

Recent advances in the Meth8/VL4 modal logic model checker

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In applied and theoretical mathematics, assertions are categorized in alphabetical order as: axiom; conjecture; definition, entry; equation; expression; formula; functor; hypothesis; inequality; metatheorem; paradox; problem; proof; schema; system; theorem; and thesis. We evaluate 437 artifacts in 2366 assertions to confirm 455 as tautology and 1911 as *not* (80.8%). We use Meth8, a modal logic checker in five models.

The semantic content or predicate basis of some expressions on their face does not disqualify them from evaluation by Meth8 in classical modal logic. However, the rules of classical logic, as based on the corrected Square of Opposition by Meth8, apply to virtually any logic system. Consequently some numerical equations are mapped to classical logic as Meth8 scripts.

The rationale for mapping quantifiers as modal operators is based on satisfiability and reproducibility of validation of the 24-syllogisms from the corrected Square of Opposition.

Test results are refuted as *not* tautologous, confirmed as tautologous, or neither. For a paradox, *not* tautologous means it is not a paradox, but not necessarily a contradiction either.

The experimental tests used variables for 4 propositions, 4 theorems, and 11 propositions. The size of truth tables are respectively for 16-, 256-, and 2048- truth values, using recent advances in look up table indexing.

The Meth8 modal theorem prover implements the logic system variant VL4 which corrects the quaternary L4 of Łukasiewicz. There are two sets of truth values on the 2-tuple {00, 10, 01, 11} as respectively {False for contradiction; Contingent for falsity; Non contingent for truthity; Tautology for proof} and {Unevaluated; Improper; Proper; Evaluated}. The designated *proof* value is T for tautology and E for evaluated. The model checker contains recent advances in parsing technology named sliding window.

The mapping of formulas in Meth8 script was performed by hand, checked, and tested for accuracy of intent. The Meth8 script uses literals and connectives in one-character. Propositions are p-z, and theorems are A-B. The connectives for {and, or, imply, equivalent} are {&, +, >, =}. The negated connectives for {nand; nor; not imply; exclusive-or} are {\, -, <, @}. The operators for {not; possibility $\diamond \exists$; necessity $\square \forall$ } are {\~, %, #}. Expressions are adopted for clarity as: (p=p) for tautologous; (p@p) for contradiction; and (x<y) for $x \in y$. The expression $x \leq y$ as "x less than or equal to y" is rendered in the negative as $\sim(y < x)$ or as $(\sim x > \sim y)$.

Definition	Axiom	Symbol	Name	Meaning	2-tuple	Binary ordinal
1	p=p	T	tautology	proof	11	3
2	p@p	F	contradiction	absurdum	00	0
3	%p>#p	N	non-contingency	truthity	01	1
4	%p<#p	C	contingency	falsity	10	2

Note the meaning of (%p>#p): a possibility of p implies the necessity of p; and some p implies all p. In other words, if a possibility of p then the necessity of p; and if some p then all p.

This shows equivalence of respective modal operators and quantified operators as in Appendix.

For Meth8 an immediate further application is mapping sentences of natural language into logical formulas, so a semi-automation of that linguistic process is near completion.

References

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No.	Name of artifact	Type of artifact	Results with instances
1	ABC	Conjecture	Invalidated
2	Abductive reasoning	System	Invalidated
3	Abduction, induction, deduction: Peirce	Inference	Invalidated(2) Validated(1)
4	Abstract theory of segments using Prolog	Proofs	Invalidated(15) Validated(3)
5	AGM / Levi and Harper bridging principles	Postulates	Invalidated(7) Validated(3)
6	Agnosticism as subset of atheism from no-belief	Conjecture	Invalidated(4) Validated(2)
7	AI: divide the dollar competition	Experiment	Invalidated(1)
8	AI: reduction for scalable deep learning	Algorithm	Invalidated(3)
9	Alcoholics Anonymous BB: We agnostics, p 53	Conjecture	Invalidated(5)
10	Alexandroff correspondence	Conditional	Invalidated(3)
11	Analysis as both correct and informative	Paradox	Invalidated(5)
12	Anderson division by zero as nullity	Theorem	Invalidated
13	Approximations of theories	System	Invalidated(1)
14	Athanasian creed (Holy Trinity)	Credo	Invalidated(1) Validated(2)
15	Axiomatizing category theory in free logic	Axioms	Invalidated
16	Banach order space, generating positive cone	Definition	Invalidated(2) Validated(1)
17	Banach-Tarski, shorter resuscitation attempt	Paradox	Invalidated(2)
18	Crucial claim in Step 3 of proof, shortest	Paradox	Invalidated(1)
19	Bar recursion	Mapping	Invalidated(2)
20	Barcan	Formula	Validated
21	Bayes rule	Rule	Invalidated(11) Validated(11)
22	BCI / BCK algebra	System	Invalidated(5) Validated(3)
23	Bell / CHSH / Spekken toy model	Inequalities	Invalidated
24	A shorter refutation	Theorem	Invalidated(2)
25	A simpler refutation	Theorem	Invalidated(2)
26	Bell's inequality by axiom of empty set	Theorem	Invalidated(2)
27	Bogus Bellian logic (BBL)	Theorem	Invalidated(5)
28	Coercive proof	Theorem	Invalidated(2)
29	Coin toss proof	Conjectures	Invalidated(2)
30	Original inequality with assumption	Conjecture	Invalidated(4)
31	Original inequality with assumptions	Conjectures	Invalidated(5)
32	Original inequality and CHSH	Conjectures	Invalidated(6)
33	Positive reasons proof	Theorem	Invalidated(6) Validated(3)
34	Tropical sum	Method	Invalidated(1)

