Concepts, Techniques, Idea & Proofs

1. 2-SAT
2. 2-Way automata
3. 3-colorability
4. 3-SAT
5. Abstract complexity
6. Acceptance
7. Ada Lovelace
8. Algebraic numbers
9. Algorithms
10. Algorithms as strings
11. Alice in Wonderland
12. Alphabets
13. Alternation
14. Ambiguity
15. Ambiguous grammars
16. Analog computing
17. Anisohedral tilings
18. Aperiodic tilings
19. Approximate min cut
20. Approximate TSP
21. Approximate vertex cover
22. Approximations
23. Artificial intelligence
24. Asimov's laws of robotics
25. Asymptotics
26. Automatic theorem proving
27. Autonomous vehicles
28. Axiom of choice
29. Axiomatic method
30. Axiomatic system
31. Babbage's analytical engine
32. Babbage's difference engine
33. Bin packing
34. Binary vs. unary
35. Bletchley Park
36. Bloom axioms
37. Boolean algebra
38. Boolean functions
39. Bridges of Konigsberg
40. Brute force
41. Busy beaver problem
42. C programs
43. Canonical order
44. Cantor dust
45. Cantor set
46. Cantor's paradox
47. CAPCHA
48. Cardinality arguments
49. Cartesian coordinates
50. Cellular automata
51. Chaos
52. Chatterbots
53. Chess-playing programs
54. Chinese room
55. Chomsky hierarchy
56. Chomsky normal form
57. Chomskyan linguistics
58. Christofides' heuristic
59. Church-Turing thesis
60. Clay Mathematics Institute

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61. Clique problem
62. Cloaking devices
63. Closure properties
64. Cogito ergo sum
65. Colorings
66. Commutativity
67. Complementation
68. Completeness
69. Complexity classes
70. Complexity gaps
71. Complexity Zoo
72. Compositions
73. Compound pendulums
74. Compressibility
75. Computable functions
76. Computable numbers
77. Computation and physics
78. Computation models
79. Computational complexity
80. Computational universality
81. Computer viruses
82. Concatenation
83. Co-NP
84. Consciousness and sentience
85. Consistency of axioms
86. Constructions
87. Context free grammars
88. Context free languages
89. Context sensitive grammars
90. Context sensitive languages
91. Continuity
92. Continuum hypothesis
93. Contradiction
94. Contrapositive
95. Cook's theorem
96. Countability
97. Counter automata
98. Counter example
99. Cross- product
100. Crossing sequences
101. Cross-product construction
102. Cryptography
103. DARPA Grand Challenge
104. DARPA Math Challenges
105. De Morgan's law
106. Decidability
107. Deciders vs. recognizers
108. Decimal number system
109. Decision vs. optimization
110. Dedekind cut
111. Denseness of hierarchies
112. Derivations
113. Descriptive complexity
114. Diagonalization
115. Digital circuits
116. Diophantine equations
117. Disorder
118. DNA computing
119. Domains and ranges
120. Dovetailing

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181. Graph cliques
182. Graph colorability
183. Graph isomorphism
184. Graph theory
185. Graphs
186. Graphs as relations
187. Gravitational systems
188. Greibach normal form
189. "Grey goo"
190. Guess-and-verify
191. Halting problem
192. Hamiltonian cycle
193. Hardness
194. Heuristics
195. Hierarchy theorems
196. Hilbert's 23 problems
197. Hilbert's program
198. Hilbert's tenth problem
199. Historical perspectives
200. Historical computers

201. Household robots
202. Hung state
203. Hydraulic computers
204. Hyper computation
205. Hyperbolic geometry
206. Hypernumbers
207. Identities
208. Immerman's Theorem
209. Incompleteness
210. Incompressibility
211. Independence of axioms
212. Independent set problem
213. Induction & its drawbacks
214. Infinite hotels & applications
215. Infinite automata
216. Infinite loops
217. Infinity hierarchy
218. Information theory
219. Inherent ambiguity
220. Initial state

221. Intelligence and mind
222. Interactive proofs
223. Intractability
224. Irrational numbers
225. JFLAP
226. Karp's paper
227. Kissing number
228. Kleene closure
229. Knapsack problem
230. Lambda calculus
231. Language equivalence
232. Law of accelerating returns
233. Law of the excluded middle
234. Lego computers
235. Lexicographic order
236. Linear-bounded automata
237. Local minima
238. LOGSPACE
239. Low-deg graph colorability
240. Machine enhancements

