

HAVE YOUR PAID HOUR CMSA MEMBERSHIP FEES FOR 1983?

## COMBINATORICS

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*Combinatorics* is the newsletter of the Combinatorial Mathematics Society of Australasia, and is published by the Society. The annual subscription rate for individual non-members and institutions is \$4 (AUST). During 1983 all enquiries should be directed to the CMSA, C/- Dr. Derrick Breach, Department of Mathematics, University of Canterbury, Christchurch, New Zealand.

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NOW IS THE TIME FOR ALL GOOD MEMBERS OF MATHEMATICS AND COMPUTER SCIENCE DEPARTMENTS TO REGISTER FOR THE XI ACCM IN CHRISTCHURCH, N.Z. 29 AUGUST TO 2 SEPTEMBER, 1983, AND DO TELL OTHERS

HAVE YOU PAID YOUR CMSA DUES FOR 1983?
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1. The Eleventh Australian Conference on Combinatorial Mathematics (XI ACCM) 29 August - 2 September 1983, University of Canterbury, Christchurch, New Zealand.

(i) Contributed Papers

Papers in all areas of pure and applied combinatorics and associated computational problems are welcome. Contributed talks will be of 30 minutes duration of which five minutes should be allowed for discussion. Those intending to present papers are asked to forward a title and abstract as soon as possible.

ABSTRACTS SHOULD REACH THE ORGANIZERS BY JULY 30TH
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(ii) Invited Speakers

The following have been asked to give one-hour talks:

Professor Brian Alspach, Simon Fraser University,  
British Columbia: *Decompositions of graphs into cycles.*

Professor J. V. Abrham, Dept. of Industrial Engineering,  
University of Toronto: *Perfect systems of difference sets (a survey).*

Dr. R.G.T. Bennett, Dept. of Physics, University of  
Canterbury: *Bell ringing.*

Dr. Elizabeth Billington, Dept. of Mathematics,  
University of Queensland: *Balanced n-ary designs: a combinatorial survey and some new results.*

Professor Katherine Heinrich, Simon Fraser University,  
British Columbia.

Professor Ralph Stanton, University of Manitoba.

Professor Carsten Thomassen, Technical University of  
Denmark: *Configurations in graphs of large minimum degree or large girth.*

- (iii) Others who will probably attend (with  $p > .99$  in most cases) are:

Dr. D. Billington,	University of Queensland,
Dr. D. R. Breach,	University of Canterbury,
Dr. L. Cacetta,	Western Australian Institute of Technology,
Dr. L.R.A. Casse,	University of Adelaide,
Dr. I. D. Coope,	University of Canterbury,
W. R. de Launey,	University of Sydney,
M. N. Ellingham,	University of Waterloo,
Dr. L. R. Foulds,	University of Canterbury,
Dr. J. W. Giffin,	University of Canterbury,
Dr. D. G. Glynn,	University of Adelaide,

Dr. M. Hendy,	Massey University
Dr. D. A. Holton,	University of Melbourne
Mrs. J. A. Hoskins,	University of Manitoba,
Prof. W. D. Hoskins,	University of Manitoba
Prof. R. Lidl,	University of Tasmania,
Dr. C.H.C. Little,	Massey University,
Prof. P. J. Lorimer,	University of Auckland,
K. L. McAvaney,	Deakin University
Dr. D. F. Robinson,	University of Canterbury,
Dr. J. Seberry,	University of Sydney,
Dr. A. Street,	University of Queensland,
A. R. Thompson	University of Canterbury,
Prof. J. van Rees,	University of Manitoba,
Dr. K. Vijayan,	University of Western Australia,
Dr. W. D. Wallis,	University of Newcastle,
Dr. G. R. Wood,	University of Canterbury.

(iv) A skeleton programme goes as follows:

Sunday 28th August, evening: Registration and informal gathering at the Halls of Residence.

Monday 29th August, morning: Registration and opening sessions in the Science Lecture Block.  
afternoon: Papers followed by sherry party at the University Staff Club.

Tuesday 30th August, morning: Papers  
afternoon: Papers and A.G.M. of the Combinatorial Mathematics Society of Australasia.  
evening: games evening.

Wednesday, 31st August, morning: Papers  
afternoon: Excursions including a visit to the St. Helena vineyards.  
evening: Free (a theatre party is a possibility.)

Thursday, 1st September, morning: Papers  
afternoon: Papers  
evening: Conference dinner at the University of Canterbury Staff Club, Ilam Homestead.

