THE NEW ZEALAND
MATHEMATICAL SOCIETY (INC.)

NEWSLETTER

CONTENTS

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PUBLISHER'S NOTICE

The Newsletter is the official organ of the New Zealand Mathematical Society Inc. This issue was assembled at the University of Auckland and printed by the University of Auckland Uniprint. The official address of the Society is:

The New Zealand Mathematical Society,
c/o The Royal Society of New Zealand,
Private Bag, Wellington, New Zealand.

However, correspondence should normally be sent directly to the Secretary:

Dr DR Breach,
Department of Mathematics,
University of Canterbury, Christchurch, New Zealand.

NZMS COUNCIL AND OFFICERS

ANNUAL GENERAL MEETING

The Annual General Meeting of the NZMS will be held at the Australian National University, Canberra, Australia during the 1988 Mathematical Sciences Congress, 16-20 May, 1988.

The following nominations have been received for positions on the next Council. Each is accompanied by a brief biographical sketch of the nominee.

Council Member

Dr Marston DE Conder, University of Auckland.
M.Soc.Sc.(Waikato), M.Sc., D.Phil.(Oxon)

Marston Conder studied at the University of Waikato 1973-77, obtained his doctorate at Oxford in 1980, was a post-doctoral fellow at Otago in 1981 and then a Royal Society research fellow at Tübingen (West Germany) in 1982, before being appointed at Auckland, where he is now a Senior Lecturer. In 1984 he spent

the academic year at Victoria University (on exchange with Rob Goldblatt). Marston's research interests are in group theory and combinatorics. He has served on the NZMS Council (1985-1988), including eighteen months as Secretary (1985-1986).

Proposer: Ivan Reilly. Seconder: David Gauld.

Incoming Vice President

Dr Gillian M Thornley, Massey University.
M.Sc. (Hons) Canterbury 1963, Ph.D. Toronto 1965.

Lecturer in Mathematics at Canterbury (1966-67) and at the University of the West Indies (1968-69). Produced children in 1970 and 1971 and worked part-time in Polytechnics, Teachers' College, Victoria University of Wellington and the Ministry of Energy before returning to a full-time position at Wellington Polytechnic in 1978 and Massey University in 1980. Present position is Senior Lecturer and Chairperson of the Mathematics Section of the Department of Mathematics and Statistics. Research interests in differential geometry. Served on NZMS Council 1978-80 and 1986-88, as Secretary in 1980-81 and currently Convenor of the Publications Committee and NZMS coordinator for overseas visitors.

Proposer: Ivan Reilly. Seconder: David Gauld.

NOTICES

CALL FOR PAPERS

Operational Research Society of New Zealand, 24th Annual Conference.

Date: Thursday and Friday **18-19 August, 1988.**

Venue: Auckland University.

Papers: Papers are invited on all aspects of the theory and practice of Operations Research. Each paper will be allocated about thirty minutes. Please submit abstracts, before **30th April**, to

ORSNZ Conference Secretary,
TAM Department,
University of Auckland,
Private Bag, Auckland.

We intend to publish papers in summary form (approximately four pages) prior to the conference. Summary papers will be required by **3rd June**; further details on the format will be sent to authors in May.

Students: Student papers are especially welcome. Student travel grants may be available—for details, contact the Conference Organisers.

Registration: Registration forms will be available from the Conference Organisers and will be sent to members in due course.

Enquiries to: Julie Falkner (09) 737-999 x 8387.
Andy Philpott (09) 737-999 x 8394.

CALL FOR PAPERS

Fourth International Meeting on Statistical Climatology, 27-31 March, 1989.

41MSC, organised and hosted by the New Zealand Meteorological Service, will be held in the week following Easter at the Quality Inn, Rotorua. The meeting is also sponsored by the World Meteorological Organisation, the NZ Statistical Association, the NZ Meteorological Society, the American Meteorological Society, Air New Zealand and Canadian Airlines International. The official language of the meeting is English.

41MSC is under the general guidance of an international Steering Committee chaired by Profesor Allan Murphy, Department of Atmospheric Sciences, Oregon State University, Corvallis, Oregon 97331, USA.

Invited speakers include LS Gandin, RE Livezey, MR Leadbetter, K Hasselman, WS Cleveland, H van Loon and PD Jones. These will give lead papers in sessions on

Quality control and spatial variability,
Multivariate analysis,
Univariate models,
Non-linear analysis,
Computer graphics and statistical software,
Detecting shifts, trends and periodicities,
Sources of climate information.

Final date for submission of abstracts is **31 July, 1988**. Contributors will be notified by 31 October, 1988 of the acceptance, reserve status or non-acceptance of their papers in the programme.

