

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 430 artifacts in 2325 assertions to confirm 449 as tautology and 1876 as *not* (80.7%). 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 Ł4 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-Tarski, shorter resuscitation attempt	Paradox	Invalidated(2)
17	Crucial claim in Step 3 of proof, shortest	Paradox	Invalidated(1)
18	Bar recursion	Mapping	Invalidated(2)
19	Barcan	Formula	Validated
20	Bayes rule	Rule	Invalidated(11) Validated(11)
21	BCI / BCK algebra	System	Invalidated(5) Validated(3)
22	Bell / CHSH / Spekken toy model	Inequalities	Invalidated
23	A shorter refutation	Theorem	Invalidated(2)
24	A simpler refutation	Theorem	Invalidated(2)
25	Bell's inequality by axiom of empty set	Theorem	Invalidated(2)
26	Bogus Bellian logic (BBL)	Theorem	Invalidated(5)
27	Coercive proof	Theorem	Invalidated(2)
28	Coin toss proof	Conjectures	Invalidated(2)
29	Original inequality with assumption	Conjecture	Invalidated(4)
30	Original inequality with assumptions	Conjectures	Invalidated(5)
31	Original inequality and CHSH	Conjectures	Invalidated(6)
32	Positive reasons proof	Theorem	Invalidated(6) Validated(3)
33	Tropical sum	Method	Invalidated(1)
34	Berkeley	Paradox	Invalidated

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

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

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

No.	Name of artifact	Type of artifact	Results with instances
137	Gödel completeness	Theorem	Invalidated
138	Gödel completeness, shortest	Theorem	Invalidated(2)
139	Gödel first incompleteness	Theorem	Invalidated(4)
140	Gödel incompleteness	Equations	Invalidated(14) Validated(1)
141	Gödel incompleteness FOL	Contradictions	Invalidated(14) Validated(1)
142	Gödel incompleteness theorem	Assistant tools	Invalidated(2) Validated(2)
143	Gödel incompleteness theorem	Refutation	Invalidated(7)
144	Gödel incompleteness via two counter-examples	Refutation	Invalidated(9) Validated(2)
145	Gödel-justification logic	Refutation	Invalidated(7) Validated(2)
146	Subsets	Models	Invalidated(2)
147	Gödel-Löb	Axiom	Invalidated
148	Gödel pairing function	Axiom	Invalidated(3) Validated(1)
149	Gödel recursion	Theorem	Validated
150	Gödel-Scott on God	Theorem schema	Invalidated
151	Goldbach's conjectures	Conjectures	Invalidated
152	Graded modal logic	Frame classes	Invalidated(4) Validated(2)
153	Grassmannian (<i>recently discovered</i>)	Paradox	Invalidated
154	Hadamard gate	Theory	Invalidated(3) Validated(1)
155	Hahn-Banach	Theorem	Invalidated(5)
156	Hall	Effect	Invalidated
157	Hamiltonian quaternion	Definition	Invalidated(3)
158	Hardy's generalized paradox	Conjecture	Invalidated(6)
159	Hegel's dialectic	Method	Invalidated(6) Validated(3)
160	Heider inspired international relations theory	Theory	Invalidated(5) Validated(1)
161	Heisenberg uncertainty principle	Axiom	Invalidated(2)
162	Conjecture	Principle	Invalidated(1)
163	Replacement theorem	Axiom	Inalidated (2) Validated(3)
164	Take a picture of an electron	Principle	Invalidated(6) Validated(2)
165	Henkin cyclic algebra and first order logic	System	Invalidated(9) Validated(6)
166	Applications to logic	Axioms	Invalidated(8) Validated(6)
167	Permutation model nonrepresentable	Assertion	Invalidated(1)
168	Herbrand semantics	System	Invalidated(6)
169	Heyting algebra	Algebra	Invalidated(21)
170	Heyting-Brouwer intuitionistic logic	Systems	Invalidated(9) Validated(1)

