No

Algebraic and complex geometry

7 of 36 families formalised

No.	Result family	Lean formalisation
032	The rational Hodge conjecture for CM abelian varieties and products of K3 surfaces 8 manuscripts	No
033	Campana's orbifold Iitaka conjecture and logarithmic subadditivity 5 manuscripts	Yes scope Comparator: LogKodairaFiberNegative
034	Log abundance and effective Iitaka fibrations 14 manuscripts	No
035	Threefold log abundance in numerical dimension one in characteristic $p > 3$ 2 manuscripts	No
036	Numerical semiampleness and generalized minimal models 4 manuscripts	No
037	The sharp ordinary-double-point volume gap 2 manuscripts	No
038	Fujita's freeness conjecture 1 manuscript	No
039	Nagata's conjecture and maximal Seshadri constants 4 manuscripts	Yes scope Comparator: Nagata, MaximalSeshadriConstants
040	Bloch's conjecture for complex surfaces 1 manuscript	No
041	Hyperkähler SYZ and projective-space bases 2 manuscripts	No
042	Oka classification for K3 surfaces and other compact complex surfaces 1 manuscript	No

No.	Result family	Lean formalisation
043	$P = W$ for fixed-determinant moduli spaces 1 manuscript	No
044	The equivariant cohomological Hikita conjecture for quivers 1 manuscript	No
046	Counterexamples to Shafarevich holomorphic convexity 2 manuscripts	No
047	Complex counterexamples to cancellation and affine fibrations 1 manuscript	Yes scope Comparator: <code>ComplexCancellation</code>
048	A characteristic-zero counterexample to Lipman–Zariski 1 manuscript	No
049	A stable-coordinate counterexample in four variables 2 manuscripts	Yes scope Comparator: <code>AbhyankarSathaye</code> , <code>CommutingDerivations</code>
050	A counterexample to Griffiths’ positivity conjecture 1 manuscript	Yes scope Comparator: <code>QuadricBundles</code>
051	Kobayashi’s canonical-ampleness conjecture 1 manuscript	No
052	Tangent-bundle splittings and universal covers 2 manuscripts	Yes scope Comparator: <code>KahlerSplitting</code> , <code>SplitTangentIntegrability</code>
053	A counterexample to Pixton’s original completeness conjecture 1 manuscript	No
054	Counterexamples to Kuznetsov’s rationality conjecture 1 manuscript	No
055	Toda’s Gepner conjecture and large-volume stability 2 manuscripts	No
056	Termination of fourfold minimal model programs 5 manuscripts	No
057	Campana’s abelianity conjecture and special varieties 3 manuscripts	No
058	The Kollár–Pardon universal-cover conjecture 2 manuscripts	Yes scope Comparator: <code>SymmetricDomains</code>
059	Counterexamples to Zariski’s multiplicity conjecture 2 manuscripts	No
060	The Global Spherical Shell conjecture 1 manuscript	No
062	The LeBrun–Salamon conjecture and projective contact classification 1 manuscript	No
063	The generalized Mukai conjecture 1 manuscript	No
064	The μ -constant problem for surface singularities 1 manuscript	No

No.	Result family	Lean formalisation
065	Virasoro constraints for complete intersections and projective bundles 2 manuscripts	No
066	Bounded klt complements for Fano contractions 2 manuscripts	No
067	The Campana–Petersen conjecture in dimension six 1 manuscript	No
068	Anticanonical nonvanishing under smooth semipositivity 7 manuscripts	No
069	Quantum geometric Langlands at irrational level 1 manuscript	No

Real and complex analysis

9 of 16 families formalised

No.	Result family	Lean formalisation
071	Koebe’s circle-domain conjecture and circle-domain rigidity 2 manuscripts	Yes scope Comparator: <code>KoebeCircleDomains</code>
072	Brennan’s conjecture and a counterexample to Kraetzer’s prediction 2 manuscripts	Yes scope Comparator: <code>Brennan, BrennanSharp, StrictMeans</code>
073	The Falconer distance conjecture 1 manuscript	Yes scope Comparator: <code>PlanarFalconer, FalconerAllDimensions</code>
074	Takeya in three and four dimensions 2 manuscripts	No
075	The $L \log L$ Fourier-convergence conjecture 1 manuscript	No
076	Ultraflat real Littlewood polynomials 3 manuscripts	Yes scope Comparator: <code>AsymptoticallyMinimalLittlewood, LittlewoodFiniteFlatness</code>
077	Fourier restriction for positively curved surfaces 2 manuscripts	No
078	The three-dimensional Bochner–Riesz conjecture 1 manuscript	No
079	Sogge’s local smoothing conjecture in dimension three 1 manuscript	No
080	The Sobolev endpoint in Carleson’s Schrödinger convergence problem 2 manuscripts	No
081	The David–Semmes Riesz-transform problem in higher codimension 1 manuscript	Yes scope Comparator: <code>RieszQuantitative</code>

No.	Result family	Lean formalisation
082	Maximal and variational bounds for the triangular Hilbert transform 3 manuscripts	Yes scope Comparator: <code>TriangularHilbert</code>
083	Stein’s conjecture for Hilbert transforms along Lipschitz directions 1 manuscript	Yes scope Comparator: <code>LipschitzHilbert</code>
084	The geometric case of the Erdős similarity conjecture 2 manuscripts	Yes scope Comparator: <code>DyadicAvoidance</code>
085	Endpoint regularity of the planar centered maximal function 1 manuscript	Yes scope Comparator: <code>SignedFiniteBand</code> , <code>DiskMaximal</code>
086	An L^3 bound for the trilinear Hilbert transform 1 manuscript	No