Requests for further information and other enquiries should be addressed to

Dr John Revfeim, Convenor Organizing Committee 41MSC,
PO Box 722,
Wellington, New Zealand.

COMBINATORIAL MATHEMATICS

The **Fifteenth Australasian Conference on Combinatorial Mathematics and Computing** will be held at the Universtiy of Queensland, Brisbane, Queensland, from **10-14 July, 1989**. All interested persons are cordially invited to attend. Contributed papers are welcome in all areas of combinatorics and combinatorial computing, pure and applied. Invited speakers are being arranged. Accommodation on campus at the University of Queensland will be available.

Those who are not memers of CMSA but are interested in attending the conference please write to:

Professor Anne Penfold Street,
Director, CMSA,
Department of Mathematics,
University of Queensland,
St Lucia, Queensland 4067,
Australia.

The Combinatorial Mathematics Society of Australasia was formed in 1978 to promote combinatorial mathematics. It disseminates information about combinatorics and combinatoricists through its newsletter *Combinatorics*, and it conducts an annual conference with refereed published proceedings. There are currently about 120 members from all over the world. Any interested person is invited to join the CMSA. Annual subscription for 1988 is A$5, payable to CMSA. Members receive the newsletter and a reduction in the conference registration fee. Please adddress all enquiries, giving your full name and address, to Professor Street at the above address.

1989 NEW ZEALAND MATHEMATICS COLLOQUIUM

Preliminary arrangements are being made for the Colloquium in 1989 which is to be organised (off-campus) by the Department of Mathematics and Statistics, Massey University, Palmerston North. In 1987 it was agreed at the Colloquium meeting that an off-campus venue is acceptable, and the Palmerston North Teachers' College facilities have been reserved.

The dates for the Colloquium are Monday to Wednesday, **15-17 May, 1989**. Departments and individuals who are aware of possible suitable invited speakers are encouraged to inform us of this as soon as possible so that we can proceed. Especially welcome will be information on potential speakers who will be in our region around this time of year. So far we have knowledge of Professor Saunders MacLane (visiting Otago in 1989), but we understand that the 1989 Forder Lecturer (Professor Sir Michael Atiyah) will miss the Colloquium, expecting to travel through the country during February and March.

We look forward to seeing you in Palmerston North in 1989.

Graeme Wake and Mike Hendy, Massey University.

NONLINEARITY: A New Journal.

In the London Mathematical Society Newsletter Professor EC Zeeman, the President, writes:

The launching of our new journal *Nonlinearity* is part of a broader long-term strategy for the Society.

During the last forty years there has been a divergence between pure and applied mathematics, perhaps more noticeable in this country than elsewhere, but now the pendulum is beginning to swing back. By the turn of the century I foresee a growing movement of interaction and mutual enrichment. Examples of this movement can already be seen in the current SERC initiatives on nonlinear systems and stochastic analysis, and in the increasing cross-fertilisation between theoretical physics and differential geometry and topology. Whereas classical applied mathematics has traditionally used tools that were originally forged in the 19th century, the new branches of applied mathematics are looking to the 21st century to provide the tools that they will need. We are standing on the threshold of a rare opportunity, and it is only right and proper that the London Mathematical Society, as the leading mathematical society in the country, should participate in this exciting future evolution of applied mathematics. Indeed in the past our Society has played just as much a leading role in applied mathematics as in pure mathematics, as can be seen for instance from the list of past presidents including Kelvin, Lamb, Larmor, Rayleigh and Whittaker; and no doubt it will continue to play a leading role in the future.

The heart of any mathematical society is its journals, and at present our three main journals (the *Journal*, the *Proceedings* and the *Bulletin*) specialise mostly in pure mathematics. And since there is no shortage of high calibre papers being submitted to those journals, Council did not wish to disturb that very satisfactory equilibrium. Therefore the logical development was to launch a new journal in applied mathematics. Council planned for it to be a broadly based, international journal, as Professor Brannan has pointed out in the November Newsletter. Also I am pleased to announce that two distinguished Russian mathematicians have now agreed to join the Editorial Board: Professor Y. Sinai and Professor Ju. I. Manin.

The name "Nonlinearity" was suggested by Professor Michael Berry, and I think it is a splendid name, embracing all those subtle and difficult techniques that have been developed in so many branches of mathematics in order to extend our knowledge from the simple local linear case to the much richer global nonlinear case.

The launching of a new journal is not without serious consideration for the current plight of libraries, who are finding it difficult to maintain subscriptions to existing journals, let alone take on new journals. The Council were influenced, however, by the fact that had the London Mathematical Society not been willing to collaborate in launching the journal, then the Institute of Physics would have launched it alone, and if neither of us had been willing, then at least two commercial companies were waiting in the wings to launch a similar journal and snap up that corner of the market; in which case the journal could well have been much more expensive for our libraries.