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301. Polynomial hierarchy	321. Quantifiers	341. Rejection
302. Polynomial-time	322. Quantum computing	342. Relations
303. P-time reductions	323. Quantum mechanics	343. Relativity theory
304. Positional # system	324. Quaternions	344. Relativization
305. Power sets	325. Queue automata	345. Resource-bounded comput.
306. Powerset construction	326. Quine	346. Respect for the definitions
307. Predicate calculus	327. Ramanujan identities	347. Reusability of space
308. Predicate logic	328. Ramsey theory	348. Reversal
309. Prime numbers	329. Randomness	349. Reverse Turing test
310. Principia Mathematica	330. Rational numbers	350. Rice's Theorem
311. Probabilistic TMs	331. Real numbers	351. Riemann hypothesis
312. Proof theory	332. Reality surpassing Sci-Fi	352. Riemann's zeta function
313. Propositional logic	333. Recognition and enumeration	353. Robots in fiction
314. PSPACE	334. Recursion theorem	354. Robustness of P and NP
315. PSPACE completeness	335. Recursive function theory	355. Russell's paradox
316. Public-key cryptography	336. Recursive functions	356. Satisfiability
317. Pumping theorems	337. Reducibilities	357. Savitch's theorem
318. Pushdown automata	338. Reductions	358. Schmitt-Conway biprism
319. Puzzle solvers	339. Regular expressions	359. Scientific method
320. Pythagorean theorem	340. Regular languages	360. Sedenions

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361. Self compilation	381. Steiner tree	401. Tradeoffs
362. Self reproduction	382. Stirling's formula	402. Transcendental numbers
363. Set cover problem	383. Stored progam	403. Transfinite arithmetic
364. Set difference	384. String theory	404. Transformations
365. Set identities	385. Strings	405. Transition function
366. Set theory	386. Strong AI hypothesis	406. Transitive closure
367. Shannon limit	387. Superposition	407. Transitivity
368. Sieve of Eratosthenes	388. Super-states	408. Traveling salesperson
369. Simulated annealing	389. Surcomplex numbers	409. Triangle inequality
370. Simulation	390. Surreal numbers	410. Turbulence
371. Skepticism	391. Symbolic logic	411. Turing complete
372. Soundness	392. Symmetric closure	412. Turing degrees
373. Space filling polyhedra	393. Symmetric venn diagrams	413. Turing jump
374. Space hierarchy	394. Technological singularity	414. Turing machines
375. Spanning trees	395. Theory-reality chasms	415. Turing recognizable
376. Speedup theorems	396. Thermodynamics	416. Turing reduction
377. Sphere packing	397. Time hierarchy	417. Turing test
378. Spherical geometry	398. Time/space tradeoff	418. Two-way automata
379. Standard model	399. Tinker Toy computers	419. Type errors
380. State minimization	400. Tractability	420. Uncomputability

Concepts, Techniques, Ideas & Proofs

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"Make everything as simple
as possible, but not simpler."
- Albert Einstein (1879-1955)

Occam's razor!

INFLUENCES

MAINLY THE SHORT-STORY WRITERS— HEMINGWAY, EUDORA WELTY, AND, OF COURSE, CHEKHOV.

THERE WAS A TEACHER IN HIGH SCHOOL, AND THE OWNER OF THE FIRST GARAGE I WORKED IN. THEN, OF COURSE, CHEKHOV.

I HAD A GREAT BATTING COACH IN THE MINORS, AND I TRY TO EMULATE THE GREAT OUTFIELDERS, LIKE DIMAGGIO AND MAYS. AND, OF COURSE, THERE'S CHEKHOV.