No.	Name of artifact	Type of artifact	Results with instances
35	Bellman's Lost in the forest problem, solution	Theorem	Validated(4)
36	Berkeley	Paradox	Invalidated
37	Bernstein-Vazirani	Algorithm	Invalidated(4) Validated(1)
38	No-cloning theorem	Theorem	Invalidated(2)
39	Bertrand-Chebyshev theorem / postulate	Theorem	Invalidated(2)
40	Betweenness theory	Axioms	Invalidated(9) Validated(7)
41	Biscuit conditionals	System	Invalidated(13)
42	Bisimulation, coinduction, Howes' congruence	Proof method	Invalidated(5)
43	Blameworthiness degrees	Coalition	Invalidated(3) Validated(5)
44	Block argumentation	Method	Invalidated(15)
45	Blok-Esakia	Theorems	Invalidated(5)
46	Bogdanov map, 2D conjugate of Hénon map	Formula	Invalidated
47	Born rule	Theorem	Invalidated(6)
48	Exclusivity rule as basis	Theorem	Invalidated(5)
49	Borsuk-Ulam theorem (BUT)	Conjecture	Invalidated(1)
50	Branching quantifier (Hintikka)	System	Invalidated
51	Brouwer fixed point theorem (BFPT)	Conjecture	Invalidated(3) Validated(2)
52	Browder's theorem	Conjecture	Invalidated(1)
53	Buddhist logic	Tetralemma	Invalidated(12)
54	Buridan's Ass	Paradox	Invalidated
55	Cantor's continuum conjecture, binary injection	Hypothesis	Invalidated(2)
56	Continuum conjecture, interpreted	Hypothesis	Invalidated(3)
57	Diagonal argument	Proof	Invalidated(3)
58	Pairing	Functor	Invalidated(2)
59	Carroll's tortoise and Achilles	Paradox	Invalidated
60	Caswell's significant curriculum issues (1952)	Theorem	Invalidated(5) Validated(1)
61	Causality	Axiom	Invalidated(3) Validated(2)
62	Category composition of morphisms	Definition	Invalidated(1)
63	CC conjecture of Lin Fan Mao	Conjecture	Invalidated(2)
64	Chaitin incompleteness and L constant	Theorem	Invalidated(3) Validated(1)
65	Chinese room argument: Brain Simulator Reply	Conjecture	Validated(3)
66	CHSH inequality	Conjecture	Invalidated(1)
67	Church	Thesis	Invalidated
68	Clausius-Clapeyron on spacial dimension	Equation	Invalidated(1)