Convex and metric geometry

13 of 15 families formalised

No.	Result family	Lean formalisation
087	The Mahler conjectures and symplectic width 3 manuscripts	Yes scope Comparator: <code>MahlerConjecture</code> , <code>SymmetricMahlerEquality</code> , <code>GeneralMahler</code> , <code>SymmetricPolar</code>
088	Petty’s projection-volume conjecture and simplex counterexamples 2 manuscripts	Yes scope Comparator: <code>PettyProjectionVolume</code> , <code>ProjectionCounterexample</code> , <code>ProjectionVolume</code>
089	Bounded-distortion L_1 embeddings of planar and bounded-treewidth graphs 2 manuscripts	Yes scope Comparator: <code>PlanarL1</code> , <code>BoundedTreewidthL1</code>
090	Universal optimality of the triangular lattice 4 manuscripts	Yes scope Comparator: <code>AtomicGaussian</code> , <code>TriangularEnergy</code> , <code>TriangularGaussian</code> , <code>PlanarPacking</code>
091	The logarithmic Brunn–Minkowski conjecture 1 manuscript	Yes scope Comparator: <code>LogBrunnMinkowski</code>
092	The optimal order of convex-body covering density 2 manuscripts	Yes scope Comparator: <code>SingleLatticeCovering</code> , <code>CoveringDensity</code>
093	Dimension-free logarithmic Sobolev inequality for subgaussian log-concave measures 1 manuscript	No
094	Subpolynomial dimension reduction in L_p 1 manuscript	Yes scope Comparator: <code>SubpolynomialLp</code>
095	Hyperbolicity cones without semidefinite lifts 3 manuscripts	Yes scope Comparator: <code>HyperbolicCones</code>
096	The Gaussian propeller conjecture 1 manuscript	Yes scope Comparator: <code>GaussianPropeller</code>

No.	Result family	Lean formalisation
097	The Euclidean Steinitz–Bergström conjecture 1 manuscript	Yes scope Comparator: <code>SteinitzBergstrom</code>
098	A negative answer to the Lang–Plaut problem 1 manuscript	Yes scope Comparator: <code>DoublingHilbert</code> , <code>CompactBanach</code>
099	The sharp distortion of edit distance into ℓ_1 3 manuscripts	Yes scope Comparator: <code>EditDistance</code> , <code>FiniteCircle</code> , <code>BinaryEditLower</code> , <code>TreeEdit</code>
100	A counterexample to Bang’s cylinder-covering bound 4 manuscripts	Yes scope Comparator: <code>CylinderCovering</code> , <code>TriangularCovering</code> , <code>RuledCovering</code>
101	The sharp simplex conjecture for isotropic constants 1 manuscript	No

Theoretical computer science

32 of 40 families formalised

No.	Result family	Lean formalisation
102	The Unique Games Conjecture and optimal approximation thresholds 5 manuscripts	Yes scope Comparator: <code>UniqueGamesTheorem</code> , <code>OptimalMaxCut</code> , <code>VertexCover</code> , <code>MinUncut</code> , <code>DirectedFeedback</code>
103	Derandomization of logarithmic space: $L = RL = BPL$ 1 manuscript	No
104	Quasipolynomial algorithms for mean-payoff, stochastic and parity games 4 manuscripts	Yes scope Comparator: <code>TruffetCounterexample</code> , <code>RandomizedMeanPayoff</code>
105	The 2-to-1 Games Conjecture with perfect completeness 1 manuscript	Yes scope Comparator: <code>PerfectCompleteness</code>
106	Hardness of coloring three-colorable graphs 1 manuscript	Yes scope Comparator: <code>IndependentSets</code>
107	Matrix multiplication with exponent at most $9/4$ 3 manuscripts	Yes scope Comparator: <code>MatrixMultiplication</code> , <code>MatrixFields</code>
108	A cubic permanent–determinant lower bound 1 manuscript	Yes scope Comparator: <code>PermanentCubic</code> , <code>SmoothInitialForm</code>
109	Integer multiplication below $n \log n$ 1 manuscript	No
110	Optimal-order randomized k -server on arbitrary metrics 2 manuscripts	Yes scope Comparator: <code>KServer</code> , <code>UniformKServer</code>
111	One-sample matroid prophet inequalities against an almighty adversary 1 manuscript	Yes scope Comparator: <code>MatroidProphet</code> , <code>MatroidSecretary</code>

No.	Result family	Lean formalisation
112	Beyond the square-root exponent for depth-three circuits 1 manuscript	Yes scope Comparator: <code>DepthThree</code>
113	Approximate counting and the perfect-matching entropy conjecture 2 manuscripts	Yes scope Comparator: <code>MatchingFPRAS</code> , <code>MatchingEntropy</code> , <code>BinaryMatching</code> , <code>SingletonLoopMatching</code> , <code>MatchingEntropyBounds</code> , <code>TriangleFace</code>
114	Approximate counting of common integer polymatroid bases 2 manuscripts	Yes scope Comparator: <code>CommonBasesFPRAS</code>
115	Sampling and counting contingency tables with arbitrary margins 2 manuscripts	Yes scope Comparator: <code>ContingencyTables</code>
116	Uniform identity testing for noncommutative formulas 3 manuscripts	Yes scope Comparator: <code>FormulaHitting</code> , <code>RationalHitting</code>
117	Uniform sparsest cut: hardness and semidefinite gaps 2 manuscripts	Yes scope Comparator: <code>UniformSparsestCut</code>
118	Unbounded bin-packing gaps and the modified integer round-up conjecture 1 manuscript	Yes scope Comparator: <code>BinPackingGap</code>
119	The Courtade–Kumar and Hellinger conjectures 2 manuscripts	Yes scope Comparator: <code>CourtadeKumar</code> , <code>SoftChannel1204</code>
120	Almost-linear-time exact matching in general graphs 1 manuscript	No
121	Almost-linear expected-time approximation of edit distance 1 manuscript	Yes scope Comparator: <code>EditApproximation</code>
122	Superpolynomial lower bounds and quasipolynomial reconstruction from deletion traces 3 manuscripts	Yes scope Comparator: <code>TraceReconstruction</code>
124	Polynomial-time scheduling on three identical machines 1 manuscript	Yes scope Comparator: <code>ThreeMachine</code>
125	The approximation threshold for metric k -median 2 manuscripts	Yes scope Comparator: <code>KMedianRecovery</code> , <code>KMedianRefinedRecovery</code> , <code>KMedianThreshold</code> , <code>MetrickMedian</code>
126	Exponential semidefinite complexity of perfect matching 1 manuscript	Yes scope Comparator: <code>MatchingAffineLift</code> , <code>MatchingPSD</code>
127	The asymptotic Gotsman–Linial conjecture 1 manuscript	Yes scope Comparator: <code>GotsmanLinial</code>
128	A factor-two approximation for shortest common superstring 1 manuscript	Yes scope Comparator: <code>Superstring</code>
129	Exponential state costs for two-way automata 2 manuscripts	Yes scope Comparator: <code>TwoWayComplementation</code> , <code>TwoWayDeterminization</code> , <code>OneWayLiveness</code>

