

COMBINATORIAL DESIGNS – A TRIBUTE TO HAIM HANANI

PREFACE

This volume is dedicated to a mathematician who laid the ground work for the modern study of combinatorial design theory. Haim Hanani pioneered the techniques for constructing designs and the theory of pairwise balanced designs, leading directly to Wilson's Existence Theorems. He also has lead the way in the study of resolvable designs, covering and packing problems, latin squares, 3-designs, and other combinatorial configurations. All this is made more remarkable by the fact that Haim's first paper in design theory (the existence theorem for Steiner quadruple systems) appeared only in 1960. His encyclopaedic papers are widely referenced, and his genius for construction is known and respected throughout the design theory community.

Haim Hanani was born in Poland in 1912; he studied mathematics in Vienna and Warsaw from 1929–34, graduating with an M.A. from the University of Warsaw. In 1935 he emigrated to Israel and was awarded the Hebrew University's first Ph.D. in Mathematics in 1938. His dissertation was on the four colour problem. While a student he joined the National Military Organization (IZL), an underground force fighting for the establishment of a Jewish state in the land of Israel. He was imprisoned by the British authorities in 1944 and exiled to Eritrea, and then to Kenya, returning to Israel only in 1949 after Israel's independence. In 1955 he was appointed to the faculty of the Technion in Haifa. During the period from 1969–73 he served as the first rector of Ben Gurion University in Beersheba, and in 1979 he was awarded an honorary doctorate for his work in founding the university. In 1980 he was appointed Professor Emeritus at the Technion. Throughout his career he has held numerous administrative posts in the Technion and in professional and government agencies. He is on the editorial board of *Discrete Mathematics*, *Journal of Combinatorial Theory* and the *European Journal of Combinatorics*.

I would like to take this opportunity to express my gratitude to Professor Hanani for his contributions to mathematics, and to wish him a long, fruitful and healthy life on his seventy-fifth birthday. This volume of research and survey papers is a fitting tribute to a founding father, from his mathematical sons and daughters.

Alan Hartman
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July, 1988

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OBITUARY: SHMUEL SCHREIBER (1920–1988)

It is with great sadness that we note the passing of Shmuel Schreiber. Shmuel's last two papers appear in this volume, and were completed only days before his death. He was born in Romania, arriving in (then) Palestine in 1940. He received his Master's degree from the Hebrew University in 1947. His career was not in academia, so his time for research was limited; nevertheless his papers on Steiner triple systems and finite algebras remain as important works. His presence at combinatorial meetings in Israel was inspiring, his questions and problems always challenging, and his infectious enthusiasm for mathematics was remarkable. He will be greatly missed by the Israeli mathematical community and the combinatorial theorists of the world who had the privilege to know him.

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LIST OF PUBLICATIONS by Haim Hanani

1. Über wesentlich unplättbar Kurven im dreidimensionalen Raume, *Fundamenta Mathematicae* 23 (1934) 135–142.
2. A contribution to the four color problem, thesis for the Ph.D. degree, submitted to the Hebrew University, Jerusalem, 1938 (in Hebrew).
3. A contribution to the four color problem, *Am. J. Math.* 64 (1942) 36–54.
4. Sur les changements des signes d'une série à termes complexes. *Comptes rendus des séances de l'Académie des Sciences* 225 (1947) 516–518 (with A. Dvoretzky).
5. On the number of straight lines determined by n points, *Riveon Lematematika* 5 (1951) 10–11 (in Hebrew, English Summary).
6. On sums of series of complex numbers, *Pacific J. Math.* 3 (1953) 695–709.
7. On the number of lines and planes determined by d points, *Scientific Publications, Technion, I.I.T. Haifa*, 6 (1954/5) 58–63.
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9. On the number of monotonic subsequences, *Bull. Res. Council Israel* 7F (1957/8) 11–13.
10. A generalization of the Banach and Mazur game, *Trans Amer. Math. Soc.* 94 (1960), 86–102.
11. On quadruple systems, *Canad. J. Math.* 12 (1960) 145–157.
12. A note on Steiner triple systems, *Math. Scandinavica* 8 (1960) 154–156.
13. The existence and construction of balanced incomplete block-designs, *Annals Math. Statistics* 32 (1961) 361–386.
14. Some characterizations of a class of unavoidable compact sets in the game of Banach and Mazur, *Pacific J. Math.* 11 (1961) 945–959, (with M. Reichbach).
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18. On a limit theorem in combinatorial analysis, *Publicationes Mathematicae* 10 (1963) 10–13 (with P. Erdős).
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21. A balanced incomplete block design, *Annals Math. Statistics* 36 (1965) 711.
22. Some combinatorial configurations, *Trans. N.Y. Acad. Sci., Ser. II*, 30 (1968) 421–426.
23. Eigenvalues of infinite matrices, *Colloquium Mathematicum* 19 (1968) 89–101. (With E. Netanyahu and M. Reichaw).
24. On the number of orthogonal latin squares, *J. Combin. Theory* 8 (1970) 247–271.
25. On balanced incomplete block designs with large number of elements, *Canad. J. Math.* 22 (1970) 61–65.
26. Truncated finite planes, *Proc. Symposia in Pure Mathematics*, A.M.S. 19 (1971) 115–120.
27. On balanced incomplete block designs with blocks having five elements, *J. Combin. Theory* 12 (1972) 184–201.
28. On resolvable designs, *Discrete Math.* 3 (1972) 343–357 (with D.K. Ray-Chaudhuri and R.M. Wilson).
29. On resolvable balanced incomplete block designs, *J. Combin. Theory* 17 (1974) 275–289.
30. On transversal designs, *Combinatorics, Proceedings of the NATO Advanced Study Institute (Breukelen, The Netherlands, 1974)* 43–53.
31. Balanced incomplete block designs and related designs, *Discrete Math.* 11 (1975) 255–369.
32. A combinatorial identity, *Fibonacci Quarterly* 14 (1976) 49–51.
33. Resolvable designs, *Colloquio Internazionale sulle Teorie Combinatorie, Atti dei Convegni Lincci, Roma* 17 (1976) 249–252.
34. Group divisible designs with block-size four, *Discrete Math.* 30 (1977) 1–10 (with A.E. Brouwer and A. Schrijver).
35. A class of three-designs, *J. Combin. Theory* 26 (1979) 1–19.

36. Decomposition of Hypergraphs into Octahedra, Trans. N.Y. Acad. Sci. 319 (1979) 260–264.
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