No.	Name of artifact	Type of artifact	Results with instances
69	Clifford tori 2D / Kanban cell neuron	Definition	Validated
70	Coherence in modal logic	Refutation	Invalidated(1)
71	Collatz (briefest known confirmation)	Conjecture	Invalidated(4) Validated(1)
72	Commutative short circuit on propositional logic	System	Invalidated (1)
73	Complementarity inequality	Refutation	Invalidated(2) Validated(1)
74	Complex (\mathbb{C}), imaginary number rendering	Method	Invalidated(1) Validated(1)
75	Conceptivistic / containment logic: proscription	Systems	Invalidated(3)
76	Conditional logic: improved Adams	Hypothesis	Invalidated(7)
77	Events in QL	Conjectures	Invalidated(8) Validated(1)
78	Confluence in rewrite systems	Property	Invalidated(3)
79	Connexive logic: Wansing's nightmare	System	Invalidated(2)
80	Aristotle, Boethius justifying connexive	Theses	Invalidated(4)
81	De Finettian logic conditionals	Indicatives	Invalidated(10)
82	Stit logic (see to it that)	System	Invalidated(13)
83	Constructivistic logic	System	Invalidated(14) Validated(2)
84	Continuum hypothesis	Conjecture	Invalidated(2) Validated(1)
85	Craig's interpolation	Theorem	Invalidated(2) Validated(2)
86	Creative theories in degrees of unsolvability	Theorem	Invalidated
87	D Ultrafilter contra continuum problem	Equation	Invalidated(1)
88	De Morgan algebras, existentially closed	System	Invalidated(2)
89	Dedekind lattice identity	Axiom	Validated
90	Dempster-Shafer belief and plausibility	Theory	Invalidated(3)
91	Density of all Turing and truth table degrees	Formula	Invalidated(2)
92	Description logic	System	Invalidated(2)
93	Power set POW on of any Ω -model	Operator	Invalidated(4)
94	Unions in descriptively near sets	Operator	Invalidated(6) Validated(2)
95	Dialetheism	System	Invalidated(4)
96	Dialetheism: inconsistent	System	Invalidated(2)
97	Dichotomy of selection	System	Invalidated
98	Disturbance	Feature	Invalidated(4)
99	Diverse double compiling	Schema	Invalidated
100	Doxastic logic	System	Invalidated(8) Validated(13)
101	Drinker's paradox	Paradox	Invalidated
102	$E=mc^2$	Theorem	Invalidated(3) Validated(1)

No.	Name of artifact	Type of artifact	Results with instances
103	EF-axiom: topology and near sets	Axiom	Invalidated
104	Ehrenfeucht-Mostowski indiscernables	Theorem	Invalidated(1)
105	Einstein–Podolsky–Rosen (EPR)	Paradox	Invalidated(1)
106	Energy-mass equation, $E=mc^2$	Theorem	Invalidated(3) Validated(1)
107	Entanglement vs untanglement: no-no go-go	Conjecture	Invalidated(28)
108	Epicurus invoked by Epictetus	Paradox	Invalidated(1)
109	Epimenides the Cretan	Paradox	Invalidated(1)
110	Epistemic coalition	Perfect recall	Invalidated(4) Validated(3)
111	Epistemic dynamic reasoning	System	Invalidated(2)
112	Epistemic Hilbert substructure	System	Invalidated(5)
113	Epistemic for knowledge and probability	System	Invalidated(2)
114	Epistemic navigation	System	Invalidated(8)
115	Epistemic quantifiers over agents	Conjecture	Invalidated(8) Validated(12)
116	Erdős-Strauss	Conjecture	Invalidated
117	Euathlus paradox	Paradox	Invalidated(9)
118	"Ex nihilo": some thing from nothing	Conjecture	Invalidated(4) Validated(4)
119	Fictional logic based on Levi-identity / AGM	System	Invalidated(5) Validated(4)
120	Fixedpoint operator mapping mu-calculus	Conjecture	Invalidated(2)
121	Fitch's knowability	Paradox	Invalidated(4)
122	FOL disjunctive normal forms (DNF): minimize	FOL Optimizer	Invalidated(2) Validated(1)
123	FOL continuous induction on real closed fields	System	Invalidated(11) Validated(1)
124	Forcing method	Paradoxes	Invalidated(2)
125	Frauchiger-Renner thought experiment	Paradox	Invalidated(5)
126	Frauchiger-Renner thought quantum model	Paradox	Invalidated(14) Validated(2)
127	Fredkin	Paradox	Invalidated(1)
128	Free will argument of Maimonides	Paradox	Invalidated(1)
129	Free will non-existence	Refutation	Invalidated(8) Validated(2)
130	Free will theorem: Clifton-Kochen-Specker	Theorem	Invalidated(1)
131	Free will theorem: FIN axiom	Hypothesis	Invalidated(2) Validated(2)
132	Free will theorem: MIN' axiom	Hypothesis	Invalidated(1)
133	Frequency dependence of mass	Theorem	Invalidated(3) Validated(1)
134	Functions as injective, surjective, bijective	Theorems	Validated(4)
135	Gentzen proof of sequent System G-M	System	Invalidated(6) Validated(2)
136	Gettier (justified belief)	Problem	Invalidated(6)