Friday, 2nd September, morning: Papers. Conference ends at midday.

(v) At the time of writing it is not known just which of the University Halls will be assigned to us. This depends on the other conferences being held on the campus. However we should be told well before the conference and all those booked into the Halls should receive precise directions before they depart their home bases. The organising committee will meet all international flights arriving in Christchurch on Sunday 28th August. They will try to be at the airport at strategic times on other days. In particular it would help us if those

arriving on Air New Zealand domestic flights can tell us if they want to be met at the airport.

Local telephone numbers for those who may be disorientated (undigraphed?) are

482.009, Ext. 680 or Ext. 679 or Ext. 689: Mathematics Department, University of Canterbury;

43.197: D. R. Breach;

487.489: L. R. Foulds.

- (vi) We hope that the weather will be benign for the conference. However at that time of year it can be bracing (frosts at night) or moist (pouring with rain) so you are well advised to bring some warm clothing and a raincoat just in case. If all goes well you may get to scamper among the early daffodils.
  - (vii) Space will be available for a display of books if anyone wishes to use it.
  - (viii) Mail and messages for those at the conference should be addressed c/o D. R. Breach, Dept. of Mathematics, University of Canterbury, Christchurch, New Zealand.
  - (ix) Those giving papers and wishing to submit them for publication in the Proceedings are asked to bring a typed copy or a clean holograph to the conference - or better still send it on beforehand. This can speed up the refereeing process.
2. Obituary. It is a sad thing to report the death of HENRY MAURICE FINUCAN on February 28th, 1983, aged 65, after open heart surgery performed early in January. Henry Finucan was a Reader in the Department of Mathematics at the University of Queensland. While his principal research was in statistics he had wide interests and many will remember the enthusiasm of his talks on the Catalan numbers.
3. Personal Column
- (i) Dr. L. R. Foulds (at present in Operations Research, Department of Economics, the University of Canterbury, Christchurch, N.Z.) has been appointed to a full professorship in the Department of Industrial and Systems Engineering at the University of Florida, Gainesville, Florida, U.S.A., and will take up his duties on January 1st, 1984. He will be teaching applied graph theory, networks, optimization and facilities planning. He hopes that all those in combinatorics that he knows will visit him there. He is currently working on classifying graceful hanging wheels, Hamiltonicity of degree-constrained triangulations, enumeration of phylogenetic labelled trees, and algorithms for maximum weight planar subgraphs.

- (ii) Dr. Deborah J. Street, has recently taken up an appointment at the Waite Agricultural Research Institute, P.O. Box 1, Glen Osmond, South Australia 5064.
- (iii) Dr. Roger Duke who has been working at the Open University in the U.K. and who specializes in matroid theory has returned to Australia. His address is 3 Gladstone Parade, Caloundra, Queensland 4551.
- (iv) Professor D. Avis of the School of Computer Science, McGill University, 805 Sherbrooke St. W., Montreal, P.Q. Canada H3A 2K6 wishes to contact researchers who are interested in combinatorics, discrete geometry, graph theory and algorithms.
- (v) Dr. W. D. Wallis is one of the invited speakers at the Manitoba Conference on Numerical Mathematics this year. He has also been awarded a Canadian Commonwealth Fellowship to visit Simon Fraser University from Sept. 1984 to Feb. 1985.
- (vi) Dr. Alan Hartman has a new position called 'Scientist' (Mada'an in Hebrew) with the IBM Israel Scientific Center, Electrical Engineering Building, Technion City, Haifa 32,000, Israel.
- (vii) Dr. Brendan D. McKay has a new address at the Computer Science Department, Australian National University, P.O. Box 4, Canberra, A.C.T. 2600.
- (viii) Professor Z. Skupien's address is Instytut Matematyki Agh, al. Mickiewicza 30, 30-059, Krakow, Poland.
- (ix) Dr. D. R. Breach will be going on leave for a year from October 1st, 1983.
- (x) Dr. Anne Street plans to go on leave for the first half of 1984.

#### 4. Change of Name of Conference: Notice of Motion

At the Fourth Annual Meeting of the Combinatorial Mathematics Society of Australasia on the 27th August, 1982, at the University of Adelaide it was put to the meeting that:

"The name of the conference be changed to Conference on Combinatorial Mathematics and Computing."

This motion was carried, 9 to 6. There were 32 members present.