No.	Result family	Lean formalisation
130	Fourier transforms below $n \log n$ 2 manuscripts	Yes scope Comparator: <code>ExactFourier</code>
131	Polynomial mixing of graph switches with prescribed degrees 1 manuscript	Yes scope Comparator: <code>SwitchChain</code>
132	A counterexample to the quadratic sensitivity conjecture 1 manuscript	Yes scope Comparator: <code>SensitivitySeparation</code>
133	The complexity of Weisfeiler–Leman refinement 4 manuscripts	Yes scope Comparator: <code>ParityLifts</code> , <code>WLIdentification</code> , <code>WeisfeilerLeman</code> , <code>VariableWL</code>
134	Generalized star height at most three 3 manuscripts	Yes scope Comparator: <code>GeneralizedStarHeight</code>
135	Sharp homogeneous depth-five complexity of matrix products 1 manuscript	Yes scope Comparator: <code>DepthFive</code>
136	The quasilinear PCP-for-PPAD conjecture 1 manuscript	No
137	One-tape time simulation in two-fifths-power space 1 manuscript	No
138	Subset Sum in $O(2^{0.49n})$ time 2 manuscripts	No
139	Subpolynomial queries for log-concave sampling 1 manuscript	Yes scope Comparator: <code>LogConcaveQuery</code>
140	Memory–sample lower bounds for noiseless Gaussian regression 6 manuscripts	Yes scope Comparator: <code>MemoryPrecision</code> , <code>NoiselessRegression</code> , <code>PosteriorReplicas</code> , <code>GaussianFiniteEntropy</code> , <code>GaussianInformation</code> , <code>ProjectionMoments</code> , <code>GaussianReplacement</code> , <code>SubsphereCurrent</code>
141	The existential theory of the reals and existential–universal sentences in the counting hierarchy 1 manuscript	No
142	Deterministic polynomial factorization over prime fields 1 manuscript	No

Dynamical systems and ergodic theory

9 of 12 families formalised

No.	Result family	Lean formalisation
143	Uniform limit-cycle bounds in Hilbert’s sixteenth problem 2 manuscripts	Yes scope Comparator: <code>QuinticLienard</code>
144	Banach’s simple Lebesgue-spectrum problem 1 manuscript	Yes scope Comparator: <code>ThreeTorus</code>

No.	Result family	Lean formalisation
145	Rokhlin's multiple-mixing problem 1 manuscript	Yes scope Comparator: Rokhlin
146	Sinai's positive-entropy conjecture for the standard map 1 manuscript	Yes scope Comparator: StandardMapComponents, StandardMapEntropy, StandardMapLyapunov
147	The near-boundary Birkhoff conjecture 2 manuscripts	No
148	The dimension formula for self-similar measures on the line 1 manuscript	Yes scope Comparator: SelfSimilar, SelfSimilarCorollaries
149	Permanence for weakly reversible reaction networks 2 manuscripts	Yes scope Comparator: MassAction
150	Weak mixing of irrational triangular billiards 2 manuscripts	Yes scope Comparator: IrrationalTriangleBilliard
151	A C^1 counterexample to Shub's entropy conjecture 1 manuscript	Yes scope Comparator: C1EntropyCounterexample
152	Zero entropy does not guarantee a smooth positive-volume model 1 manuscript	Yes scope Comparator: SmoothObstruction
153	Arithmetic classification of Bernoulli convolutions 1 manuscript	No
154	Pointwise multiple ergodic averages for mixing transformations 4 manuscripts	No

Combinatorics

33 of 37 families formalised

No.	Result family	Lean formalisation
155	A counterexample to periodic tiling in dimension three 1 manuscript	Yes scope Comparator: PeriodicTilingThree
156	Borsuk's conjecture fails in dimension nine 1 manuscript	Yes scope Comparator: BorsukNine
157	Counterexamples to the Hadwiger and Colin de Verdière conjectures 3 manuscripts	Yes scope Comparator: ListHadwiger
158	The Euclidean plane cannot be colored with five colors 1 manuscript	Yes scope Comparator: EuclideanFiveColor, PlaneColoring
159	Erdős's reciprocal-sum conjecture and quasipolynomial Szemerédi bounds 1 manuscript	Yes scope Comparator: ErdosReciprocal
160	Superexponential van der Waerden numbers 1 manuscript	Yes scope Comparator: QuantitativeVanDerWaerden