No.	Name of artifact	Type of artifact	Results with instances
137	GHZ (Greenberger-Horne-Zeilinger)	Experiments	Invalidated(1)
138	Gleason	Theorem	Invalidated(1)
139	Gödel compactness	Theorem	Invalidated(6) Validated(2)
140	Gödel completeness	Theorem	Invalidated
141	Gödel completeness, shortest	Theorem	Invalidated(2)
142	Gödel first incompleteness	Theorem	Invalidated(4)
143	Gödel incompleteness	Equations	Invalidated(14) Validated(1)
144	Gödel incompleteness FOL	Contradictions	Invalidated(14) Validated(1)
145	Gödel incompleteness theorem	Assistant tools	Invalidated(2) Validated(2)
146	Gödel incompleteness theorem	Refutation	Invalidated(7)
147	Gödel incompleteness via two counter-examples	Refutation	Invalidated(9) Validated(2)
148	Gödel-justification logic	Refutation	Invalidated(7) Validated(2)
149	Subsets	Models	Invalidated(2)
150	Gödel-Löb	Axiom	Invalidated
151	Gödel pairing function	Axiom	Invalidated(3) Validated(1)
152	Gödel recursion	Theorem	Validated
153	Gödel-Scott on God	Theorem schema	Invalidated
154	Goldbach's conjectures	Conjectures	Invalidated
155	Goldblatt-Thomason with back/forth duality	Theorem	Invalidated(3)
156	Graded modal logic	Frame classes	Invalidated(4) Validated(2)
157	Grassmannian (<i>recently discovered</i>)	Paradox	Invalidated
158	Hadamard gate	Theory	Invalidated(3) Validated(1)
159	Hahn-Banach	Theorem	Invalidated(5)
160	Hall	Effect	Invalidated
161	Hamiltonian quaternion	Definition	Invalidated(3)
162	Hardy's generalized paradox	Conjecture	Invalidated(6)
163	Hegel's dialectic	Method	Invalidated(6) Validated(3)
164	Heider inspired international relations theory	Theory	Invalidated(5) Validated(1)
165	Heisenberg uncertainty principle	Axiom	Invalidated(2)
166	Conjecture	Principle	Invalidated(1)
167	Replacement theorem	Axiom	Inalidated (2) Validated(3)
168	Take a picture of an electron	Principle	Invalidated(6) Validated(2)
169	Henkin cyclic algebra and first order logic	System	Invalidated(9) Validated(6)
170	Applications to logic	Axioms	Invalidated(8) Validated(6)

No.	Name of artifact	Type of artifact	Results with instances
171	Permutation model nonrepresentable	Assertion	Invalidated(1)
172	Herbrand semantics	System	Invalidated(6)
173	Heyting algebra	Algebra	Invalidated(21)
174	Heyting-Brouwer intuitionistic logic	Systems	Invalidated(9) Validated(1)
175	Heyting logic	Idempotency	Invalidated(2) Validated(1)
176	Hexagons of opposition for statistical modalities	Conjectures	Invalidated(9) Validated(1)
177	Higher-order mathematical induction	Principle	Invalidated(2) Validated(1)
178	Hilbert #10 Diophantine universal solution	Formulas	Invalidated
179	Hilbert generalization	System	Invalidated
180	Hilbert grand hotel	Paradox	Invalidated(1)
181	Hilbert / Kolmogorov intuitionistic logic	Systems	Invalidated(9)
182	Huhn 2-distributive lattice identity	Formula	Invalidated
183	Hydraulic forgiveness (confirmed)	Theorem	Invalidated(6) Validated(2)
184	Hydraulic corollary of peace	Corollary	Validated(1)
185	Ideals	Definition	Invalidated(4)
186	Ignorance of first choice	System	Invalidated
187	Imaginary numbers	Definition	Invalidated(2)
188	Imperative logic	System	Invalidated(3) Validated(4)
189	Implication combination forms from $(p \rightarrow r) \rightarrow r$	Theorems	Invalidated(3) Validated(16)
190	Inconsistent theory	Theorem	Invalidated
191	Extending the monad to a triad	Formulas	Invalidated
192	Kunen inconsistency	Theorem	Invalidated
193	Independence-friendly logic (Kreiselization)	System	Invalidated(2)
194	Indicative conditionals	Encyclopedia entry	Invalidated
195	Induction: Black raven (swan); Kripkenstein	System	Invalidated(3)
196	Induction: New riddle	Paradox	Invalidated (2)
197	Inequality: 'arbitrarily' vs 'sufficiently large'	Conjecture	Invalidated(2) Validated(1)
198	Infinite set theory	Theorem	Invalidated
199	Information theory: mutual information	Definition	Invalidated(4)
200	Interval logic for model checking	System	Invalidated(3)
201	Join-prime in lattice theory	Definition	Validated
202	Jonsson positive logic: retromorphism	System	Invalidated(3)
203	k -triangular set function logic	Definition	Validated(1)
204	Kanban cell neuron maps whole brain	Model	Invalidated(242) Validated(14)