As it is, by collaborating with the IOP, we have been able to recruit a far stronger Editorial Board than we might otherwise have been able, and I venture to suggest that we shall be able to attract more distinguished papers in both mathematics and physics. Moreover we have at the same time been able to make the journal

available to our own members relatively cheaply. The annual cost will normally be £110, but to members of the London Mathematical Society only £10 (to overseas members £13.50 or US$23.50); meanwhile membership of the Society costs only £6 (or US$12), and reciprocity membership costs only £3 (or US$6). Thus, although libraries are financially hard-pressed, at least we are making these exciting new developments in mathematics and physics available relatively inexpensively to members of the Society.

As Professor Brannan mentioned in his announcement, all members will be receiving a complimentary copy of the first issue. Please bring this to the attention of your colleagues in applied mathematics, and encourage them to join the Society if they are interested. Meanwhile may I encourage you to consider sending your own best papers in nonlinear mathematics to the new journal?

E C Zeeman

To order, write to

The Treasurer
London Mathematical Society
Burlington House
Piccadilly
London W1V ONL
United Kingdom

ANALYSIS AND TOPOLOGY

It is proposed to hold a **Mid-Winter Conference on Analysis and Topology** on **August 5 - 6, 1988** at the University of Auckland, Department of Mathematics and Statistics.

The main speakers will be Professors Mary Ellen and Walter Rudin, of University of Wisconsin, Madison. Their visit to Auckland during July and August is supported by the University of Auckland Foundation.

There will be sessions for contributed papers on any aspect of Analysis and Topology. Please send an Abstract of your talk by 15 July 1988 to the undersigned.

The organizers will try to arrange accommodation for participants who desire it.

For further information, and to be included in a mailing list for future notices, please write as soon as possible to

Ivan L. Reilly,
Department of Mathematics and Statistics,
University of Auckland,
Private Bag,
Auckland.

CENTREFOLD COMMENTS

B. H. Neumann writes: In the centrefold, on Prof Zulauf [NZMS Newlsetter **40**, August 1987], I find that his supervisor in Mainz was "**H. H. Rohrbach**". I believe the middle name of Hans Rohrbach is Wolfgang—his middle initial is certainly W. Also he was NOT a disciple of Edmund Landau, but of Issai Schur, under whom he completed his Dr.Phil. degree in 1931, and whose assistant he was until the Nazis dismissed Issai Schur. Hans Rohrbach moved from Berlin to Göttingen in 1936, by which time Edmund Landau had also already been dismissed by the Nazis.

Prof. Zulauf comments in reply: He always called himself "Hans Rohrbach". If he had a middle name, I don't think he ever used it in the literature. B. H. Neumann and H. Rohrbach were indeed both pupils of Issai Schur in Berlin. I was under the impression, perhaps mistakenly, that Rohrbach also attended lectures by Landau, but that may have been in the mid-30's when Rohrbach already had his doctorate. I believe (and again I may be wrong) that Landau, Schur, Neumann and Rohrbach were all together in the same place (Zürich?) for a while, but it may bave been just a visit or conference or some such.

GJ Tee (Computer Science Department, University of Auckland) writes: When I heard that some uncertainty had been expressed about the name of Hans Rohrbach, I consulted the standard reference work: Johann Christian Poggendorf (et alia), *Biographischliterarisches Handwörterbuch zur Geschichte der exacten Naturwissenschaften*. That series of volumes has been published since 1863, and it is one of the most useful sources for information about scientists working in mathematics, physics, astronomy etc; from antiquity to the present. In each set of volumes the scientists are listed in alphabetical order, with brief biographical details and a list of publications.

Volume 7 has a listing for Rohrbach (born 1903), giving his name as **Hans Joachim Albert Rohrbach**.

LOCAL NEWS

DSIR

AMD, Mt. Albert

Sue Camell started work as an industrial operational research consultant at the end of January. She had been working with Fletcher Steel for the previous year. Jocelyn Dale returned at the beginning of January to work on a half-time basis as an industrial statistician. Thomas Yee started with us on a half-time basis in mid-February, just before the last of our three vacation students returned to University study. He will assist with consulting work for other Mount Albert Research Centre divisions. Chris Triggs, Jocelyn and Thomas will all be giving courses of lectures at university this year.

