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## COMBINATORICS

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*Combinatorics* is the newsletter of the Combinatorial Mathematics Society of Australasia, 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/- Kevin L. McAvaney, Division of Computing and Mathematics, Deakin University, Victoria 3217, Australia.

## C.M.S.A. Subscription Renewal



Members are reminded that their 1980 subscriptions fell due on 1 January. The rates remain at \$A4 for those in full time employment and \$A2 otherwise. If a tick appears in the box above, your subscription has not been received. Prompt payment would be appreciated. Please make cheques, etc. payable to C.M.S.A. and post with full name, address, and phone number to: Kevin L. McAvaney, Director C.M.S.A., Division of Computing and Mathematics, Deakin University, Victoria 3217, Australia.

This issue of *Combinatorics* is being sent to all 1979 and 1980 members. The membership list will be pruned of unfinancial members before the next issue.

## Definition of Combinatorial Mathematics

Members are invited to send their favourite definitions (address on front cover) for consideration, compilation, and possible publication and comment in the next issue of *Combinatorics* in July. One problem of course is that the suitability of the definition depends on who it is intended for. So you are invited to send one definition for a mathematician and one for an intelligent non-mathematician. Such definitions are handy when drafting letters/applications for grants, information, etc..

## Higher Degrees

It is intended to continue listing higher degrees by thesis on combinatorial mathematics awarded by Australasian institutions. Please send details - recipient's name, supervisor's name, date of award, degree, institution, title, short abstract - to Dr. Anne Penfold Street, Department of Mathematics, University of Queensland, St. Lucia, Qld. 4067, Australia.

## Announcements

Under this heading we publish short news items for the information of members. All contributions should be sent to Professor R.W. Robinson, Department of Mathematics, University of Newcastle, N.S.W. 2308.

### VISITORS:

Prof. Brian Alspach and Dr. Katherine Heinrich from Simon Fraser University to University of Newcastle, May-August 1980. Contact Prof. W.D. Wallis.

Prof. Johan Seidel from University of Technology, Eindhoven, to University of Sydney, June-July 1980. Contact Dr. Don Taylor.

Dr. John Sheehan from University of Aberdeen, to University of Melbourne, 26 May - 26 September 1980. Contact Dr. Derek Holton.

Dr. Rosemary Bailey from The Open University, to University of Western Australia, June-August 1980.

Dr. Neil Sloane from Bell Labs to University of Tasmania, December 1980 - February 1981. Contact Prof. Rudolph Lidl.

### NEW ADDRESSES:

Dr. David Glynn, Instituto di Geometrica, Piazza di Porta San Donato 5, 40127 Bologna, Italy.

Dr. James Oxley, until 1 December 1980, Department of Mathematics, University of North Carolina, Chapel Hill, North Carolina 27514, U.S.A.

Dr. Chris Godsil, Institut für Mathematik, Montanuniversität, A-8700 Leoben, Austria.

### NEW APPOINTMENTS:

Brendan McKay, from 7 August 1980, Assistant Professor, Department of Computer Science, Vanderbilt University, Nashville, Tennessee 37235, USA.

### COMBINATORICS CONFERENCES:

The Fourth International Conference on the Theory and Applications of Graphs, Kalamazoo, Michigan, 6-9 May 1980. Contact Graph Theory Conf., Department of Mathematics, Western Michigan University, Kalamazoo, MI 49008, U.S.A.

The Eighth Australian Conference on Combinatorial Mathematics, Geelong Victoria Australia, 25-29 August 1980. See the Second Notice in this issue.

The Tenth Manitoba Conference on Numerical Mathematics and Computing, 1-4 October 1980, Winnipeg. Invited speakers include Brendan McKay, J.H. Wilkinson. Contact Department of Computer Science, University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada.

The Third Caribbean Conference in Combinatorics and Computing, 5-8 January 1981, Cave Hill campus of University of West Indies, Barbados. Invited speakers include Prof. Read and Prof. Churchhouse. Contact Prof. C.C. Cadogan, Department of Mathematics, University of West Indies, P.O. Box 64, Bridgetown, Barbados, West Indies.

The Eighth British Combinatorial Conference, Swansea, Wales, 20-24 July 1981. Contact Dr. A.D. Keedwell, Hon. Sec. British Combinatorial Committee, Department of Mathematics, University of Surrey, Guildford Surrey GU2 5XH, England.