No.	Result family	Lean formalisation
161	Counterexamples to Sidorenko’s conjecture and the forcing conjecture 1 manuscript	Yes scope Comparator: SidorenkoCounterexample
162	Counterexamples to Ryser’s covering and Gyárfás’s tree-cover conjectures 2 manuscripts	Yes scope Comparator: BalancedRyser, RyserCovering, RyserOddExtensions
164	Hindman’s finite sums and products conjecture 1 manuscript	No
165	Exact crossing numbers of complete and complete bipartite graphs 2 manuscripts	Yes scope Comparator: CompleteCrossing, BipartiteCrossing
166	The higher-dimensional Erdős distinct-distances conjecture 1 manuscript	No
167	Pinned distances and a power saving for planar unit distances 2 manuscripts	Yes scope Comparator: PinnedDistances, PlanarUnitDistances
168	Combinatorial invariance of Kazhdan–Lusztig polynomials 1 manuscript	Yes scope Comparator: KLInvariance
169	The Shareshian–Wachs e -positivity conjecture 1 manuscript	Yes scope Comparator: ElementaryPositivity
170	Sharp logarithmic exponents for off-diagonal Ramsey numbers 2 manuscripts	Yes scope Comparator: RamseyFive, SharpLogRamsey
171	The hypercube Ramsey conjecture 1 manuscript	No
172	Classification of finite Euclidean Ramsey configurations 1 manuscript	Yes scope Comparator: EuclideanRamsey, GrahamSpherical, EuclideanRamseyCircle, EuclideanRamseyNine, EuclideanRamseyQuadratic, EuclideanRamseySpherical, EuclideanRamseyTransitive
173	Seymour’s second-neighborhood conjecture 1 manuscript	Yes scope Comparator: SeymourSecondNeighborhood
174	Deterministic construction of strong thin spanning trees 2 manuscripts	Yes scope Comparator: StrongThinTree, AlgorithmicThinTrees
175	Talagrand’s conjectures and graph decompositions at expectation thresholds 3 manuscripts	Yes scope Comparator: TalagrandExpectationThreshold, TalagrandDiscreteConvexity
176	The second Kahn–Kalai conjecture 1 manuscript	Yes scope Comparator: SecondKahnKalai
177	Bounded-degree coboundary expanders in every dimension 1 manuscript	Yes scope Comparator: CoboundaryExpanders

No.	Result family	Lean formalisation
178	Deterministic nonbipartite Ramanujan graphs in every fixed degree 1 manuscript	No
179	The circulant Hadamard conjecture 1 manuscript	Yes scope Comparator: CirculantHadamard, EvenBarker
180	Barnette's Hamiltonian-cycle conjecture 1 manuscript	Yes scope Comparator: BarnetteHamiltonian
181	The Erdős–Gallai cycle-decomposition conjecture 1 manuscript	Yes scope Comparator: CycleDecomposition
182	Power savings for polynomial-difference-free sets 3 manuscripts	Yes scope Comparator: SquareDifference
183	Power savings for planar halving lines and k -sets 1 manuscript	Yes scope Comparator: HalvingLines
184	Coloring and independence in graphs with forbidden subgraphs 2 manuscripts	Yes scope Comparator: CliqueFreeLog
185	Counterexamples to infinite matroid intersection and packing/covering 1 manuscript	Yes scope Comparator: InfiniteMatroid, InfiniteMatroidCorollaries
186	The Friedgut–Kalai graph and hypergraph threshold conjectures 2 manuscripts	Yes scope Comparator: SharpThreshold
187	Snaky in 21 Maker moves 1 manuscript	Yes scope Comparator: SnakyCertificate, SnakyConditional, SnakyTwentyOne
188	The sharp constant in random triangle removal 1 manuscript	Yes scope Comparator: TriangleRemoval
189	Exact cycle–clique Ramsey numbers 1 manuscript	Yes scope Comparator: CycleCliqueRamsey
190	Polynomial removal fails for ordered binary matrices 1 manuscript	Yes scope Comparator: MatrixRemoval
191	A power improvement in the Heilbronn triangle problem 1 manuscript	Yes scope Comparator: HeilbronnTriangle
192	A counterexample to the Gopalan–Servedio conjecture 1 manuscript	Yes scope Comparator: SquareRootDegree

Algebra

9 of 18 families formalised

No.	Result family	Lean formalisation
193	Serre's intersection-multiplicity conjecture 1 manuscript	No
194	Lech's multiplicity conjecture 1 manuscript	Yes scope Comparator: DuttaDomain

No.	Result family	Lean formalisation
195	A counterexample to the small Cohen–Macaulay module conjecture 1 manuscript	No
196	A counterexample to Kaplansky’s zero-divisor conjecture 1 manuscript	Yes scope Comparator: <code>TorsionFreeZeroDivisors</code>
197	Nonsofic groups and group-ring counterexamples 4 manuscripts	Yes scope Comparator: <code>KaplanskyFinitelyPresented</code> , <code>KaplanskyDirectFiniteness</code> , <code>GroupRingDeterminant</code> , <code>OddKaplansky</code>
198	A counterexample to the little finitistic-dimension conjecture 1 manuscript	Yes scope Comparator: <code>LittleFinitistic</code> , <code>FinitisticAsymmetry</code>
199	Counterexamples to conjectures of Auslander–Reiten, Tachikawa, and Nakayama 2 manuscripts	Yes scope Comparator: <code>AuslanderReiten</code> , <code>Tachikawa</code>
200	Eisenbud–Green–Harris and lex-plus-powers in characteristic zero 2 manuscripts	No
201	A counterexample to Kurosh’s division-ring problem 1 manuscript	No
202	The blockwise Alperin weight conjecture 1 manuscript	No
203	Donovan’s conjecture over fields and discrete valuation rings 2 manuscripts	No
204	Tensor saturation for even spin groups 1 manuscript	No
205	Saxl’s conjecture and universal tensor squares 2 manuscripts	Yes scope Comparator: <code>UniversalTensorSquares</code> , <code>Saxl</code>
206	Finite lattice representation: counterexamples and undecidability 2 manuscripts	Yes scope Comparator: <code>FiniteCongruenceGraph</code>
207	The ℓ^1 -Bass and complex Bass trace conjectures 2 manuscripts	Yes scope Comparator: <code>BassTrace</code> , <code>BassTorsionFree</code>
208	The finite Benson–Etingof–Ostrik conjecture 1 manuscript	No
209	Integral counterexamples to Gersten’s conjecture 2 manuscripts	No
210	Foulkes’ conjecture for sixth powers and quadratic stabilization 2 manuscripts	Yes scope Comparator: <code>FoulkesHowe</code>