John and Mary Nash are with us as visitors until mid-May. Mary's speciality is bibliographic database techniques. John is from the Faculty of Administration at the University of Ottawa. He is author of a recent Dekker book *Non-linear Parameter Estimation*. One of his tasks while here is to prepare a second edition of his earlier book *Compact Numerical Methods for Computers*. He has been concerned to provide software that can be used widely on microcomputers, and as a result he has written much of his code in BASIC. He was a contributing editor (scientific computing) for *Byte* during 1984-6, and he has been a chairman of the Canadian Standards Association working group on BASIC.

JH Maindonald

UNIVERSITY OF AUCKLAND

Computer Science

By the end of the first week of the academic year, 532 students had enrolled for Introduction to Programming (first half of the year) and 556 for Introduction to Computer Science (second half of the year), with 300 students taking the service course Elements of Computing. In 1987 our laboratories and lecture theatres were crammed full, with the corresponding numbers for Stage 1 students being 400, 422, and 230 respectively. Over all courses, the number of Effective Full-Time Students has increased 11 percent, from 339.18 to 375.26. No further students are being accepted for Stage 1 papers after the enrolment week.

Peter Gibbons is the Acting Head of Department while Bob Doran is on leave for 1988 in the USA and France. Alan Creak is on leave at the Department of Cybernetics, University of Reading.

Peter Fenwick has returned from leave at the Physical Sciences Laboratory of the University of Wisconsin, Madison, where he tested the performance of the very high-speed Ethernet link into the main Madison campus (39 km distance).

Bruce Hutton has returned from leave at the University of Kent at Canterbury, where he worked on design of extensible programming languages.

Barbara Reilly has returned from leave at the University of California Davis, where she taught a data structures course. She attended several conferences dealing with the role of women in science.

Professor Mark Lee, from the University College of Wales, Aberystwyth, is here on leave for the first two terms of 1988, teaching a Stage Four course on intelligent robotics.

John Hosking has been appointed as Chairman of the NZ North section of the Institute of Electrical and Electronics Engineers, and he attended the IEEE World Sections Congress at Anaheim, California in October 1987. He is also the IEEE representative on the Auckland Committee of the Institute of Professional Engineers of NZ Electrotechnical Group and editor of their newsletter, and he is a member of the committee for the Expert Systems Special Interest Group of the NZ Computer Society.

During the sumnmer vacation John Butcher furthered his work on numerical solution of ordinary differential equations, visiting the University of Wolfville (Acadia, Nova Scotia), University of Toronto and University of Illinois, Urbana.

The first event of British celebrations of the Australian Bicentennial was the Conference on Anglo-Australian Science 1788-1988, held at the Royal Institution in London on January 7-8. Garry Tee gave an invited lecture there on "Mathematics in the Pacific Basin". He then attended the 1988 Summer Research Institute of the Australian Mathematical Society at the University of Newcastle, where the speakers included Profesor Paul Erdös, Professor Claude Berge, Dr Henry Pollack and Dr Ron Graham.

Seminars:

Dr Christopher Senft (Technical University of Vienna), "A computer-aided design environment for distributed realtime systems".

Dr Herber Groiss (Technical University of Vienna), "Multi-level reasoning in an expert system for fault diagnosis".

Dr Michael Schrift (Technical University of Vienna), "Object class definition by generalization using upward inheritance".

Dr Luis Penedo (IBM Portugal) "Basics of fractal geometry".

Dr Jack Rosenfeld (IBM Thomas J Watson Research Laboratories) "Research at the IBM Thomas J Watson Research Laboratories".

GJ Tee

Mathematics and Statistics

Shaun Cooper and Thomas Yee, graduates of this Department, have been appointed half-time assistant lecturers. Dr M Conder has been appointed to the Departmental Committee, Professor M Kallaher of Washington State University is visiting the Department until June. Ivan Reilly and David Smith both arrived back from USA in January after having spent 1987 on leave there. Functional analysis seminars introduced by Dr BD Calvert are being held weekly within the Department.

Seminars:

Dr H Abdel-Aty, (University of South Pacific), "Developments in latent class models for analysing time changes in attitude and behaviour."

Dr Jock Mackay (University of Waterloo), "How we encourage high school students to study maths."

Professor PCB Phillips (Yale University), "Fractional operators and multivariate tests."

Ms Sharleen Forbes (Wallaceville Research Centre, MAF), "Mathematics and/or statistics—a female perspective."

IL Reilly, E Douglas

Theoretical and Applied Mechanics

As predicted in my last letter, Roger Nokes has arrived to take up his lectureship. Sue Byrne has been promoted to Senior Lecturer. Bruce Murtagh, from UNSW (who will be remembered by the NZ OR fraternity) is visiting us from 1 April to 31 October to work with David Ryan. Our former research fellow, George Zyvoloski, has returned to make a quick visit to his geothermal colleagues.