No.	Name of artifact	Type of artifact	Results with instances
171	Heyting logic	Idempotency	Invalidated(2) Validated(1)
172	Hexagons of opposition for statistical modalities	Conjectures	Invalidated(9) Validated(1)
173	Higher-order mathematical induction	Principle	Invalidated(2) Validated(1)
174	Hilbert #10 Diophantine universal solution	Formulas	Invalidated
175	Hilbert generalization	System	Invalidated
176	Hilbert grand hotel	Paradox	Invalidated(1)
177	Hilbert / Kolmogorov intuitionistic logic	Systems	Invalidated(9)
178	Huhn 2-distributive lattice identity	Formula	Invalidated
179	Hydraulic forgiveness (confirmed)	Theorem	Invalidated(6) Validated(2)
180	Hydraulic corollary of peace	Corollary	Validated(1)
181	Ideals	Definition	Invalidated(4)
182	Ignorance of first choice	System	Invalidated
183	Imaginary numbers	Definition	Invalidated(2)
184	Imperative logic	System	Invalidated(3) Validated(4)
185	Implication combination forms from $(p \rightarrow r) \rightarrow r$	Theorems	Invalidated(3) Validated(16)
186	Inconsistent theory	Theorem	Invalidated
187	Extending the monad to a triad	Formulas	Invalidated
188	Kunen inconsistency	Theorem	Invalidated
189	Independence-friendly logic (Kreiselization)	System	Invalidated(2)
190	Indicative conditionals	Encyclopedia entry	Invalidated
191	Induction: Black raven (swan); Kripkenstein	System	Invalidated(3)
192	Induction: New riddle	Paradox	Invalidated (2)
193	Inequality: 'arbitrarily' vs 'sufficiently large'	Conjecture	Invalidated(2) Validated(1)
194	Infinite set theory	Theorem	Invalidated
195	Information theory: mutual information	Definition	Invalidated(4)
196	Interval logic for model checking	System	Invalidated(3)
197	Join-prime in lattice theory	Definition	Validated
198	Jonsson positive logic: retromorphism	System	Invalidated(3)
199	k -triangular set function logic	Definition	Validated(1)
200	Kanban cell neuron maps whole brain	Model	Invalidated(242) Validated(14)
201	Kant: falsity of syllogistic figures	Theorems	Invalidated(8) Validated(2)
202	Karpenko, S.A.	System K-L4	Invalidated(6) Validated(8)
203	King algebras on rough set concept analysis	Algebra	Invalidated(5)
204	Kleene lattices, reversible	Axiomatization	Invalidated(3) Validated(1)

No.	Name of artifact	Type of artifact	Results with instances
205	Kramers-Kronig	Relation	Invalidated
206	Kripke-Platek and CZF	Set Theory	Invalidated(1)
207	Kuratowski–Zorn lemma (Zorn's lemma)	Lemma	Invalidated
208	Lachlan problem solution	Problem	Invalidated(4)
209	Lambda λ -calculus and LISP	System	Invalidated(7) Validated(1)
210	Lean prover from Microsoft	System	Invalidated(3)
211	Leibniz' ontological proof	Proof	Invalidated(1) Validated(1)
212	Briefest known ontological proof of God	Proof	Validated(2)
213	Lemmon D	Axiom	Invalidated
214	van Leunen deformation field	Conjecture	Invalidated(4)
215	van Leunen lattice logic, weak modular	Theorem	Invalidated(2)
216	Liar	Paradox	Invalidated
217	Prior rendition	Paradox	Invalidated
218	Kripke rendition	Paradox	Invalidated
219	Line through a circle	Conjecture	Validated(1)
220	Linear algebra	Theorems	Invalidated(4)
221	Linear programming: Kharun-Kush-Tucker	Conditions	Invalidated(4)
222	Liouville	Theorem	Invalidated(2) Validated(1)
223	Löb original, corrected	Theorem	Invalidated(1) Validated(1)
224	Löb with Gödel incompleteness	Theorems	Invalidated(3)
225	Lonely runner	Conjecture	Invalidated(8) Validated(1)
226	Löwenheim–Skolem	Theorem	Invalidated(5)
227	Löwenheim–Skolem, Hilbert style	Metatheorem	Invalidated(4)
228	Luce model (general)	Definitions/axioms	Validated(5)
229	Łukasiewicz nightmare: $(\diamond p \& \diamond q) \rightarrow \diamond(p \& q)$	Allegation	Invalidated(4) Validated (3)
230	Łukasiewicz modal $\mathbb{L}4$	Objections	Invalidated(8) Validated(1)
231	Lyndon interpolation and GL	Interpolation	Invalidated(8) Validated(1)
232	Majorana's 'root'	Equations	Invalidated(9)
233	Matita prover superposition	Algorithms	Invalidared (3)
234	Mereology, behavioral	System	Invalidated(2)
235	Mereotopology, distributive	Relations	Invalidated(9)
236	Metaphysics: "Something rather than nothing"	Problem	Validated(2)
237	Meth8/ $\mathbb{V}\mathbb{L}4$ self-proof in one variable	Theorem	Validated(8)
238	Meth8 versus Prover9 via Lifshitz	Problem	Validated

