

Table of Contents

Fundamental Definitions and Results	1
1. The Priority Method	9
2. Hilbert's Tenth Problem	15
3. The Equivalence Problem for LOOP(1)- and LOOP(2)-Programs	25
4. The Second LBA Problem	37
5. LOGSPACE, Random Walks on Graphs, and Universal Traversal Sequences	41
6. Exponential Lower Bounds for the Length of Resolution Proofs	49
7. Spectral Problems and Descriptive Complexity Theory ...	61
8. Kolmogorov Complexity, the Universal Distribution, and Worst-Case vs. Average-Case	71
9. Lower Bounds via Kolmogorov Complexity	77
10. PAC-Learning and Occam's Razor	85
11. Lower Bounds for the Parity Function	91
12. The Parity Function Again	101
13. The Complexity of Craig Interpolants	111
14. Equivalence Problems and Lower Bounds for Branching Programs	115
15. The Berman-Hartmanis Conjecture and Sparse Sets	123

16. Collapsing Hierarchies	131
17. Probabilistic Algorithms, Probability Amplification, and the Recycling of Random Numbers	141
18. The BP Operator and Graph Isomorphism	153
19. The BP-Operator and the Power of Counting Classes	163
20. Interactive Proofs and Zero Knowledge	175
21. $IP = PSPACE$	183
22. $P \neq NP$ with probability 1	191
23. Superconcentrators and the Marriage Theorem	197
24. The Pebble Game	203
25. Average-Case Complexity	213
26. Quantum Search Algorithms	223
Solutions	237
Bibliography	309
Index	313