DA Nield

UNIVERSITY OF CANTERBURY

Electrical and Electronics Engineering

Two of my research students have just departed having submitted rather mathematical Ph.D. theses: "Blind Deconvolution and Phase Retrieval" by Richard G. Lane (Post-doctoral Fellow in EEE Department, University of Adelaide) and "Implementable Multi-dimensional Inverse Scattering Theory" by David G. H. Tan (still only 20 years old, Lecturer and Fellow of Churchill College, Cambridge, and Research Associate, Department of Applied Mathematics and Theoretical Physics).

RHT Bates

Mathematics

This year we welcome three new members of staff. David Glynn comes from the Applied Mathematics and Computing Division of the Australian Nuclear Science Technical Organisation in New South Wales, and he is interested in geometry and combinatorics. Frank Lad is from the Department of Statistics at Purdue University, U.S.A. and he studies the subjective theory of probabilities. Mark Hickman will join us this month from the Department of Physics and Astronomy at the University of Pittsburg, and his area of research is relativity. Bill Barit left us during the summer but Bill Baritompa has proved to be a more than adequate replacement.

Professor Ian Percival is visiting us as an Erskine Fellow during March and April. He hails from Queen Mary College, London, and is interested in dynamics, nonlinear systems and chaos in Hamiltonian systems. During his stay he is giving a course on dynamical systems which forms part of our fourth year honours course.

David Wall has gone on sabbatical leave. He is visiting the Centre for Mathematical Analysis in Canberra at the moment, and he plans to move on to Ohio after that. Peter Waylen will go on leave next month and he hopes to spend time in Cambridge (England), Waterloo (Canada) and Austin (Texas).

Last year's experiment in tutorials has been expanded so that all our courses now have weekly or bi-weekly tutorials as an integral part of the course. In several cases this has gone hand in hand with the introduction of computer packages. Perhaps the biggest achievement was the initiation of 800 first year statistics students into the mysteries of Minitab, all in one week. Such is our dedication that we even sacrificed our tea-room and it has been converted into two tutorial rooms.

We have also been expanding our computing facilities in the department. Our main computer, the Sun 3/160 with fileserver and 16 ports, is being connected to two Sun 3/60's and 4 Sun 3/50's and will eventually be served by about one gigabyte of disk space (some of it locally assembled). Software is also being updated and the Sun system now has Emacs, Publisher, Macsyma, Maple, Reduce and S up and running. Finally a new printer has started the Postscript revolution.

J Hannah

MASSSEY UNIVERSITY

Mathematics and Statistics

As this is being written, term has just begun, and class rolls seem to be well up in many of our papers, notably the mainstream first year calculus and statistics papers. Very good for departmental morale—so I guess we do not mind having to cope with the consequent hassles of overfilled rooms, underestimated print runs and the like.

Our postdoctoral fellows have all now managed to navigate through the minefield of immigration formalities and reach us in one piece. The most recent arrival was Monwar Hossain (from Bangladesh via a Queensland Ph.D. in Chemical Engineering). He is working jointly with the biotechnologists on the modelling of freezing and thawing of irregularly-shaped foods.

Wayne Burrows, Shirley Dixon, Gerard Palmer and Mike Steel have been appointed as Junior Lecturers for 1988, and Robert Crawford, John Koolard and Marijcke Vlieg as Graduate Assistants.

The summer saw something of an exodus (luckily temporary) to Australia. John Giffin, Hugh Morton, Ingrid Rinsma, Adrian Swift and Graeme Wake were all lured across the Tasman by such attractions as the SRI, the Applied Maths Conference, the Maths-in-Industry Study Group and (in Hugh's case) the Cumberland College of Health Sciences. Back home, seminar activity quietened down a bit, but there were a few.

Seminars:

John Bibby (Edinburgh), "What can the history of teaching statistics tell us about part-time students and distance education?"

Paul Hutchinson (Adelaide), "Some loose ends from my book on 'Road Accident Statistics'."

Ann-Lee Wang (Malaya), "Some gambling games of Malaysia."

Alan Andrew (La Trobe), "Computation of the higher eigenvalues for Sturm-Liouville problems."

MR Carter

OTAGO UNIVERSITY

Mathematics and Statistics

Professor Vernon Squire is to be awarded the Polar Medal by her Majesty the Queen in recognition of his outstanding service as a member of various polar expeditions from 1976 to 1986. Further information relating to his work is to be found on page 12 of this Newsletter.

