COMBINATORICS

Combinatorics is the newsletter of the
Combinatorial Mathematics Society of Austral-
asia, and is published by the Society. Annual
subscription rate for individual non-members
and institutions is $A4. All enquiries should
be directed to the C.M.S.A., c/- Dr. Sheila
Williams, Department of Mathematics, University
of Queensland, St. Lucia, Queensland, 4067,
Australia.

C.M.S.A. SUBSCRIPTION RENEWAL

Members are reminded that their 1981 subscriptions fell due on 1 January.
The rates remain at $A4 for those in full time employment and $A2 other-
wise. *If a tick appears in the box above,* your subscription had not been
received at time of mailing. Prompt payment would be appreciated. Please
make cheques, etc. payable to C.M.S.A. and post with full name, address
and telephone number to: Dr. Sheila Williams, Director C.M.S.A., Depart-
ment of Mathematics, University of Queensland, St. Lucia, Queensland, 4067,
Australia.

This issue of *Combinatorics* is being sent to all 1980 and 1981 members.
The membership list will be pruned of unfinancial members before the next
issue.

Receipts are enclosed for those paid up members who have not already
received them. Because of the costs of cashing cheques in $U.S., would
those members who wish to pay in cheques in $U.S. please send $U.S.6.00.
ould those who have underpaid please add $U.S.1.00 to next year's
subscription.

GENERAL ANNOUNCEMENTS

Visitors:

Dr. Tony Gardiner from University of Birmingham to University of Melbourne,
March-April, 1981; Deakin University, May-September, 1981. Contact Derek
Holton (University of Melbourne) or Kevin McAvaney (Deakin University).

Professors Chu Yoeng Chin and Liu Cheng-Lung from Chinese Academy of
Science, Bejing, China, to University of Melbourne, July, 1981; Deakin
University, 2-15 August, 1981, then the Universities of Sydney, Newcastle
and Queensland. Contact Derek Holton (University of Melbourne).

Mailing List:

The mailing list (Vol. 2, Number 4) should be updated as follows:

Changes:

Dr. A.H. Ball, 5 Elva Ave., Speers Point, N.S.W., 2284.

Dr. Louis Caccetta, School of Mathematics and Computing, Western Australian
Institute of Technology, South Bentley, W.A., 6102.

Mr. Gek Ling Chia, Department of Mathematics, University of Malaya, Kuala
Lumpur 22-11, Malaysia.

Prof. Dr. Heiko Harborth, Beinroder Weg 47, D-3300 Braunschweig, West
Germany.

Dr. Anne Penfold Street, Department of Mathematics, University of
Queensland, St. Lucia, Qld., 4067.

Ms. D.J. Street, Department of Mathematics, University of Queensland,
St. Lucia, Qld., 4067.

New Members:

Prof. J. Abraham, Industrial Engineering Department, University of Toronto, Toronto, Ontario, Canada M551A4.

Mr. R.N. Buttsworth, Department of Mathematics, University of Queensland, St. Lucia, Queensland, 4067.

Dr. C.D.H. Cooper, School of Mathematics and Physics, Macquarie University, North Ryde, N.S.W. 2113.

Prof. D.F. Hsu, Mathematics Department, Fadham University, Bronx, N.Y. 10458, U.S.A.

Prof. S. Kageyama, Department of Mathematics, Shinonome School, Faculty of School Education, Hiroshima University, 1-33 Shinonome 3-chrome, Hiroshima 734, Japan.

Prof. A. Kotzig, Centre de Recherche de Mathematiqués Appliques, Université de Montréal, GP6128, Montréal, Quebec, Canada H3C3J7.

Dr. Philippa Patisen, Department of Psychology, University of Melbourne, Parkville, Vic. 3052.

Prof. J.M. Turgeon, Department de Mathematiques et Statistiques, Université de Montréal, GP6128, Montréal, Quebec, Canada H3C3J7.

Dr. W.H. Wilson, Department of Computer Science, University of Queensland, St. Lucia, Queensland, 4067.

C.M.S.A. Committee:

After much active co-opting on the part of the Director, the committee is now : Sheila Williams (Director), Bill Wilson (Acting Treasurer), Anne Street (Assistant Treasurer), Elizabeth Billington (Secretary) and Debbie Street (Committee member). Peter Eades, who was elected Treasurer, is not in Australia at present.

Combinatorics Conferences:

Finite Geometries, 7-11 April, Washington State University, Pullman. Includes talks on applications to other areas and contributed papers. Invited speakers include A. Barlotti, P. Cameron, D.A. Foulser, C. Hering, D.G. Hymans, D.R. Hughes, U.M. Kantor, H. Lüneburg, E. Shult. Contact M.J. Kallaher or C.T. Long, Department of Pure and Applied Mathematics, Washington State University, Pullman, Washington, 99164.

International Conference on Combinatorics, 15-20 June, 1981, Marseille-Luminy. Main topics will be classical graph theory, hypergraphs, constructive and algebraic combinatorics, coding theory and various applications. Contact F. Sterboul, Congrès de Combinatoire 1981, E.R.175-C.M.S., 54, bd. Raspail, 75270 Paris Cedex, France.