Probability and statistical mechanics

19 of 29 families formalised

No.	Result family	Lean formalisation
211	Geometry, diffusion, and spectra of random planar maps 7 manuscripts	Yes scope Comparator: FKCRT
212	No bigeodesics and smooth limit shapes in planar first-passage percolation 2 manuscripts	Yes scope Comparator: PlanarFirstPassage, GammaPassage
213	No infinite critical clusters on quasi-transitive graphs 2 manuscripts	Yes scope Comparator: CriticalZ3, CriticalPercolation
214	The Benjamini–Schramm nonuniqueness conjecture 1 manuscript	Yes scope Comparator: BenjaminiSchramm, CayleyPercolation
215	Massive continuum limits and exact mass asymptotics for planar $O(n)$ models 5 manuscripts	Yes scope Comparator: ClassicalON
216	Critical logarithmic corrections and BKT scaling for the planar XY model 6 manuscripts	No
217	The low-temperature Sherrington–Kirkpatrick fluctuation law 2 manuscripts	No
218	Conformal universality for weakly interacting and disordered Ising models 6 manuscripts	Yes scope Comparator: BufferedIsing
219	GOE universality for random regular graphs with weak disorder 2 manuscripts	No
220	Directional zero–one laws and ballisticity in random environments 3 manuscripts	Yes scope Comparator: DirectionalWalk, DirectionalBallisticity, VelocityHemisphere
221	The Mézard–Parisi formula for diluted spin glasses 1 manuscript	Yes scope Comparator: DilutedSpin
222	Perceptron free energies and microscopic jamming 4 manuscripts	Yes scope Comparator: IsingFiniteness, PerceptronFreeEnergy, SphericalField
223	Conformal limits of square-lattice random-cluster interfaces 6 manuscripts	No
224	Critical and near-critical universality for Voronoi percolation 3 manuscripts	No
225	Gaussian free field limits for the balanced six-vertex model 1 manuscript	No
226	The double-dimer CLE_4 conjecture in the half-plane 1 manuscript	No
227	The dynamical phase transition in the Sherrington–Kirkpatrick model 8 manuscripts	Yes scope Comparator: SKHighTemperature, SKRatio, CriticalSKMixing, CriticalSK, SKBarriers

No.	Result family	Lean formalisation
228	Continuum phase transitions for radial pair potentials 2 manuscripts	Yes scope Comparator: <code>ContinuumTransition</code> , <code>RadialTransition</code> , <code>RadialDensityInterval</code>
229	Sharp three- and four-state reconstruction thresholds 3 manuscripts	Yes scope Comparator: <code>ThreeStateSupercritical</code> , <code>ThreeStateTreeClauses</code>
230	Exact Hausdorff measure for SLE 2 manuscripts	Yes scope Comparator: <code>SLELowerPositivity</code>
231	The free uniform spanning forest is a factor of IID 1 manuscript	Yes scope Comparator: <code>StronglyRayleighDPP</code> , <code>FreeUniformSpanningForest</code>
232	Gaussian fields and SLE interfaces for Lipschitz heights 3 manuscripts	No
233	The joint critical Ashkin–Teller scaling limit 1 manuscript	No
234	All-temperature pressure for orthogonally invariant Ising spin glasses 1 manuscript	Yes scope Comparator: <code>InvariantIsing</code>
235	Random-SAT thresholds, sharp variance and computability 4 manuscripts	Yes scope Comparator: <code>FixedClauseThreshold</code> , <code>SATSharpness</code> , <code>SATVariance</code> , <code>SATComputability</code>
236	The factor-of-IID threshold for free Ising states on trees 1 manuscript	Yes scope Comparator: <code>FreeIsing</code>
237	The three-quarter diameter exponent for honeycomb walks 13 manuscripts	Yes scope Comparator: <code>HoneycombBridgeFiniteness</code> , <code>HoneycombFreeEnergy</code> , <code>CriticalStripMass</code>
238	Optimal logarithmic mixing of the Thorp shuffle 12 manuscripts	Yes scope Comparator: <code>ThorpFirstReciprocal</code> , <code>ThorpRemaining</code> , <code>PartialPermutation</code> , <code>ThorpRouting</code> , <code>OccupiedOverlap</code> , <code>WeightedSweepMoments</code> , <code>CoordinateTrace</code> , <code>ThorpWeightedCompatibility</code> , <code>SpinAngle</code> , <code>SignedSweepMoment</code> , <code>BinarySweep</code> , <code>CoordinateSweeps</code> , <code>FourRowPermanent</code>
239	Sharp singularity rates for symmetric sign matrices 2 manuscripts	No

Mathematical logic

6 of 6 families formalised

No.	Result family	Lean formalisation
240	Shelah’s eventual categoricity conjecture 2 manuscripts	Yes scope Comparator: <code>CHObstruction</code>