No.	Name of artifact	Type of artifact	Results with instances
239	Minkowski plane, classical set of points/cycles	Theorems	Invalidated(2) Validated(1)
240	Modal aleatoric calculus	System	Invalidated(6)
241	Modal logics: 2; 3; 4; B; D; E; K; M; T; and W	Systems	Invalidated(2) Validated(8)
242	Modal GL_2	Logic	Invalidated(8) Validated(1)
243	Modern modal logics (2): JYB4 and AR4	Axioms	Invalidated(12) Validated(17)
244	Modified divine command	Theory	Invalidated
245	Modus ponens consequent as conditional	Rule	Invalidated(3) Validated(1)
246	Molyneux's problem	Problem	Invalidated(1)
247	Moore's paradox	Paradox	Invalidated(2) Validated(1)
248	Moral absolutism impossible	Conjecture	Invalidated(3) Validated(1)
249	Relativity of moral absolutism	Conjecture	Invalidated(2) Validated(1)
250	Most	Quantifier	Invalidated(2)
251	Necessitation: K,T,4,B,D,5; $D,M,S4,B,S5$	Axiom	Invalidated(10) Validated(7)
252	Leonard Nelson's criticism of epistemology	System	Invalidated
253	von Neuman-Bernays-Gödel [NBG]	Theory	Invalidated(2) Validated(3)
254	Neutrosophic logic	Theorems	Invalidated(5)
255	Dezert-Smarandache	Theory	Invalidated(2)
256	Generalized Hegel's dialectics	Method	Invalidated(4)
257	Generalized intuitionistic, fuzzy logic	System	Invalidated(2)
258	Geometry of Smarandache / Lin Fan Mao	Definition	Invalidated(2)
259	MANET attack genetics	Algorithm	Invalidated(1)
260	Negated adjectival phrases	Lattices	Invalidated(2)
261	Neutrosophic logic: theory of everything	Theorem	Invalidated(2)
262	Neutrosophic sets	Properties	Invalidated(3)
263	Neutrosophy with dependent probability	Definitions	Invalidated(3) Validated(2)
264	Quinary	System	Invalidated(2)
265	Retract crisp set topology	Propositions	Invalidated(5)
266	Smarandache multi-space theory	System	Invalidated(5)
267	Soft lattice theory	Theorem	Invalidated(2)
268	Unification of other logics	Axioms / Rules	Invalidated(2)
269	Values as 1, 0, between 0 and 1	Designated logic	Invalidated(2)
270	Vector space on $\{-0, 0, 0 < p < 1, 1, 1+\}$	Multi-valued logic	Invalidated(3)
271	Newcomb's game	Paradox	Invalidated(2)
272	Non-deterministic logic	Completeness	Invalidated(8)