Mr Russell A Dear (HOD Mathematics at Southland Boys' High School) is the 1988 Otago University Teaching Fellow. Russell has a distinguished record in Mathematics Education. For example, he is Past-President of the Southland Mathematical Association and Editor of *Mathsmatters* (a magazine for the NZ Mathematics Teachers), he has been a Mathematics Advisor to the Education Department as well as a resource-person at numerous in-service courses from Invercargill to Auckland, he was a contributor to the Teaching Statistics session at ICME 5 and is a Woolf-Fisher Fellow for 1988. As the Otago Teaching Fellow, Russell is working on problem solving in the senior school, extending the more able student at all levels, and various ways of approaching mathematics through its applications.

Professor Mel Nyman (Chairman since 1981 of the Department of Mathematics and Computer Science at Alma College in Alma, Michigan, USA) is spending his February-August sabbatical leave as a visitor in our Department. He is lecturing in both probability and statistics and plans to do joint work with Dr Murray Brown of our Botany Department on mathematical modelling for growth and development of giant kelp, *Macrocystis*.

Professor Vernon Squire presented a paper in February at the International Glacialogical Society's

symposium on ice dynamics in Hobart. He is a member of the editorial committee and council of IGS.

Dr Malcolm Faddy visited the USA in February in order to present a paper at the symposium on Estimation and Analysis of Insect Populations, held at the University of Wyoming in Laramie. He also gave talks at the University of California at Santa Barbara, the Naval Postgraduate School in Monterey, and Texas A and M University.

Dr REL (Tank) Aldred (our Beverly Research Fellow) presented a paper in February at the Southeastern International Conference on Combinatorics, Graph Theory and Computing in Baton Rouge, Louisiana. He also gave talks at Vanderbilt University, Nashville; Southern Illinois University at Carbondale; West Virginia University at Morgantown; and he visited the University of Waterloo, Canada.

John Rayner (of our Department) and John Best (CSIRO) have recently completed a monograph of their research. It is entilted *Smooth Tests of Goodness of Fit*, and will be published by Oxford University Press.

Dingjun Lou (from China) is our newest Ph.D. student. He is studying Graph Theory under Professor Derek Holton.

This year, Janet Levy and Ross Brown are sharing an Assistant Lectureship.

Seminars:

Professor Rob Goldblatt (VUW), "Orthogonality as a primitive in affine geometry".

Professor LR Foulds (Waikato), "Towards a new decision support system of facilities layout".

Dr Rod Downey (VUW), "Reverse mathematics, unprovable theorems, and Harvey Friedman's program".

G Olive

VICTORIA UNIVERSITY OF WELLINGTON

Mathematics

Congratulations to Philip Rhodes-Robinson for his Fulbright Travel Award for his sabbatical to Stanford later this year.

Congratulations also to Terence Nonweiler for his Visiting Fellowship of Wolfson College during his current sabbatical in Cambridge, UK.

Thora Blithe and Jim Ansell are Presidents of the VUW Associations of Women Academics and University Teachers respectively.

Jim Ansell has also been involved with David Vere-Jones and Helen Anderson (Geophysics Division, DSIR) in running an Italy and NZ Workshop on Comparative Earthquake Risk on 15-16 March. Those attending were three Italians, two Americans, one British and about twenty from NZ.

Megan Clark and Peter Donelan are soon to go on sabbatical to Southampton.

Chris Atkin is currently away on a term's leave at the University of Indiana.

Mike Dollinger (Pacific Lutheran University, Washington State) is currently here on sabbatical. As this goes to press he is preparing his seminar on the average case behaviour of continuous algorithms.

Dan McKenzie (Earth Sciences, Cambridge) gave us an intriguing seminar on space groups and bifurcation theory while visiting Wellington as the 1988 Royal Society Rutherford Lecturer.

JF Harper

UNIVERSITY OF WAIKATO

Mathematics

The Waikato scribe was on leave during term III last year, accounting for the vacant slot in the last issue of the Newsletter. The department is moving into a time of significant change: the departure of a colleague, new arrivals, new academic programmes and a very significant increase in our student enrolment.

Professor Hosking announced towards the end of last year that he had accepted the Chair of Mathematics at James Cook University in Queensland. We regret that Waikato and NZ will be losing Roger after over seventeen years in the department. His position will be advertised soon with applicants being sought from people working in any of the mathematical sciences. A large number of 'baby boom' mathematicians are expected to apply! Information can be obtained from the Registrar at Waikato.

A meeting is being planned for the early 1990's for the Applied Mathematics Division of the Australian Mathematical Society to be held somewhere in the South Island. This is a follow up to the successful meeting held at Wairakei in February last year.

Alfred Sneyd is heading off to places north on leave from May until the end of the year. He will attend first an IUTAM meeting in Riga (Latvia) on Metallurgic Applications of MHD in May. Most of the rest of his leave will be spent working in the Department of Applied Mathematics and Theoretical Physics at Cambridge University.