No.	Result family	Lean formalisation
241	Rigidity of the Turing degrees 1 manuscript	Yes scope Comparator: DegreeRigidity
242	Single-fold Diophantine representations 1 manuscript	Yes scope Comparator: SingleFold
243	Choiceless counting does not capture polynomial time 2 manuscripts	Yes scope Comparator: ChoicelessPolynomialTime, WitnessedChoice
244	The partition principle does not imply choice 1 manuscript	Yes scope Comparator: PartitionPrinciple, PartitionConsistency
245	The β -Barendregt–Geuvers–Klop conjecture 1 manuscript	Yes scope Comparator: TypeSystemNormalization

Group theory

12 of 14 families formalised

No.	Result family	Lean formalisation
246	Cannon’s conjecture 1 manuscript	Yes scope Comparator: CannonGeometricAction
247	An infinite finitely presented residually finite 2-group 2 manuscripts	Yes scope Comparator: PeriodicGroup
248	Thompson’s group F is nonamenable 1 manuscript	Yes scope Comparator: ThompsonNonamenability
249	A finitely generated counterexample to Eilenberg–Ganea 1 manuscript	Yes scope Comparator: EilenbergGanea
250	The Boone–Higman conjecture and higher finiteness 3 manuscripts	Yes scope Comparator: BooneHigman, SimpleOvergroups, UniversalFInfinity
251	Amenability, unitarizability, and Ulam stability 2 manuscripts	Yes scope Comparator: DixmierAllDiscrete, Dixmier
252	A non-residually-finite torsion-free hyperbolic group 1 manuscript	Yes scope Comparator: TorsionFreeHyperbolic
253	An infinite finitely presented simple amenable group 1 manuscript	Yes scope Comparator: SimpleAmenable
254	Classifying spaces and geometric obstructions for Artin groups 3 manuscripts	Yes scope Comparator: HarmonicArtin, ArtinCAT0, ArtinParabolicIntersections
255	Quasi-isometric rigidity of virtually polycyclic groups 1 manuscript	Yes scope Comparator: PolycyclicRecognition
256	Howie’s conjecture on equations over groups 2 manuscripts	Yes scope Comparator: Kervaire

No.	Result family	Lean formalisation
257	A hyperbolic group with no geometric CAT(0) action 1 manuscript	Yes scope Comparator: HyperbolicObstruction
258	Gersten's conjecture for one-relator groups 2 manuscripts	No
259	A group without fixed price 1 manuscript	No

Mathematical physics

17 of 25 families formalised

No.	Result family	Lean formalisation
260	Spacetime Penrose inequalities and rigidity 13 manuscripts	Yes scope Comparator: CKSBondiPenrose
261	Localization and delocalization in the Anderson model 2 manuscripts	Yes scope Comparator: PlanarAndersonSpectrum
262	Sharp one-dimensional Lieb–Thirring inequalities 3 manuscripts	Yes scope Comparator: LiebThirring
263	The ionization and generalized ionization conjectures 3 manuscripts	Yes scope Comparator: CoulombIonization, CoulombRadii
264	Strong cosmic censorship near two-ended Kerr data 3 manuscripts	No
265	The two-dimensional gapped area law 2 manuscripts	No
266	Exactly three mutually unbiased bases in dimension six 2 manuscripts	Yes scope Comparator: MUBSix, HadamardCubeFiber
267	Positive-temperature Bose–Einstein condensation and quantum depletion 5 manuscripts	Yes scope Comparator: HardSphere
268	The spin-one Haldane gap 2 manuscripts	No
269	The Laughlin gap and stability under scalar disorder 2 manuscripts	Yes scope Comparator: LaughlinGap, Laughlin, LaughlinFock, LaughlinPlanar
270	Threshold and positive-energy bound states of the BFSS model 2 manuscripts	No
271	Bloch's law and spontaneous ferromagnetic order 4 manuscripts	Yes scope Comparator: Heisenberg
272	Entanglement without secret key and the PPT-square conjecture 1 manuscript	Yes scope Comparator: DimensionTenChannel, DimensionTenPair
273	The entropy photon-number inequality 1 manuscript	Yes scope Comparator: EntropyPhotonNumber

No.	Result family	Lean formalisation
274	Moore’s parity conjecture for QAC ⁰ 2 manuscripts	Yes scope Comparator: QACParity, RegularParity
275	QMA-hardness of continuum Coulomb energy 2 manuscripts	Yes scope Comparator: ContinuumCoulombHardness
276	The classical capacity of generalized amplitude damping 1 manuscript	Yes scope Comparator: AmplitudeDamping
277	Threshold repetition for entangled games 1 manuscript	Yes scope Comparator: EntangledGames
278	Failure of Kohn–Sham ensemble representation 1 manuscript	No
279	Exact quantum factoring over a fixed finite gate set 1 manuscript	Yes scope Comparator: ExactQuantumFactoring
280	Strong locality for strongly rational unitary vertex operator algebras 1 manuscript	Yes scope Comparator: VertexAlgebraNet
281	QAOA optimality for the SK model 2 manuscripts	Yes scope Comparator: SKValue, SKFullSupport
282	Scale-to-conformal enhancement in four-dimensional QFT 1 manuscript	No
283	Polynomial-time, constant-error unitary synthesis from a Boolean oracle 1 manuscript	No
284	The optimal randomized–quantum query exponent 1 manuscript	No

Operator algebras

14 of 19 families formalised

No.	Result family	Lean formalisation
285	Counterexamples to Baum–Connes and Kadison–Kaplansky 3 manuscripts	No
286	Arithmetic rigidity of lattice von Neumann algebras 2 manuscripts	No
287	All nonabelian free group factors are isomorphic 1 manuscript	Yes scope Comparator: InterpolatedFactors
288	Kadison’s similarity conjecture 1 manuscript	Yes scope Comparator: KadisonSimilarity, UniformCommutator
289	The strong Kadison–Kastler conjecture 3 manuscripts	Yes scope Comparator: StrongKadisonKastler
290	Connes’ bicentralizer conjecture and relative bicentralizers 2 manuscripts	Yes scope Comparator: BoundedRecovery