EINSTEIN SIMPLIFIED
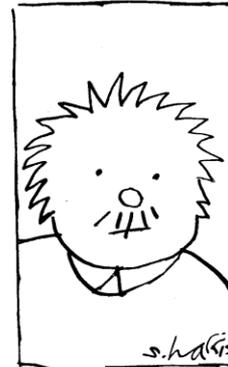
The Extended Chomsky Hierarchy Reloaded

$2^{\Sigma*}$

? $\overline{H}$ H

Turing degrees

Not finitely describable

Not Recognizable

Recognizable

EXPSPACE-complete =RE

EXPTIME-complete Go

PSPACE-complete QBF

NP-complete SAT

Decidable — Presburger arithmetic

EXPSPACE

EXPTIME

PSPACE — PH BPP

Context sensitive — LBA

NP

P — $a^n b^n c^n$

Context-free ww^R

Det. CF $a^n b^n$

Regular a^*
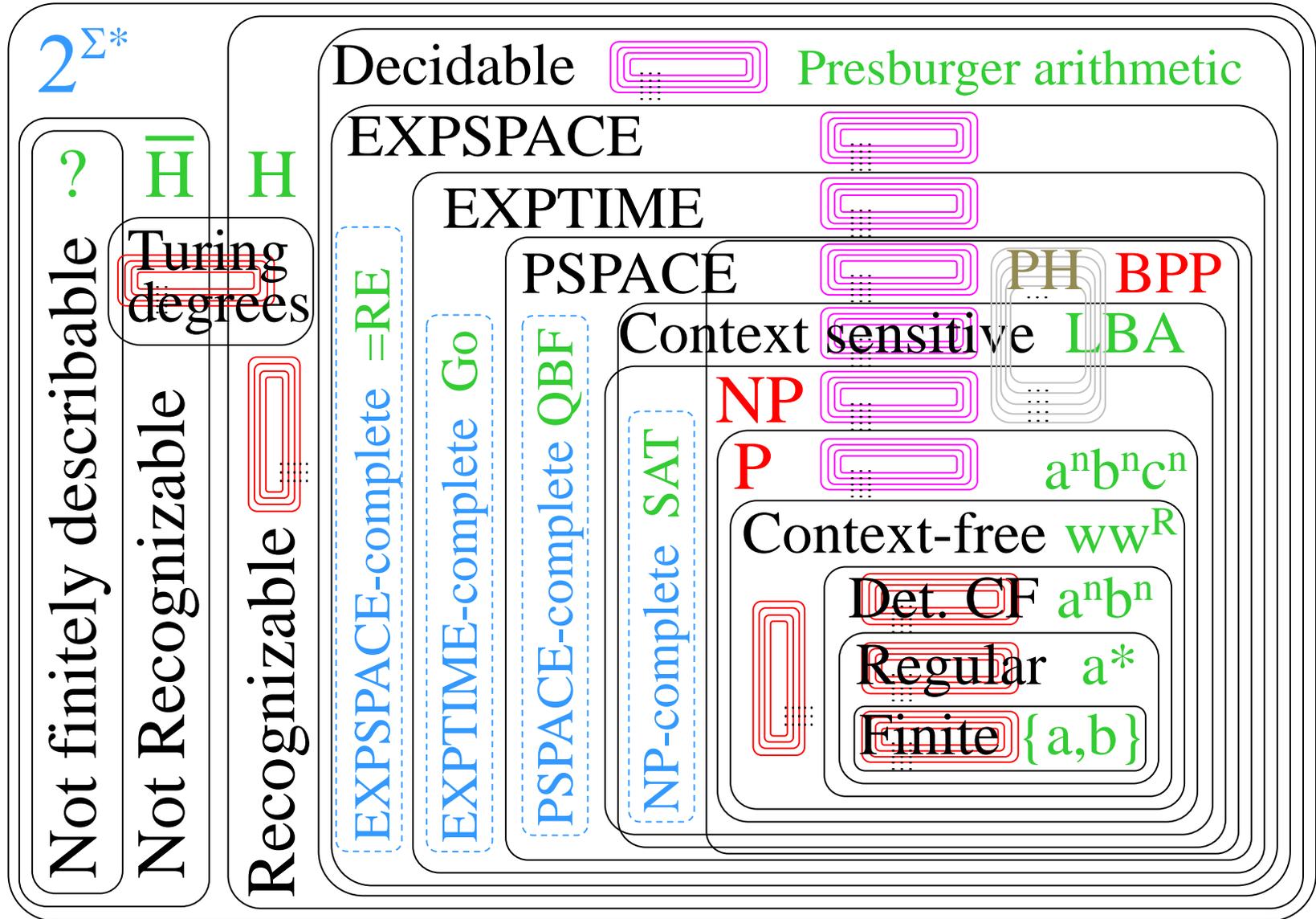
Finite $\{a,b\}$

Dense infinite time & space complexity hierarchies

Other infinite complexity & descriptive hierarchies