Kevin Broughan spent the third term on leave working on symbolic language and symbolic-numeric interface development at Waikato and then visited colleagues and presented seminars at Berkeley, Sun Microsystems, DEC Western Research Labs and Franz Inc, all in California.

John Turner, as well as mothering the new School of Computing and Mathematical Sciences into infancy, fostered a positive working relationship with George Shaake of Waikato Polytechnic. George, in eight years, has developed a new process for braid construction using continued fractions and diophantine equations. Numerous booklets and research reports are to be published—a fortuitous connection indeed with John's own work in knot theory (which is continuing to thrive).

Mark Schroder, after performing herculean work on the university time-table, escaped to Mannheim in West Germany for a well-earned sabbatical year. His contribution to the Newsletter is gratefully acknowledged.

Terry Robb, who has been working as a research assistant with the Mathemaical Software Project, was appointed to a one year position in the department commencing January this year. He is teaching calculus and mathematical physics courses and continuing with his string theory research.

Peter Danaher, an ex Auckland applied statistician was appointed to a position in the department which he will be taking up in July. He comes to us from a position at University College Dublin.

The degree program for the school of Computing and Mathematical Sciences was approved by the Curriculum Committee in September, and the commencement of teaching was approved by the University Council on 11 November. The School opened its doors to 98 initial enrolees at the end of February. A full array of academic and social activities is planned, including a personal tutor system for each student, a ComMath society and a school T- shirt emblazoned with the 8 sub 18 knot. Course enrolments in the department are up by almost 20% and our facilities are stretched more than ever before.

KA Broughan

HONOURS

Helen Wily

The Society congratulates Mrs Helen Mary Wily of Christchurch who has been awarded the Queen's Service Medal in the New Year's Honours list, 1988. Mrs Wily was a teacher of mathematics at Rangi Ruru Girls School, 1955-71, Senior Lecturer (Mathematics) at Christchurch Teachers College, 1971-81, and life member of the Canterbury Mathematical Association.

Vernon Squire

The Society congratulates Dr Vernon Squire of Otago University who has been awarded a Polar medal. The award recognises 10 years of polar research up to 1986 first as a young honours graduate from the University of Wales, and later as a staff member of the Scott Polar Research Institute at Cambridge.

Dr Squire has specialised in the study of sea ice and, as a mathematician, is interested in the characteristics of waves reflected from ice edges. He started in his field of work in 1976 with eight weeks on the

Labrador coast in mid-winter. It was hazardous work with storms breaking up the ice, and on one occasion his instruments were carried away on an ice floe.

Since then Dr Squire has worked in a submarine under the ice and been on expeditions around the Newfoundland and Greenland coasts and in the Bering Sea. He has also studied icebergs in Antarctica, worked with the DSIR near Scott Base studying sea ice loads, and been on a ship which made the first passage through the winter pack ice in the Weddell Sea.

A member of both the Arctic and Antarctic Clubs and of a number of learned societies, Dr Squire joined the Otago University staff last year.

(Information taken from *Otago Daily Times*, March 7, 1988)

Peter Whittle

Professor Peter Whittle was awarded the degree of Doctor of Science at Victoria University of Wellington on 8 July, 1987. The following is taken from the texts of the Citation of Peter Whittle and his Reply to the Citation. [Readers may recall that Professor Whittle was the subject of a Centrefold article in NZMS Newsletter **22**, December 1981.]

The Citation

Peter Whittle was dux of Wellington College in 1945, entered Victoria College with a junior scholarship the following year, and graduated M.Sc. with first class honours in Mathematics in 1949. With characteristic independence, he did not follow the traditional route of science graduates to the United Kingdom and to Cambridge, but chose to join a major continental school of graduate study, that of the University of Uppsala in Sweden, then a recognized centre for the application of modern mathematical analysis to practical problems of time series analysis and forecasting. In fact the work that Peter Whittle developed in Sweden has been described as the foundation stone of the theory of inference for time series.

After defending his thesis (in Swedish) in Uppsala in 1951 he worked for a futher two years as a Docent in the Institute of Statistics at the University of Uppsala, but then returned to the Applied Mathematics Laboratory of the New Zealand Department of Scientific and Industrial Research, where he had been a vacation worker for some years previously. Far from being frustrated by the remoteness of this institution from the main centres of European mathematics, he found in the direct contact with the immediate practical problems of DSIR scientists a source of major mathematical themes, which he continued to develop during his distinguished career in the United Kingdom. From the record of a tidal pool at Island Bay came fundamental ideas on the spectral analysis of time series; from the study of rabbit populations came a new theorem on stochastic epidemics as well as a continued interest in non-linear problems; from studies of crop fertility came new models for spatial processes and new ideas for their analysis; from a local problem on the coagulation of anitbodies came a lasting interest in the mathematics of phase transitions, with quite unexpected links to networks of queues and computer networks. These and other problems which he worked on in New Zealand led to early papers, modest in format, but marked by an originality and seminal importance that have only recently come to be truly appreciated.