No.	Result family	Lean formalisation
291	Toms–Winter and equivariant Jiang–Su stability 4 manuscripts	Yes scope Comparator: <code>UniformGamma</code>
292	A counterexample to Kirchberg’s norm-ultrapower embedding problem 1 manuscript	Yes scope Comparator: <code>NuclearUltrapower</code>
293	A counterexample to the hyperinvariant-subspace problem 2 manuscripts	Yes scope Comparator: <code>FiniteFactor</code> , <code>BackwardIntertwiners</code> , <code>ContinuousCircleWeight</code> , <code>HyperinvariantSubspaces</code> , <code>IrrationalRotation</code> , <code>ProductBrown</code>
294	A counterexample to Kaplansky’s quasitrace conjecture 1 manuscript	Yes scope Comparator: <code>KaplanskyQuasitrace</code> , <code>KaplanskyStableFiniteness</code>
295	The Kadison–Ringrose cohomology conjecture 1 manuscript	Yes scope Comparator: <code>KadisonRingrose</code>
296	The generator problem for finite factors 1 manuscript	Yes scope Comparator: <code>FactorGeneration</code> , <code>RelativeGeneration</code>
297	A ZFC counterexample to Naimark’s problem 1 manuscript	Yes scope Comparator: <code>Naimark</code>
298	A counterexample to Voiculescu’s free-entropy equality conjecture 1 manuscript	Yes scope Comparator: <code>FiniteEntropySeparation</code>
299	The Kirchberg–Rørdam character criterion 1 manuscript	Yes scope Comparator: <code>CharacterCriterion</code>
300	The Popa–Vaes quadratic strong-operator paving conjecture 2 manuscripts	No
301	Classification by trace cones after Razak–Jacelon stabilization 1 manuscript	No
302	The Phillips–Toms formula for minimal integer actions 2 manuscripts	No
303	From ordinary to strong pure infiniteness 1 manuscript	Yes scope Comparator: <code>ExactInfiniteness</code> , <code>IndividualStrongInfiniteness</code>

Topology

3 of 18 families formalised

No.	Result family	Lean formalisation
304	The Hilbert–Smith conjecture in every dimension 1 manuscript	No
305	Counterexamples to disk embedding and Wall’s manifold conjecture 3 manuscripts	No
306	The purely cosmetic surgery conjecture for knots in S^3 1 manuscript	No

No.	Result family	Lean formalisation
307	Failure of rational injectivity for maximal coarse assembly 2 manuscripts	Yes scope Comparator: <code>CoarseAssembly</code>
308	Smith–Toda complexes at every height with varying primes 2 manuscripts	No
309	The Kervaire invariant problem at the prime three 1 manuscript	No
310	Quillen’s conjecture in rational homology 1 manuscript	No
311	Chai’s invariant-ideal conjecture 1 manuscript	No
312	The Grothendieck homotopy hypothesis 1 manuscript	Yes scope Comparator: <code>GrothendieckElementaryExpansion</code>
313	Finite generation for the $K(n)$ -local sphere 1 manuscript	No
314	The chromatic Smith fixed-point problem for finite p -groups 1 manuscript	No
315	The four-dimensional Singer conjecture 1 manuscript	No
316	Curtis’s conjecture 1 manuscript	No
317	Thomason model structures in every strict higher dimension 1 manuscript	Yes scope Comparator: <code>ThomasonModelStructures</code>
318	Chromatic splitting: counterexamples and filtrations 5 manuscripts	No
319	Counterexamples to the Hahn–Wilson conjecture at height two 1 manuscript	No
320	A four-dimensional counterexample to Borel rigidity 1 manuscript	No
321	A counterexample to Wall’s finite $D(2)$ conjecture 1 manuscript	No

Functional analysis

10 of 11 families formalised

No.	Result family	Lean formalisation
322	Tingley’s sphere-isometry problem 1 manuscript	Yes scope Comparator: <code>TingleySphereIsometry</code>
323	Relative independence of the separable quotient problem 1 manuscript	Yes scope Comparator: <code>SeparableQuotientNegative</code>

No.	Result family	Lean formalisation
324	Lipschitz equivalence without linear isomorphism 2 manuscripts	Yes scope Comparator: LipschitzEquivalence, C0Absorption
325	The complete Crouzeix conjecture 2 manuscripts	Yes scope Comparator: DirectCrouzeix, CompleteCrouzeix, StructuralCrouzeix, CrouzeixHilbert, HilbertCrouzeix
326	The cotype–cotype conjecture under the approximation property 1 manuscript	Yes scope Comparator: Cotype
327	Markov type characterizes superreflexivity 1 manuscript	Yes scope Comparator: MarkovType
328	Fixed points of nonexpansive maps in reflexive Banach spaces 1 manuscript	Yes scope Comparator: ReflexiveFixedPoints
329	A counterexample to Pietsch’s metric-entropy duality conjecture 1 manuscript	Yes scope Comparator: MetricEntropyDuality
330	A negative answer to Kalton’s Lipschitz-free approximation question 1 manuscript	Yes scope Comparator: RealL1Renorming, DiscreteLipschitzFree
331	Asymptotic midpoint uniform convexity without asymptotically uniformly convex renorming 7 manuscripts	Yes scope Comparator: ForestSpace, MidpointLenses, DiamondDistortion, DaugavetModuli, BoundedTreePotentials, IndependentProducts, RecursivePotentials
332	Metric Markov cotype two for ℓ_1 1 manuscript	No