At this year's Annual Meeting to be held during the conference in Christchurch, N.Z., it will be moved from the chair that, with reference to the motion of 27th August, 1982;

"The change of name from Conference on Combinatorial Mathematics to Conference on Combinatorial Mathematics and Computing be confirmed."

I take it that the word "Australian" is to be understood before the words "Conference".

D. R. Breach,  
Director, CMSA, 1983.

## 5. Research Announcements

- (i) D. R. Stinson and W. D. Wallis, *An Even Side Analogue of Room Squares*.

There is no such animal as a Room square of even side; however, in investigating Room squares with subsquares, certain arrays of even side arise which closely resemble Room squares in many ways. We have shown that such an object exists for even side exceeding 4. As a consequence, if  $n \geq 4$  and if  $r \geq 7$  and  $r$  is odd (except  $r = 11$ ), there is a Room square of side  $nr + n - 1$  with subsquares of sides  $r$  and  $2n - 1$ .

- (ii) A. Hartman, *A general recursive construction for quadruple systems*, J. Comb. Theory (A), 33 (1982), 121-134.
- (iii) A. Hartman, H. Hanani and E. S. Kramer, *On three designs of small order*, to appear in Discrete Math.
- (iv) A. Hartman, W. H. Mills and R. C. Mullin, *Covering triples by quadruples - an asymptotic solution*, to appear in the Proceedings of the Silver Jubilee Conference at Waterloo in the Annals of Discrete Mathematics.

## 6. Recent Books

- (i) Optimization Techniques: An Introduction by L. R. FOULDS, Springer-Verlag Undergraduate Texts in Mathematics, 1981. 545 pp + 72 figs. Approx. US\$39.10.

Contents: Plan of the Book. - Introduction. - Linear Programming. - Advanced Linear Programming Topics. - Integer Programming. - Network Analysis. - Dynamic Programming. - Classical Optimization. - Nonlinear Programming. - Appendix. - Further Reading. - References. - Solutions to Selected Problems.

This book is a practical introduction to the field of optimization, an important tool in operations research and other disciplines related to applied mathematics, such as engineering design. The author covers the main optimization techniques in current use, including mathematical programming, network, and classical methods

at an advanced undergraduate level. Using arguments which are intuitive rather than highly technical, the approach focuses on familiar real-life problems, proceeding by induction to the underlying theory. New formulations and models in integer programming are covered, while algorithms are simply explained with illustrative numerical examples. The numerous exercises are suitable for courses in mathematics, engineering, and business; and the straightforward style of exposition may also be used by research scientists in transport planning, and by operations research and planning personnel in industry.

- (ii) Finite Fields by RUDOLF LIDL and HARALD NIEDERREITER, Vol. 20 of the Encyclopedia of Mathematics and its Applications, Addison-Wesley, 1983, 660 pp + line drawings and tables.

Contents. Algebraic Foundations. - Structure of Finite Fields. - Polynomials over Finite Fields. - Factorization of Polynomials. - Exponential Sums. - Equations over Finite Fields. - Permutation polynomials. - Linear Recurring Sequences. - Applications of Finite Fields. - Tables. - Bibliography. - Author Index. - Subject Index.

The theory of finite fields is a branch of modern algebra which has come to the fore in the last fifty years because of its diverse applications in such areas as combinatorics, coding theory, and the mathematical study of switching circuits. This book, the first one devoted entirely to this theory provides comprehensive coverage of the literature on finite fields and their applications. Extensive bibliographical notes at the end of each chapter give an historical survey of the development of the subject. Worked-out examples and lists of exercises found throughout the book make it useful as a text for advanced level courses.

- (iii) The Fifty-nine Icosahedra by H.S.M. COXETER, P. Du VAL, H. T. FLATHER and J. F. PETRIE, Springer-Verlag, 1982, 26 pp + 20 plates + 9 figures.

This is a reprint of a monograph first published in 1938 by the University of Toronto Press. For this edition P. Du Val has written a preface describing the contribution of each author. For those who construct and study polyhedra this classic work is a collector's item for the clarity of its plates alone.

- (iv) Introduction to Coding Theory by J. H. Van LINT, Springer-Verlag Graduate Texts in Mathematics, No. 86, 1982, 171 pp.