## Research Announcements

*Please send contributions to Dr. D.A. Holton, Department of Mathematics, University of Melbourne, Parkville, Vic., 3052. An Asterisk indicates that preprints of that article are available.*

- P.J. Cameron and C.E. Praeger, Graphs and permutation groups with projective subconstituents.
- \*D.A. Holton, B.D. McKay and M.D. Plummer, Cycles through specified vertices in 3-connected cubic graphs.
- D.A. Holton and M.D. Plummer, Cycles through prescribed and forbidden point sets.
- \*C.E. Praeger, Primitive permutation groups and a characterization of the odd groups.
- C.E. Praeger, On the orders of primitive permutation groups.
- C.E. Praeger, and J. Saxl, On fixed points in paired suborbits.

## New Publications

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

- G. Olive, Binomial functions and Combinatorial Mathematics, *J. Math. Anal. Appl.*, 70, 1979, 460-473.
- M. Herzog and C.E. Praeger, Direct factors of Sylow groups, *Comm. Alg.*, 6, 1978, 1375-1382.
- C. Praeger, Doubly transitive automorphism groups of block designs, *J. Comb. Th.*, 25A, 1978, 258-266.
- C. Praeger, On primitive permutation groups with a doubly transitive suborbit, *J. Lond. Math. Soc.*, 17, 1978, 67-73.
- C. Praeger, On elements of prime order in primitive permutation groups, *J. Alg.*, 60, 1979, 126-157.

## Problems in Discrete Geometry

William Moser has been compiling and distributing the informal publication "Problems in Discrete Geometry" over the last three years. Editions 1,2,3,4 appeared in July 1977, October 1977, June 1978, September 1979 respectively: a total of 84 problems. Supporting information and references are provided with each problem if available. Some typical problems from edition 4 appear below. He plans to establish a regular periodical in 1980. Send comments, suggestions, problems, solutions, requests for copies, etc., to William Moser, Department of Mathematics, McGill University, 805 Sherbrooke Street West, Montreal, Quebec H3A 2K6, Canada.

Problem: 18.

Can space be filled with cubes, all with integral edge length, no two cubes being the same size? (Problem due to D.F. Daykin).

Problem: 19.

- (a) Decompose a unit square into  $n$  sets so as to minimise the maximum diameter of the sets. For known results see (1).
- (b) Decompose a unit equilateral triangles into  $n$  sets so as to minimise the maximum diameter of the sets. For  $n = 1, 2, 3, \dots, 15$  this was investigated by Graham (2); some of the extremal configurations are rather pretty.
1. R. Guy Selfridge, Optimal coverings of the square. Infinite and finite sets, Colloq. Keszthely, 1973, vol. II, 745-799.
  2. R. Graham, On partitions of an equilateral triangle. Canad. J. Math. 19 (1967), 394-409. MR 35 #874.

Problem: 26.

Let  $f(n)$  be the maximum number of points which one can choose in the unit  $n$ -dimensional cube so that all mutual distances are at least 1. It is easy to see that  $f(n) = 2^n$  for  $n = 1, 2, 3$ . A. Meir has shown that  $f(4) = 17$ , and several have shown that  $\log f(n) \sim \frac{1}{2} n \log n$ . Determine  $f(5)$  and sharpen the asymptotic relation.

This problem appears in (1, problem 41), and repeated in (2, p.244).

1. L. Moser, Poorly formulated problems of combinatorial geometry, mimeographed, 1966.
2. R. Guy, Problems (The Geometry of Metric and Linear Spaces, Michigan, 1974), Springer Lecture Notes #490.

# Eighth Australian Conference on Combinatorial Mathematics

## Second Notice

The Eighth Australian Conference on Combinatorial Mathematics will be conducted by the Combinatorial Mathematics Society of Australasia at Deakin University, Geelong, Victoria, Australia from Monday 25 August to Friday 29 August 1980. The second Annual General Meeting of the C.M.S.A. will be held at the conference. The conference will commence with registration at 0900 hours on 25 August 1980 and finish at about 1300 hours on 29 August 1980. If you wish to attend please indicate on the reply form and return it by 30 June 1980.

### PATRONAGE

A number of organisations have been approached to support the conference financially. To date the following have agreed:

Deakin University  
Australia and New Zealand Banking Group Limited  
Blue Circle Southern Cement Limited  
Australian Mathematical Society

### INVITED ADDRESSES:

Each of the following will give a one hour invited address:

Dr. Brian A. Alspach, Simon Fraser University  
Dr. Chuan-Chong Chen, Nanyang University  
Dr. Ronald L. Graham, Bell Telephone Laboratories  
Prof. Peter J. Lorimer, University of Auckland  
Prof. Ronald C. Read, University of Waterloo  
Prof. Johan J. Seidel, University of Technology, Eindhoven  
Dr. John Sheehan, University of Aberdeen  
Prof. Ralph G. Stanton, University of Manitoba.

Also Ralph Stanton and Ron Graham will give one or two expository lectures each.