Differential geometry

15 of 29 families formalised

No.	Result family	Lean formalisation
333	Smooth isometric immersions of surfaces into $\mathbb{R}^4$ 1 manuscript	Yes scope Comparator: SurfaceImmersion
334	A smooth surface metric with no local immersion in $\mathbb{R}^3$ 1 manuscript	Yes scope Comparator: IsometricImmersion
335	Gromov’s integral scalar-curvature inequality 2 manuscripts	No
336	Spectral scalar curvature and codimension-two width 3 manuscripts	No
337	Cartan–Hadamard isoperimetry and CAT(0) fillings 2 manuscripts	Yes scope Comparator: FillingCoefficient, SharpCAT0Filling
338	Yau’s uniformization conjecture 1 manuscript	No

No.	Result family	Lean formalisation
339	Katok's entropy rigidity conjecture 1 manuscript	No
340	A counterexample to the nearby Lagrangian conjecture 1 manuscript	No
341	Donaldson's hypersymplectic deformation conjecture 1 manuscript	No
342	Donaldson's tamed-to-compatible conjecture 1 manuscript	Yes scope Comparator: <code>TamingCompatibility</code>
343	Sharp symplectic ball-packing criteria in higher dimensions 1 manuscript	Yes scope Comparator: <code>BallPacking</code> , <code>BallPackingNecessity</code>
344	The metric Blaschke conjecture 1 manuscript	No
345	Infinitely many closed geodesics on spheres and three-manifolds 1 manuscript	No
346	Sharp singular-set bounds for stationary integral varifolds 2 manuscripts	No
347	Counterexamples to strong forms of Arnold's fixed-point conjecture 5 manuscripts	Yes scope Comparator: <code>ArnoldCounterexample</code>
348	Nonnegatively curved Einstein four-manifolds and a topological gap 3 manuscripts	Yes scope Comparator: <code>EinsteinFour</code>
349	The Solomon–Yau least-volume conjecture 1 manuscript	No
350	Yau's nodal conjecture: surfaces and counterexamples 3 manuscripts	Yes scope Comparator: <code>NodalLength</code> , <code>SmoothYau</code> , <code>YauCounterexample</code>
351	Scalar curvature detects four-dimensional Ricci-flow singularities 3 manuscripts	No
352	Finite-time singularity of Calabi flow 1 manuscript	No
353	The sharp dimension threshold for affine Bernstein rigidity 2 manuscripts	Yes scope Comparator: <code>AffineBernstein</code>
354	Isoperimetric regions in the cubic three-torus 1 manuscript	Yes scope Comparator: <code>CubicTorus</code>
355	Unique tangent flows at the first surface singularity 1 manuscript	No
356	Gigli's characterization of Alexandrov curvature 2 manuscripts	Yes scope Comparator: <code>WeakHessian</code>
357	Bi-Lipschitz coordinates at every regular RCD point 1 manuscript	No
358	A three-manifold with no conjugate points and no nonpositively curved metric 1 manuscript	Yes scope Comparator: <code>ConjugatePoints</code>

No.	Result family	Lean formalisation
359	Negative Kähler curvature without bounded holomorphic coordinates 2 manuscripts	Yes scope Comparator: <code>PinchedKahler</code>
360	Villani’s convexity conjecture and regular optimal transport 2 manuscripts	Yes scope Comparator: <code>WeakMTWGlobalSupport</code> , <code>BiholderTransport</code>
361	Counterexamples to Yau’s harmonic dimension bound 2 manuscripts	Yes scope Comparator: <code>HarmonicGrowth</code>

Partial differential equations

11 of 16 families formalised

No.	Result family	Lean formalisation
362	Global smoothness for relativistic Vlasov–Maxwell 1 manuscript	Yes scope Comparator: <code>VlasovMaxwell</code>
363	Boltzmann nonuniqueness with exact local conservation 2 manuscripts	Yes scope Comparator: <code>BoltzmannNonuniqueness</code>
364	Kinetic limits and fluctuations over the Boltzmann lifespan 2 manuscripts	No
365	Joint metric and connection recovery from one boundary patch 3 manuscripts	Yes scope Comparator: <code>Conductivity</code>
366	The planar Mumford–Shah regularity conjecture 1 manuscript	No
367	The critical dimension for the one-phase Bernoulli problem 1 manuscript	Yes scope Comparator: <code>BernoulliNonflatInSeven</code>
368	The three-dimensional Ball–Evans approximation problem 2 manuscripts	No
369	The hot spots conjecture for simply connected planar domains 1 manuscript	Yes scope Comparator: <code>HotSpots</code>
370	The subcritical Lane–Emden and Hénon–Lane–Emden conjectures 1 manuscript	Yes scope Comparator: <code>HenonEmden</code>
371	Stable blowup for a defocusing Schrödinger equation 1 manuscript	Yes scope Comparator: <code>DefocusingNLS</code>
372	Global uniqueness in smooth isotropic elasticity 1 manuscript	Yes scope Comparator: <code>ElasticityUniqueness</code>
373	Nonattainment in three-marginal Coulomb transport 1 manuscript	Yes scope Comparator: <code>CoulombCounterexample</code>
374	Sharp one-third stability of optimal transport maps 1 manuscript	Yes scope Comparator: <code>Brenier</code>
375	De Giorgi’s conjecture in dimension eight 1 manuscript	No

No.	Result family	Lean formalisation
376	Universal computation in forced Navier–Stokes flows 9 manuscripts	Yes scope Comparator: SolenoidalSheetPrograms, NavierStokesAlternating, NavierStokesVelocity, BalancedBoxRouting, BalancedThreeStack, ForcedNavierStokesComputation
377	Interior $C^{1,\alpha}$ regularity for infinity-harmonic functions 1 manuscript	No