No.	Name of artifact	Type of artifact	Results with instances
205	Kant: falsity of syllogistic figures	Theorems	Invalidated(8) Validated(2)
206	Karpenko, S.A.	System K-Ł4	Invalidated(6) Validated(8)
207	King algebras on rough set concept analysis	Algebra	Invalidated(5)
208	Kleene lattices, reversible	Axiomatization	Invalidated(3) Validated(1)
209	Kramers-Kronig	Relation	Invalidated
210	Kripke-Platek and CZF	Set Theory	Invalidated(1)
211	Kuratowski–Zorn lemma (Zorn's lemma)	Lemma	Invalidated
212	Lachlan problem solution	Problem	Invalidated(4)
213	Lambda λ -calculus and LISP	System	Invalidated(7) Validated(1)
214	Lean prover from Microsoft	System	Invalidated(3)
215	Leibniz' ontological proof	Proof	Invalidated(1) Validated(1)
216	Briefest known ontological proof of God	Proof	Validated(2)
217	Lemmon D	Axiom	Invalidated
218	van Leunen deformation field	Conjecture	Invalidated(4)
219	van Leunen lattice logic, weak modular	Theorem	Invalidated(2)
220	Liar	Paradox	Invalidated
221	Prior rendition	Paradox	Invalidated
222	Kripke rendition	Paradox	Invalidated
223	Line through a circle	Conjecture	Validated(1)
224	Linear algebra	Theorems	Invalidated(4)
225	Linear programming: Kharun-Kush-Tucker	Conditions	Invalidated(4)
226	Liouville	Theorem	Invalidated(2) Validated(1)
227	Löb original, corrected	Theorem	Invalidated(1) Validated(1)
228	Löb with Gödel incompleteness	Theorems	Invalidated(3)
229	Lonely runner	Conjecture	Invalidated(8) Validated(1)
230	Löwenheim–Skolem	Theorem	Invalidated(5)
231	Löwenheim–Skolem, Hilbert style	Metatheorem	Invalidated(4)
232	Luce model (general)	Definitions/axioms	Validated(5)
233	Łukasiewicz nightmare: $(\diamond p \& \diamond q) \rightarrow \diamond(p \& q)$	Allegation	Invalidated(4) Validated (3)
234	Łukasiewicz modal Ł4	Objections	Invalidated(8) Validated(1)
235	Lyndon interpolation and GL	Interpolation	Invalidated(8) Validated(1)
236	Majorana's 'root'	Equations	Invalidated(9)
237	Matita prover superposition	Algorithms	Invalidated (3)
238	Mereology, behavioral	System	Invalidated(2)