### CONTRIBUTED PAPERS:

Contributed papers on any area of pure and applied combinatorics are now sought. Contributed talks will be 30 minutes including 5 minutes for discussion. If you want to give a paper please insert the title on the reply form and return the form with abstract attached by 30 June 1980.

### CONFERENCE PROCEEDINGS:

Springer-Verlag have agreed to publish the refereed proceedings of the conference in the Lecture Notes in Mathematics series. Authors are advised that the series editors of LNM require that "The contributions should be of high standards 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 resumes 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."

It is planned to use a computer to help produce a neat and homogenous format throughout the volume and to provide an index. More details will appear in the third notice.

ACCOMMODATION:

On campus accommodation has been reserved. This consists of single bed/study rooms clustered five per toilet/shower room and fifteen per lounge/kitchen. The cost is \$25 per day and except for lunch on excursion day includes all meals, including the special Conference Dinner, commencing with tea on Sunday 24 August 1980 and finishing with lunch on Friday 29 August 1980. If you want to book this accommodation please indicate on the reply form and return it by 30 June 1980 with \$10 per person (payable to C.M.S.A.).

Off campus accommodation is available at nearby motels. The three closest (all on Princes Highway distance 1,2,3 km respectively from campus) are Waurin Ponds Hotel-Motel (052) 431244, Kiloran Motel (052) 436333, Southern Comforte Motel (052) 430122. Approximate tariffs in each case are \$17 single and \$23 twin/double excluding meals. If you want to book this accommodation please contact the Motel direct.

SOCIAL PROGRAMME:

The Conference Dinner will be on Thursday evening 28 August 1980. This will be a special four course meal and include drinks. There is no extra charge for participants in campus accommodation. The charge for others is \$15 per person. In either case please indicate on the reply form if you wish to attend the Conference Dinner and whether you will be accompanied by any non-confererees.

A Games Night will be organised. Local enthusiasts will arrange a Bridge competition if there is the demand. Chess, Go, and other games will also be arranged. It is hoped the games file will be available on the DEC20 computer. Please indicate the nature and degree of your addiction on the reply form.

A half-day excursion will be organised. This will include a memorable lunch and probably be to historical Queenscliffe (near Port Phillip Bay entrance) by bus or boat! The cost is not expected to exceed \$10 per person.

Sports facilities on campus include squash courts, tennis courts, playing fields, table tennis, billiards. It is hoped to arrange bicycles for hire.

REGISTRATION:

Registration fees are payable at the conference and will be \$27 for those in full time employment and \$12 otherwise. There will be \$2 reduction in both cases for members of C.M.S.A..

TRAVEL:

Geelong is approximately 80 km south west of Melbourne. It is planned to use (free) Deakin mini buses to transport participants between Melbourne Airport and Deakin University. To help with the arrangements, participants travelling by air are asked, where possible, to book their flights to arrive at Melbourne Airport before 1700 hours on Sunday 24 August 1980 and leave Melbourne Airport after 1600 hours on Friday 29 August 1980.

NEXT NOTICE:

The third notice with more information will appear in *Combinatorics* Vol. 2 No. 2, in July, and will be sent to all non-subscribers who have asked for it.

K.L. MCAVANEY, Director C.M.S.A.  
Division of Computing and Mathematics, Deakin University, Victoria 3217,  
Australia. Phone (052) 471382.

# Eighth Australian Conference on Combinatorial Mathematics

## Reply Form

Please circle the appropriate answers. Return this form to K.L. McAvaney, Division of Computing and Mathematics, Deakin University, Victoria 3217, Australia, by 30 June 1980.

1. I expect to attend: YES / NO
2. I want to present a 30 minute paper: YES / NO

Title: \_\_\_\_\_  
 \_\_\_\_\_

Please attach a typed abstract.

3. I want to attend the Conference Dinner: YES / NO  
 Accompanied by \_\_\_\_\_ non-conferees.

4. I want to attend the Games Night: YES / NO  
 Game: \_\_\_\_\_ Grade: Poor/Fair/Good

5. I want to attend the excursion: YES / NO

6. I want Deakin transport from Melbourne Airport to Deakin University: YES / NO

Airline: \_\_\_\_\_ Flight Number \_\_\_\_\_

Expected time of arrival in Melbourne \_\_\_\_\_

7. I want to book the on campus accommodation: YES / NO

On nights: Sunday 24 August, Monday 25 August 1980, Tuesday 26 August 1980, Wednesday 27 August 1980, Thursday 28 August 1980, and

Number of persons: \_\_\_\_\_ .

I enclose \$ \_\_\_\_\_ on campus accommodation deposit (payable to C.M.S.A.).

NAME \_\_\_\_\_

ADDRESS FOR NOTICES \_\_\_\_\_  
 \_\_\_\_\_

PHONE NUMBER \_\_\_\_\_