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$$NP \subseteq P / \log \Leftrightarrow P = NP \quad (1)$$

$$NP \subseteq P / \text{poly} \Rightarrow \cup \sum_i^p = \sum_2^p \quad (2)$$

$$EXPTIME \subseteq P / \text{poly} \Rightarrow EXPTIME = \sum_2^p \Rightarrow P \neq NP \quad (3)$$

## REFERENCES

- [1] ADLEMAN, L. Two Theorems on Random Polynomial Time. *Proc. 19th IEEE Symp. on Foundations of Computer Science*, pp. 75-83 (1978).
- [2] ALELIUNAS, R., R. M. KARP, R. J. LIPTON, L. LOVÁSZ and C. RACKOFF. Random Walks, Universal Sequences, and the Complexity of Maze Problems. *Proc. 20th IEEE Symp. on Foundations of Computer Science*, pp. 218-223 (1979).
- [3] CHANDRA, A. K. and L. J. STOCKMEYER. Alternation. *Proc. 17th IEEE Symp. on Foundations of Computer Science*, pp. 98-108 (1976).
- [4] COOK, S. A. The Complexity of Theorem-Proving Procedures. *Proc. 3rd ACM Symp. on Theory of Computing*, pp. 151-158 (1971).
- [5] ——— Towards a Complexity Theory of Synchronous Parallel Computation. *Technical Report 141/80*, Computer Science Department, University of Toronto (1980).
- [6] FORTUNE, S. A Note on Sparse Complete Sets. *SIAM J. Computing* 8, pp. 431-433 (1979).
- [7] HARTMANIS, J. and L. BERMAN. On Isomorphisms and Density of  $NP$  and Other Complete Sets. *Proc. 8th ACM Symp. on Theory of Computing*, pp. 30-40 (1976).
- [8] KARP, R. M. Reducibility Among Combinatorial Problems. I: *Complexity of Computer Computations* (R. E. Miller and J. W. Thatcher, eds.), Plenum, New York (1972).
- [9] KARP, R. M. and R. J. LIPTON. Some Connections Between Nonuniform and Uniform Complexity Classes. *Proc. 12th Annual ACM Symposium on Theory of Computing*, pp. 302-309 (1980).
- [10] KOZEN, D. On Parallelism in Turing Machines. *Proc. IEEE Symp. on Foundations of Computer Science*, pp. 89-97 (1976).
- [11] MAHANEY, S. R. Sparse Complete Sets for  $NP$ : Solution of a Conjecture of Berman and Hartmanis. *Proc. 21st IEEE Symp. on Foundations of Computer Science*, pp. 54-60 (1980).
- [12] MEYER, A. R. and M. S. PATERSON. With What Frequency are Apparently Intractable Problems Difficult, *M.I.T. Tech. Report*, Feb. 1979.
- [13] MEYER, A. R. and L. J. STOCKMEYER. The Equivalence Problem for Regular Expressions with Squaring Requires Exponential Space. *Proc. 13th IEEE Symp. on Switching and Automata Theory*, pp. 125-129 (1972).
- [14] PIPPENGER, N. On Simultaneous Resource Bounds. *Proc. 20th IEEE Symp. on Foundations of Computer Science*, pp. 307-311 (1979).
- [15] PLAISTED, D. A. New  $NP$ -hard and  $NP$ -complete Polynomial and Integer Divisibility Problems. *Proc. 18th IEEE Symp. on Foundations of Computer Science*, pp. 241-253 (1977).

(1) Obtained jointly with Ravindran Kannan.

(2) An improvement by Michael Sipser of an early result of ours.

(3) Due to Albert Meyer.

- [16] SAVAGE, J. E. Computational Work and Time on Finite Machines. *JACM* 19, (4), pp. 660-674 (1972).
- [17] SCHAEFER, T. S. On the Complexity of Some Two-Person Perfect-Information Games. *JCSS* 16, pp. 185-225 (1978).
- [18] SCHNORR, C. P. Optimal Algorithms for Self-Reducible Problems. *3rd Int. Coll. on Automata, Language and Programming*, Edinburgh (1976).
- [19] STOCKMEYER, L. J. The Polynomial-Time Hierarchy. *Theoretical Computer Science* 33, pp. 1-22 (1977).
- [20] VALIANT, L. G. Relative Complexity of Checking and Evaluating. *Univ. of Leeds Tech. Report*, (1974).

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