HIGHER DEGREES

Supervisors of higher degree theses on combinatorial mathematics in Australasian institutions are invited to send details – recipient's name, supervisor's name, degree, date awarded, institution, title, abstract – to Dr. Anne Penfold Street, Department of Mathematics, University of Queensland, St. Lucia, Queensland, 4067.

Student Degree Date Awarded	Supervisor Institution	Title Abstract reference
Alan Hartman Ph.D. 1980	R.B. Eggleton U. of Newcastle	Construction and Resolution of Quadruple Systems.

Abstract:

A quadruple system (X,Q) of order V, denoted $QS(V)$, is a set X of cardinality V, and a set Q of 4-subsets of X, with the property that each 3-subset of X is contained in a unique member of Q.

A quadruple system (X,Q) is resolvable if Q can be partitioned so that each part is itself a partition of X.

A necessary condition for the existence of a $QS(V)$ is that $V \equiv 2$ or 4 (mod 6) or, trivially, $V = 0$ or 1. In 1960 Hanani proved that these conditions are also sufficient. He used six recursive constructions and direct constructions of a $QS(14)$ and a $QS(38)$ to prove this result. The first part of this thesis contains some new recursive constructions for quadruple systems, and a unified treatment of all the existing constructions. These results enable us to give a new proof of Hanani's result using only two recursive constructions, at the expense of increasing the number of initial designs necessary for the induction. New results on the problem of embedding quadruple systems in larger quadruple systems are also obtained in this part of the thesis.

The second part of the thesis is an attack on the existence problem for resolvable quadruple systems. A necessary condition for the existence of a resolvable $QS(V)$ is that $V \equiv 4$ or 8 (mod 12) or, trivially $V = 0$, 1 or 2. The sufficiency of these conditions remains an open question. We adapt the constructions given in the first part of the thesis so that they preserve resolvability. This enables us to reduce the existence problem for resolvable $QS(V)$ to a finite set of existence problems for resolvable $QS(V)$ with certain specified subsystem properties.

The second part of the thesis also contains many direct constructions of resolvable $QS(V)$, and direct constructions of $QS(V)$ with even more stringent resolvability properties than classical resolvability.

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NEW PUBLICATIONS

Authors are invited to constitute lists of publications from 1978 and send further details of publications on appearance to Dr. D.A. Holton, Department of Mathematics, University of Melbourne, Parkville Vic., 3052.

J-c Chuan and W-f Chuan, On the generalized Hadamard product and the Jordan-Hadamard product, *Bull. Aust. Math. Soc.*, 22, 1980, 321-338.

G.R. Grimmett, Random labelled trees and their branching networks, *J. Aust. Math. Soc.*, 30A, 1980, 229-239.

C.D. Godsil, Neighbourhoods of transitive graphs and GRR's, *J. Comb. Th.*, 29B, 1980, 116-140.

A. Hartman, Resolvable Steiner quadruple systems, *Ars Comb*, IX, 1980, 263-274.

M.D. Hirschorn, Two further Ramanujan pairs, *J. Aust. Math. Soc.*, 30A, 1980, 1-4.

A.F. Horadam, Sums of products: an extension, *Fibonacci Quart.*, 17, 1979, 248-250.

A.F. Horadam, Chebyshev and Fermat polynomials for diagonal functions, *Fibonacci Quart.*, 17, 1979, 328-333.

A.F. Horadam, Extensions of a paper on diagonal functions, *Fibonacci Quart.*, 18, 1980, 3-8.

A.F. Horadam, R.P. Loh and A.G. Shannon, Divisibility properties of some Fibonacci-type sequences, in *Combinatorial Math VI*, Springer Lecture Notes in Mathematics No. 748, Springer-Verlag, Berlin, 1979, 55-64.

A.F. Horadam and A.G. Shannon, Special recurrence relations associated with the sequence $\{W_n(a,b; p,q)\}$, *Fibonacci Quart.*, 17, 1979, 294-299.

C.H.C. Little, A characterization of planar cubic graphs, *J. Comb. Th.*, 29B, 1980, 185-194.

B.D. McKay and R.G. Stanton, Some graph-isomorphism computations, *Ars Comb.*, IX, 1980, 307-313.

J. Seberry and A.L. Whiteman, Complex weighing matrices and orthogonal designs, *Ars Comb.*, IX, 1980, 149–162.

R.G. Stanton, S.T.E. Seah and D.D. Cowan, Nonexistence of an extremal graph of a certain type, *J. Aust. Math. Soc.*, 30A, 1980, 55–64.

N.C. Wormald, A correspondence for rooted planar maps, *Ars Comb.*, IX, 1980, 11–28.

NINTH AUSTRALIAN CONFERENCE ON COMBINATORIAL MATHEMATICS

First Notice

The Ninth Australian Conference on Combinatorial Mathematics will be conducted by the Combinatorial Mathematics Society of Australasia at the University of Queensland, Brisbane, Queensland, Australia, from Monday, 24 August, to Friday, 28 August, 1981. The third Annual General Meeting of the C.M.S.A. will be held at the conference. Registration will take place on the Sunday evening and on the Monday morning before the formal programme begins. The conference will conclude with lunch on Friday, 28 August. If you wish to attend, please indicate on the reply form and return it by 30 June, 1981.