No.	Name of artifact	Type of artifact	Results with instances
273	Nothing does not imply a non existent null set	Definition	Invalidated(7)
274	Nucleosynthesis	Definitions	Invalidated(4)
275	Optimization for complex number programming	Conjecture	Invalidated(1)
276	P=NP; 3-SAT	Conjectures	Invalidated(5)
277	Paraconsistency, machine-assisted view	Axioms	Invalidated
278	Paraconsistent contradiction	Conext	Invalidated
279	Paradox refutation reduced to one variable	Method	Validated
280	Partial awareness	System	Invalidated(8) Validated(1)
281	Pauli exclusion	Principle	Invalidated(4)
282	Peano arithmetic 9, 1-8	Axioms	Invalidated(1) Validated(8)
283	PŁ4	System	Invalidated(10)
284	Playfair axiom	Axiom	Validated(1)
285	Poincaré recurrence theorem	Theorem	Invalidated(2)
286	Poison modal logic (PML)	System	Invalidated(4)
287	Karl Popper on God	Proof	Validated
288	PowerEpsilon mathematical induction	Axiom	Validated(1)
289	Pratt-Floyd-Hoare logic correctness	System	Invalidated(5)
290	Preference profiles	Algorithm	Invalidated(6)
291	Prevarieties and quasivarieties of logic	Monoids	Invalidated(4)
292	Prenex normal format	Rules	Invalidated(11) Validated(3)
293	Shortest refutation based on implication	Rules	Invalidated(2) Validated(2)
294	Prisoner's paradox	Paradox	Invalidated(3)
295	Prover9 vs Meth8 differences	System	Invalidated
296	Pure alethic modal logic	System	Invalidated(1) Validated(1)
297	Quantifiers and operatoars	Connectives	Invalidated(12)
298	Quantum arithmetic for repeat-until-success	Circuits	Invalidated(2)
299	Block chain	Cryptography	Invalidated(1)
300	Classical logic as completion of QL	System	Invalidated(16) Validated(6)
301	Control by observation	System	Invalidated
302	Entanglement	Conjecture	Invalidated(5)
303	Gates correspond to logical operators	Theorems	Invalidated(4) Validated(1)
304	Gates refuted	Theorems	Invalidated(8) Validated(1)
305	Gedanken experiment	Conjectures	Invalidated(8)
306	Logic	System	Invalidated(17) Validated(2)

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

No.	Name of artifact	Type of artifact	Results with instances
341	Tradition above scripture	Pius IX	Invalidated(4)
342	Twelfth promise of St Alacoque	Vision	Invalidated(3)
343	Rosser's theorem on consistency	Theorem	Invalidated(6) Validated(1)
344	Rota lattice theory, distributive	Axiom	Invalidated
345	Russell	Paradox	Invalidated
346	S5II+ propositional quantification	System	Invalidated
347	Sabotage modal logic (revisited)	System	Invalidated(6)
348	Sacchetti's modal logics of provability	Definition	Invalidated(1)
349	Schematic refutations of formula schemata	Method	Invalidated(2)
350	Schrödinger's cat	Paradox	Invalidated
351	Self-equilibrium	Law / Paradox	Invalidated
352	Sliding scale in law	Theorem	Invalidated(3)
353	Solovay arithmetical / semantical completeness	Theorem	Invalidated(10) Validated(2)
354	Sorites	Paradox	Invalidated
355	Special theory of relativity: Crothers refutation	Confirmation	Validated
356	Square (Łukasiewicz) and Cube (Seuren)	Systems	Invalidated(27) Validated(15)
357	Square of Opposition Meth8 Corrected	System	Validated
358	Square of Opposition Modern Revised	System	Invalidated
359	Square of Opposition	Proportions	Invalidated(3)
360	Stable set lattices	Modal operators	Invalidated(2)
361	Stone space type lattice logic model	Theory	Invalidated(2)
362	Stone-Wales rotation transform reversibility	Theorem	Invalidated(2) Validated(1)
363	Superposition of states	Principle	Invalidated(6)
364	Supply and demand	Conjecture	Invalidated(6)
365	Surveillance objectives	Subgames	Invalidated(2)
366	Symplectic vector space	Theorem	Invalidated(2)
367	Tarski's undefinability of truth	Theorem	Invalidated(2)
368	Tarski–Grothendieck set theory	Axiom	Invalidated(2)
369	Tarski–Grothendieck Metamath ax-groth	Axiom	Invalidated(7)
370	Traski's planar Eucledian R-geometry	System	Invalidated(8) Validated(2)
371	Three-valued, bivalent logic VL3	System	Validated(10)
372	Time as God	Conjecture	Validated(2)
373	Time as coexisting past, present, future states	Conjecture	Invalidated(3)
374	Time as tense via converse implication (EQT)	Conjectue	Validated(1)