Contents. Algebra. - Krawtouch polynomials. - Combinatorial theory. - Probability theory. - Shannon's theorem. - Block codes. - Linear codes. - Hamming codes. - Majority Logic decoding. - Weight enumerators. - Hadamard codes. - Binary and ternary Golay codes. - Reed-Muller codes. - The Gilbert bound. - The Gilbert bound. - Upper bounds. - The linear programming bound. - Cyclic codes. - Generator matrix. - Check polynomials. - Zeros and idempotents of cyclic codes. - Representations of cyclic codes. - BCH codes. - Reed-Solomon codes. - Perfect codes. - Uniformly packed codes. - Lloyd's theorem. - Characteristic polynomials. - Non-existence theorems. - Goppa codes. - Minimum distance, asymptotic behaviour, and decoding of Goppa codes. - Generalized BCH codes. - Asymptotically good algebraic codes. - Justesen codes. - Arithmetic codes. - AN codes. - Arithmetic and modular weight. - Mandelbaum-Barrows codes. - Convolutional codes. - Decoding, construction and automorphisms of convolutional codes: - An analog of the Gilbert Bound. - Problems with hints and solutions.

- (v) New Directions in Applied Mathematics: P. J. HILTON and G. S. YOUNG, Editors. Springer-Verlag, 1982, 163 pp.

This collection of papers presented in 1980 on the occasion of the Case centennial celebration contains an article dealing with fixed-point theorems in combinatorics.

- (vi) Combinatorial Enumeration. I. P. GOULDEN and D. M. JACKSON. Wiley-Interscience Series in Discrete Mathematics, 1983, 848 pp, (In press).

An encyclopedic account of the mathematical theory and problem-solving techniques associated with enumeration problems for a wide variety of discrete structures and their substructures. Presents problems from mathematics, statistics, the physical and biological sciences, and computer science. Combines combinatorial and algebraic ideas. Includes over 300 exercises and provides full solutions.

Contents. Mathematical Preliminaries. - The Combinatorics Of the Ordinary Generating Function. - The Combinatorics of the Exponential Generating Functions. - The Combinatorics of Sequences. - The Combinatorics of Paths. References, Index.

- (vii) Introduction to the Theory of Error-Correcting Codes. V. PLESS. Wiley-Interscience Series in Discrete Mathematics, 1982, 169 pp, \$22.95 (US).

Addresses the practical questions in the transmission or storage of digital information and their transformations into problems in error-correcting codes. Demonstrates the importance of mathematical tools in the solution to these problems, and covers the necessary mathematics, such as finite fields. Examines cyclic codes, weight



distributions, relations between codes and combinatorial designs, and J. H. Conway's elegant new proof, using coding theory, of the uniqueness of the Steiner system. Maintains an elementary point of view throughout.

Contents. Introductory Concepts. - Useful Background. - A Double-Error-Correcting B.C.H. Code and a Finite Field of 16 elements. - Finite Fields. - Cyclic Codes. - The Group of a code and Quadratic Residue-Codes. - Bose-ChaudhuriHocquenghem (B.C.H.) Codes. - Weight Distributions. - Designs. - Some Codes are Unique. Appendix, Problems, References, Index.

- (viii) Combinatorics '81. In honour of Beniamino Segre: A. BARLOTTI, P. V. CECCHERINI and G. TALLINI, editors;

Proceedings of the International Conference on Combinatorial Geometries and their Applications, Rome 1981, North-Holland Mathematics Studies, 78; Annals of Discrete Mathematics, 18; 1983, 824 pp, \$89.25 (US).