Patronage

A number of organizations have been approached for financial support for the conference. To date the following have agreed:

> University of Queensland, Australian Mathematical Society
> Trafalgar Travel, B.H.P. Co. Ltd.

Invited Addresses

The following visitors have agreed to give a one hour invited address:

> Dr. Derrick Breach, University of Canterbury
>   (Star gazing in affine planes)
> Dr. Peter Cameron, Merton College, Oxford
> Dr. Tony Gardiner, University of Birmingham, U.K.
> Dr. Bill Kocay, University of Manitoba
> Dr. Rudi Mathon, University of Toronto
> Prof. Vera Pless, University of Illinois, Chicago Circle
> Dr. Cheryl Praeger, University of Western Australia
> Prof. Ralph Stanton, University of Manitoba

There will also be some expository lectures.

Contributed Papers

Papers are welcome in all areas of pure and applied combinatorics. Contributed talks will be allowed 30 minutes each, 5 minutes of which is usually for discussion. If you wish to give a paper, please insert the title on the reply form and send a typed abstract by 30 June, 1981.

Conference Proceedings

Springer-Verlag have agreed to publish the refereed proceedings of the conference in the Lecture Notes in Mathematics series. Prospective authors are advised that the series editors of LNIM require that "The contributions should be of a high standard and of current interest. Contributions should contain sufficient information and motivation. Except possibly in the case of major surveys, they should present at least outlines of the proofs, enough to enable an expert to complete them. Thus resumés and mere announcements of papers appearing elsewhere cannot be included, although more detailed versions of a contribution may well be published in other places later."

All prospective authors are asked to bring their papers with them to the conference in a form suitable for refereeing, either typed or legibly and neatly handwritten. At the latest, papers will be required in this form, ready for

refereeing, by 30 September, 1981. It is hoped that typing of all papers ready for photo-offset will be done in Queensland, in order to achieve uniformity throughout the volume.

Accommodation

On campus accommodation has been reserved in Union College, which is a four minute walk away from the location of the lectures. The cost will be $14 per night, room only (students $10), meals $2 each, payable by cash in the dining room.

There are no motels within walking distance of the University, and they tend to be either expensive (but on a bus route) or less expensive (but inconvenient without private transport). However, if college accommodation is not to your taste, the following information may help:

Coronation Motel,	Coronation Drive, Milton. Tel. 36-0055 Single $65; double $72 (on a bus route to the University)
Forest Lodge Motel,	130 Central Ave., Indooroopilly Tel. 370-7468, 371-6600 Single $21 room only, $25.50, three course breakfast Double $31 room only, $40, three course breakfast Children under 14, $5.50 (inconvenient without private car)
Spot Holiday Flats,	293 North Quay (City). Tel. 229-4411 Single $19 per day
Astor Motel,	193 Wickham Terrace (City) Tel. 221-9522 Ensuite: $30 single, $35 double Budget room (share bathroom) : Single $16, Twin $20, Double $22 Children under 12, $4. Cot $2

The University is about 6 kilometres from the City.

Will anyone requiring accommodation in Union College who may have special needs (e.g. vegetarian, or a physical disability) please notify us when booking. Most college rooms are at least one floor up, and there are no lifts.

Travel

If you wish to be met at Brisbane airport, please include your flight information on the reply form. If you are travelling by car and would like a map of the campus *before* arrival, please ask and we will send you one. Car-parking in Union College will be on a first-come first-served basis in the August break, and even when the college car park is full, there is usually ample parking at that time of year on the nearby University roads.

Registration

Registration fees are payable at the conference, and will be:

$25 for CMSA members;
$30 for non-members (this gives membership of CMSA for the rest of 1981);
$12.50 for student members or unemployed members of CMSA;
$15 for non-member students or unemployed people (giving membership of CMSA for the rest of 1981).

Social Programme

There will be a wine and cheese evening with Registration after dinner on the evening of Sunday, 23 August, in Union College.

A conference outing is being planned for the Tuesday afternoon, and will probably involve a boat trip up the Brisbane River to Lone Pine, Brisbane's home for koalas, kangaroos, a platypus, carpet snakes, dingoes, etc. The cost is not expected to exceed $10 per person.

Other social events being planned include:

A talk (with slides, etc.) from an expert on the works
of Escher.
A games evening (repeated from last year by popular
demand!)
A visit to the Sir Thomas Brisbane Planetarium.

The conference dinner will be on the Thursday evening, in Union College. The price is expected to be around $12 for registered members of the conference, and $15 for non-registered diners.

If any visitors are unable to leave before the Saturday, and if they want some exercise after the end of the conference on Friday at lunch-time, a rain forest walk at nearby Mount Glorious will be organised on the Friday afternoon.

Next Notice

The second notice with more information will appear in *Combinatorics*, Volume 3, number 2, in July, and will be sent to all non-members who have asked for it.