No.	Name of artifact	Type of artifact	Results with instances
239	Mereotopology, distributive	Relations	Invalidated(9)
240	Metaphysics: "Something rather than nothing"	Problem	Validated(2)
241	Meth8/VL4 self-proof in one variable	Theorem	Validated(8)
242	Meth8 versus Prover9 via Lifshitz	Problem	Validated
243	Minkowski plane, classical set of points/cycles	Theorems	Invalidated(2) Validated(1)
244	Modal aleatoric calculus	System	Invalidated(6)
245	Modal logics: 2; 3; 4; B; D; E; K; M; T; and W	Systems	Invalidated(2) Validated(8)
246	Modal GL_2	Logic	Invalidated(8) Validated(1)
247	Modern modal logics (2): JYB4 and AR4	Axioms	Invalidated(12) Validated(17)
248	Modified divine command	Theory	Invalidated
249	Modus ponens consequent as conditional	Rule	Invalidated(3) Validated(1)
250	Molyneux's problem	Problem	Invalidated(1)
251	Moore's paradox	Paradox	Invalidated(2) Validated(1)
252	Moral absolutism impossible	Conjecture	Invalidated(3) Validated(1)
253	Relativity of moral absolutism	Conjecture	Invalidated(2) Validated(1)
254	Most	Quantifier	Invalidated(2)
255	Necessitation: K, T, 4, B, D, 5; $D, M, S4, B, S5$	Axiom	Invalidated(10) Validated(7)
256	Leonard Nelson's criticism of epistemology	System	Invalidated
257	von Neuman-Bernays-Gödel [NBG]	Theory	Invalidated(2) Validated(3)
258	Neutrosophic logic	Theorems	Invalidated(5)
259	Dezert-Smarandache	Theory	Invalidated(2)
260	Generalized Hegel's dialectics	Method	Invalidated(4)
261	Generalized intuitionistic, fuzzy logic	System	Invalidated(2)
262	Geometry of Smarandache / Lin Fan Mao	Definition	Invalidated(2)
263	MANET attack genetics	Algorithm	Invalidated(1)
264	Negated adjectival phrases	Lattices	Invalidated(2)
265	Neutrosophic logic: theory of everything	Theorem	Invalidated(2)
266	Neutrosophic sets	Properties	Invalidated(3)
267	Neutrosophy with dependent probability	Definitions	Invalidated(3) Validated(2)
268	Quinary	System	Invalidated(2)
269	Retract crisp set topology	Propositions	Invalidated(5)
270	Smarandache multi-space theory	System	Invalidated(5)
271	Soft lattice theory	Theorem	Invalidated(2)
272	Unification of other logics	Axioms / Rules	Invalidated(2)

No.	Name of artifact	Type of artifact	Results with instances
273	Values as 1, 0, between 0 and 1	Designated logic	Invalidated(2)
274	Vector space on $\{-0, 0, 0 < p < 1, 1, 1+\}$	Multi-valued logic	Invalidated(3)
275	Newcomb's game	Paradox	Invalidated(2)
276	Non-deterministic logic	Completeness	Invalidated(8)
277	Nothing does not imply a non existent null set	Definition	Invalidated(7)
278	Nucleosynthesis	Definitions	Invalidated(4)
279	Optimization for complex number programming	Conjecture	Invalidated(1)
280	P=NP; 3-SAT	Conjectures	Invalidated(5)
281	Paraconsistency, machine-assisted view	Axioms	Invalidated
282	Paraconsistent contradiction	Conext	Invalidated
283	Paradox refutation reduced to one variable	Method	Validated
284	Partial awareness	System	Invalidated(8) Validated(1)
285	Pauli exclusion	Principle	Invalidated(4)
286	Peano arithmetic 9, 1-8	Axioms	Invalidated(1) Validated(8)
287	PŁ4	System	Invalidated(10)
288	Playfair axiom	Axiom	Validated(1)
289	Poincaré recurrence theorem	Theorem	Invalidated(2)
290	Poison modal logic (PML)	System	Invalidated(4)
291	Karl Popper on God	Proof	Validated
292	PowerEpsilon mathematical induction	Axiom	Validated(1)
293	Pratt-Floyd-Hoare logic correctness	System	Invalidated(5)
294	Preference profiles	Algorithm	Invalidated(6)
295	Prevarieties and quasivarieties of logic	Monoids	Invalidated(4)
296	Prenex normal format	Rules	Invalidated(11) Validated(3)
297	Shortest refutation based on implication	Rules	Invalidated(2) Validated(2)
298	Prisoner's paradox	Paradox	Invalidated(3)
299	Prover9 vs Meth8 differences	System	Invalidated
300	Pure alethic modal logic	System	Invalidated(1) Validated(1)
301	Quantifiers and operatoars	Connectives	Invalidated(12)
302	Quantum arithmetic for repeat-until-success	Circuits	Invalidated(2)
303	Block chain	Cryptography	Invalidated(1)
304	Classical logic as completion of QL	System	Invalidated(16) Validated(6)
305	Control by observation	System	Invalidated
306	Entanglement	Conjecture	Invalidated(5)