No.	Name of artifact	Type of artifact	Results with instances
375	Topological manifold transition	Function	Invalidated(1)
376	Topological T_0 -space	Differ modality	Invalidated(3)
377	Totherian sets	Theory	Invailedated (5)
378	Translation invariance of superposition calculus	Property	Invalidated(2)
379	Triangle inequality	Conjecture	Validated(1)
380	Trivial proofs for a troll	Conjectures	Validated(3)
381	Turing halting problem	Problem	Invalidated(2) Validated(1)
382	Twin paradox	Paradox	Invalidated(2)
383	Two-sided page	Paradox	Invalidated(5) Validated(1)
384	Unanswered logic questions	Conjectures	Invalidated(2) Validated(1)
385	Unfalsifiability	Conjecture	Invalidated(2) Validated(2)
386	Unification of simple symmetrical modal logics	Type	Invalidated(2)
387	Universal finite set	Theorem	Invalidated(2)
388	Universal network	Operator	Invalidated(5)
389	Universal logic $V\mathcal{L}4$	Logic	Validated
390	Veblen (corrected)	Axiom	Invalidated(1) Validated(1)
391	Vector conjectue for two points implying a third	Conjecture	Validated(1)
392	Verilog / VHDL hardware logic	Connectives	Invalidated(36)
393	Veronoï regions (with "nonempty sets")	Definition	Invalidated
394	Vickrey auction	Theorem	Invalidated(10) Validated(2)
395	Vietoris space modal operators	Definitions	Invalidated(2)
396	$V\mathcal{L}4$ theorems for $S5$	Theorems	Invalidated(8)
397	Vongehr's shift rendering QM "natural"	Paradigm	Invalidated(2) Validated(3)
398	W (K4W)	Theorem	Invalidated
399	Wadge order (and on Scott domain)	Theorem	Invalidated(4)
400	Well ordering property	Axiom	Invalidated
401	Wittgenstein's ab-notation	System	Invalidated(3)
402	X-homology on manifolds in topology	Axiom	Invalidated(1)
403	Yalcin logic	Axioms	Invalidated(2)
404	Yinyang	System	Invalidated(1) Validated(3)
405	Zadeh first operators on fuzzy logic	System	Invalidated(5)
406	Historical assumptions	Axioms	Invalidated(4) Validated(1)
407	Resolution and symmetry in Z-numbers	Definitions	Invalidated(2)
408	Zermelo-Fraenkel constructive (CZF)	Axioms	Invalidated(9) Validated(1)

No.	Name of artifact	Type of artifact	Results with instances
409	Zermelo-Fraenkel (ZFC):	(Axioms)	Invalidated(25) Validated(2)
410	Shortest refutation of 9 axioms	Axioms	Invalidated(10)
411	ZFC Choice	Axiom	Invalidated
412	ZFC Empty set	Axiom	Invalidated
413	Shortest refutation	Axiom	Invalidated(3)
414	ZFC Extensionality	Axiom	Invalidated(1) Validated(1)
415	ZFC Extensionality (another rendition)	Axiom	Invalidated(1)
416	ZFC Infinity	Axiom	Invalidated(2)
417	ZF INF	Axiom	Invalidated
418	ZFC Pairing	Axiom	Invalidated
419	ZFC Power set	Axiom	Invalidated
420	ZFC Regularity or foundation	Axiom	Invalidated
421	ZFC Schema of replacement	Axiom	Invalidated
422	ZFC Specification	Axiom	Validated
423	ZFC Union	Axiom	Invalidated
424	ZFC Well ordering	Axiom	Invalidated(2)
425	ZF Law of excluded middle: infinite set	Axiom	Invalidated(2)
426	ZF supremum and infimum	Definitions	Invalidated(3)
427	ZFC ⁰ : schemas of comprehension, replacement	Axioms	Invalidated(2)
428	Zero and three in arithmetic	Theorems	Validated(9)
429	Zero knowledge proof	Theorem	Invalidated
430	Zeroth law of thermodynamics	Theorem	Invalidated(3) Validated(2)