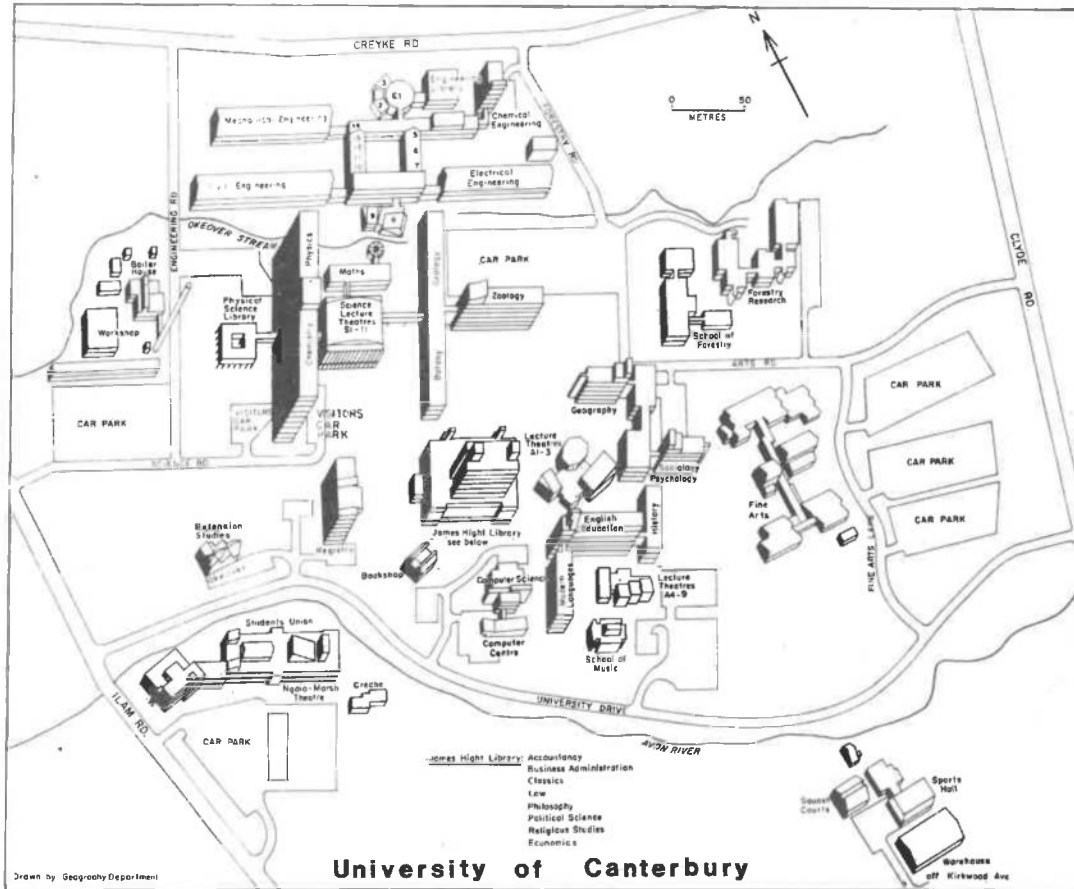
This work contains 76 articles devoted to recent progress in the following topics; finite geometries (arcs, caps, and special varieties in a Galois space; generalized quadrangles; Benz planes; foundations of geometry). design theory, finite groups, coding theory and graph theory in its geometric and design aspects.

- (ix) Attention is drawn to the Annals of Discrete Mathematics under the general editorship of Prof. P. L. Hammer of the University of Waterloo. This series, of which the previous item (viii) is a sample, is included from volume 11 onwards in the North-Holland Mathematics Studies. For more information write to Prof. P. L. Hammer, Department of Combinatorics and Optimization, Faculty of Mathematics, University of Waterloo, Waterloo, Ont. N2L 3G1, Canada. He has details on about twenty books on combinatorics, geometry, graph theory and optimization.

7. Editorial Request: When submitting abstracts of recent Masters and Doctoral theses, please remember to give the name of the supervisor.
8. Problem: Do kangaroos have upper and lower bounds? If so is the greatest lower bound equal to the least upper bound? It may be assumed that the kangaroos are not in a finite field. Correspondence in this matter would be welcome.
9. Venues of the 1984 and 1985 Conferences.

The proposed venue for the 1984 Conference is the University of Western Australia, Perth. Suggestions for the venue of the 1985 Conference are called for.

10. If you have enjoyed this copy of the Newsletter then do not leave it in the dentist's waiting room but pass it on to somebody who counts.



Drawn by Geography Department

# University of Canterbury

I expect to attend the XIth Australian Conference on Combinatorial Mathematics,  
University of Canterbury, Christchurch, New Zealand, 29 August - 2 September 1983.

Name: ..... Title: .....

Affiliation: .....

Address for notices: .....

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I wish to present a 30 minute paper ..... entitled: .....

.....

Accommodation: Hotel ..... Motel ..... Own arrangements .....

University Hostel: ..... for ..... persons for the nights of:

Sat. 27 Aug., Sun. 28 Aug., Mon. 29 Aug., Tue. 30 Aug., Wed. 31 Aug., Thur. 1 Sept.

(Please encircle appropriate days)

Expected time of arrival: ..... Airline: ..... Flight No: .....

I enclose \$.....(NZ) deposit for campus accommodation.

Signature: .....

Return completed form to Dr. D.R. Breach, Department of Mathematics, University  
of Canterbury, Christchurch, New Zealand. Phone: 482-009, Ext. 689 or 680.