No.	Name of artifact	Type of artifact	Results with instances
307	Gates correspond to logical operators	Theorems	Invalidated(4) Validated(1)
308	Gates refuted	Theorems	Invalidated(8) Validated(1)
309	Gedanken experiment	Conjectures	Invalidated(8)
310	Logic	System	Invalidated(17) Validated(2)
311	Masking	Conjectures	Invalidated(5) Validated(2)
312	Probability	Axiom	Invalidated(1)
313	Probability	Rule	Invalidated(2)
314	Quaternion on classical logic	Definition	Invalidated(5)
315	Simulation of Hamiltonian spectra	Operator	Invalidated(1)
316	Spin-statistics	Theorem	Invalidated(4) Validated(4)
317	Superposition as the red herring	Conjecture	Invalidated (3)
318	Superposition disproves Schrödinger cat	Conjecture	Invalidated(5) Validated(2)
319	Ternary probability of qutrit	Hypothesis	Invalidated(3)
320	Three lights experiment of qutrit	Conjecture	Invalidated(1)
321	Questions and answers	Problem	Invalidated(4) Validated(1)
322	Ramsey's theorem for the 2-color case	Theorem	Validated(2)
323	Ranjan, A.	Problem	Validated
324	Rational emotive behavior therapy (REBT/LBT)	Systems	Invalidated(16)
325	Realizability semantics for QML	Theorems	Invalidated(3)
326	Reichenbach common cause / event-splitting	Principle	Invalidated
327	Relativization (structural induction) in weighting	Method	Invalidated(1)
328	Relevance logic	System	Invalidated(7)
329	Definition in R	Model	Invalidated(2)
330	Reverse mathematics: recursive comprehension	Principle	Invalidated(10) Validated(2)
331	Measurability and computability	Theory	Invalidated(1) Validated(2)
332	Riemann: only zeroes at 0, 1/2	Hypothesis	Invalidated
333	Excluded middle	Conjecture	Invalidated(4)
334	Extended complex numbers on sphere	Operators	Invalidated(3) Validated(2)
335	Zeta function, Caceres 6	Proposition	Invalidated(4)
336	Zeta function, properties	Axioms	Invalidated(7)
337	Roman Catholic Church (RCC)	(Dogma)	Invalidated(7)
338	Canon law as noncontradictory/infallible	Theorem	Invalidated(4)
339	Erasmus contra Luther	Controversy	Validated
340	Infallibility and the Historic Church	Pius IX	Invalidated(2)

No.	Name of artifact	Type of artifact	Results with instances
341	Invalid epiclesis with silent Holy Ghost	Canons	Invalidated(4) Validated(1)
342	Magisterium	Paul VI	Invalidated(1)
343	Primacy of the Roman See	Pius XI	Invalidated(1)
344	Sacred heart of Jesus	Pius XI	Invalidated(3)
345	Tradition above scripture	Pius IX	Invalidated(4)
346	Twelfth promise of St Alacoque	Vision	Invalidated(3)
347	Rosser's theorem on consistency	Theorem	Invalidated(6) Validated(1)
348	Rota lattice theory, distributive	Axiom	Invalidated
349	Russell	Paradox	Invalidated
350	S5II+ propositional quantification	System	Invalidated
351	Sabotage modal logic (revisited)	System	Invalidated(6)
352	Sacchetti's modal logics of provability	Definition	Invalidated(1)
353	Schematic refutations of formula schemata	Method	Invalidated(2)
354	Schrödinger's cat	Paradox	Invalidated
355	Self-equilibrium	Law / Paradox	Invalidated
356	Sliding scale in law	Theorem	Invalidated(3)
357	Solovay arithmetical / semantical completeness	Theorem	Invalidated(10) Validated(2)
358	Sorites	Paradox	Invalidated
359	Special theory of relativity: Crothers refutation	Confirmation	Validated
360	Square (Łukasiewicz) and Cube (Seuren)	Systems	Invalidated(27) Validated(15)
361	Square of Opposition Meth8 Corrected	System	Validated
362	Square of Opposition Modern Revised	System	Invalidated
363	Square of Opposition	Proportions	Invalidated(3)
364	Stable set lattices	Modal operators	Invalidated(2)
365	Stone space type lattice logic model	Theory	Invalidated(2)
366	Stone-Wales rotation transform reversibility	Theorem	Invalidated(2) Validated(1)
367	Superposition of states	Principle	Invalidated(6)
368	Supply and demand	Conjecture	Invalidated(6)
369	Surveillance objectives	Subgames	Invalidated(2)
370	Symplectic vector space	Theorem	Invalidated(2)
371	Tarski's undefinability of truth	Theorem	Invalidated(2)
372	Tarski–Grothendieck set theory	Axiom	Invalidated(2)
373	Tarski–Grothendieck Metamath ax-groth	Axiom	Invalidated(7)
374	Traski's planar Eucleadian R-geometry	System	Invalidated(8) Validated(2)

No.	Name of artifact	Type of artifact	Results with instances
375	Theory of logic for glutty, gappy relations	System	Invalidated(16)
376	Three-valued, bivalent logic VL3	System	Validated(10)
377	Time as God	Conjecture	Validated(2)
378	Time as coexisting past, present, future states	Conjecture	Invalidated(3)
379	Time as tense via converse implication (EQT)	Conjectue	Validated(1)
380	Topological manifold transition	Function	Invalidated(1)
381	Topological T_0 -space	Differ modality	Invalidated(3)
382	Totherian sets	Theory	Invaildated (5)
383	Translation invariance of superposition calculus	Property	Invalidated(2)
384	Triangle inequality	Conjecture	Validated(1)
385	Trivial proofs for a troll	Conjectures	Validated(3)
386	Trolley ethical thought experiment	Problem	Invalidated(3)
387	Turing halting problem	Problem	Invalidated(2) Validated(1)
388	Twin paradox	Paradox	Invalidated(2)
389	Two-sided page	Paradox	Invalidated(5) Validated(1)
390	Unanswered logic questions	Conjectures	Invalidated(2) Validated(1)
391	Unfalsifiability	Conjecture	Invalidated(2) Validated(2)
392	Unification of simple symmetrical modal logics	Type	Invalidated(2)
393	Universal finite set	Theorem	Invalidated(2)
394	Universal network	Operator	Invalidated(5)
395	Universal logic VL4	Logic	Validated
396	Veblen (corrected)	Axiom	Invalidated(1) Validated(1)
397	Vector conjectue for two points implying a third	Conjecture	Validated(1)
398	Verilog / VHDL hardware logic	Connectives	Invalidated(36)
399	Veronoï regions (with "nonempty sets")	Definition	Invalidated
400	Vickrey auction	Theorem	Invalidated(10) Validated(2)
401	Vietoris space modal operators	Definitions	Invalidated(2)
402	VL4 theorems for S5	Theorems	Invalidated(8)
403	Vongehr's shift rendering QM "natural"	Paradigm	Invalidated(2) Validated(3)
404	W (K4W)	Theorem	Invalidated
405	Wadge order (and on Scott domain)	Theorem	Invalidated(4)
406	Well ordering property	Axiom	Invalidated
407	White's model of creation	System	Invalidated(7) Validated(1)
408	Wittgenstein's ab-notation	System	Invalidated(3)

No.	Name of artifact	Type of artifact	Results with instances
409	X-homology on manifolds in topology	Axiom	Invalidated(1)
410	Yalcin logic	Axioms	Invalidated(2)
411	Yinyang	System	Invalidated(1) Validated(3)
412	Zadeh first operators on fuzzy logic	System	Invalidated(5)
413	Historical assumptions	Axioms	Invalidated(4) Validated(1)
414	Resolution and symmetry in Z-numbers	Definitions	Invalidated(2)
415	Zermelo-Fraenkel constructive (CZF)	Axioms	Invalidated(9) Validated(1)
416	Zermelo-Fraenkel (ZFC):	(Axioms)	Invalidated(25) Validated(2)
417	Shortest refutation of 9 axioms	Axioms	Invalidated(10)
418	ZFC Choice	Axiom	Invalidated
419	ZFC Empty set	Axiom	Invalidated
420	Shortest refutation	Axiom	Invalidated(3)
421	ZFC Extensionality	Axiom	Invalidated(1) Validated(1)
422	ZFC Extensionality (another rendition)	Axiom	Invalidated(1)
423	ZFC Infinity	Axiom	Invalidated(2)
424	ZF INF	Axiom	Invalidated
425	ZFC Pairing	Axiom	Invalidated
426	ZFC Power set	Axiom	Invalidated
427	ZFC Regularity or foundation	Axiom	Invalidated
428	ZFC Schema of replacement	Axiom	Invalidated
429	ZFC Specification	Axiom	Validated
430	ZFC Union	Axiom	Invalidated
431	ZFC Well ordering	Axiom	Invalidated(2)
432	ZF Law of excluded middle: infinite set	Axiom	Invalidated(2)
433	ZF supremum and infimum	Definitions	Invalidated(3)
434	ZFC ⁰ : schemas of comprehension, replacement	Axioms	Invalidated(2)
435	Zero and three in arithmetic	Theorems	Validated(9)
436	Zero knowledge proof	Theorem	Invalidated
437	Zeroth law of thermodynamics	Theorem	Invalidated(3) Validated(2)