He left Wellington again in 1959 to take a post at the Statistical Laboratory in Cambridge, later succeeding Sir Maurice Bartlett as Professor of Mathematical Statistics at another Victoria University, in Manchester. In 1967, in line with his growing interest in optimization and control theory, he was appointed to the Churchill Chair of the Mathematics of Operations Research at the University of Cambridge, and was elected a Fellow of Churchill College. Since 1973 he has been director of the Cambridge Statistical Laboratory.

The fruits of this long period of distinguished teaching and research are five research monographs and over 100 research papers. During his career Peter Whittle has been awarded many honours, including the Research Medal of the New Zealand Association of Scientists, the Guy Medal in Silver of the Royal Statistical Society, Membership of the International Statistical Institute, Honorary Membership of the Royal Society of New Zealand and Fellowship of the Royal Society.

GH Hardy, perhaps the most famous of the Cambridge Pure Mathematicians, described a mathematician as "a poet of ideas". In less flamboyant language Peter Whittle himself has described the key activity of the applied mathematician in this way: "Solving a problem is like going to a strange place, not to subdue it, but simply to spend time there, to preserve one's openness, to wait for the signals, to wait for the strangeness to dissolve into sense."

While few of us may be privileged to follow Peter Whittle to these strange places, all of us can be glad

that he is once again spending time in Wellington, and can take pleasure in recognizing his outstanding imaginative achievements, the contributions he has made to science in New Zealand and overseas, and the inspiration and help he has provided to many of our students.

Peter Whittle's Reply

The University's award leaves me both honoured and moved: Honoured, because Victoria is a fine university, which I know does not confer these distinctions lightly. Moved, because Victoria is my own university, my first university, where I completed my first degree just forty years ago.

These forty years have seen a great change in Victoria, of which the greatly expanded campus is only the most visible sign. Research, before pursued effectively by only a few individuals, is now well established and flourishing. Staff levels, although doubtless universally considered inadequate, are on another scale than formerly.

New Zealand science has flourished generally, both inside and outside the universities. The world lead in the agricultural sciences is maintained, and New Zealand shows particular strength in other areas: geophysics, for example.

By the processes that we know, many New Zealand scientists find themselves abroad, although it is evident from tonight's gathering that the distribution of distinction between the home and away groups is fairly even. Whether at home or abroad, New Zealand science tends to exemplify the national virtues: individualism, ingenuity, versatility and self-reliance.

However, I would like to pose the question: Are these virtues the right ones for the world as it is becoming? The right ones, that is, either for our scientists or for the population at large? In posing this question I speak, not as a mathematician, but simply as an expatriate New Zealander of no particular qualification. The question has educational implications. Education has many aims, but one of these must surely be the securing of the country's viability, of the technological/productive base which enables the country to make its way.

In making its way, New Zealand, in common with larger countries, faces withering competition. It is required to survive in a world of specialists; a world in which there are people prepared to take infinite pains, even for apparently materialistic ends, a world in which a country as advanced as New Zealand could find itself with almost as technologically passive a role as much more backward countries; a world in which the notion of 'playing at one's work and working at one's play' is incomprehensible to those not in the habit of playing.

May I then reformulate my question: Is it possible to survive in such a world without becoming of that world—that is, without becoming an ant-society?

I certainly think a greater earnestness is called for. Not the earnestness of an ant-community, but rather the earnestness of the Scottish forebears which, I can say with statistical certainty, many of you have. The Scots regarded education as the greatest privilege—an opportunity which, grasped energetically, could lead the poorest country boy (and 'boy' it generally was in those days) to a position in which he could find the fullest exercise of his talents.

I also think that a greater earnestness is called for, a discernment which used to be regarded as a New Zealand characteristic. I refer to the simple ability to distinguish between sense and nonsense; the ability to distinguish the hard bones of reality from the cosmetic, voguish or ideological wrappings in which many factions would enswathe them.

Granted these returns to an older code, I think that my own answer to my own question would be 'yes'; that the qualities we esteem are also the qualities which will enable us to survive. Certainly, other things being equal, individuality will prevail. Those who have been at the real front of reasearch know that there is no substitute for individuality, and the same is probably true for all real innovation. However, to make my final point, this individuality must be applied at the point of maximal benefit.

When I was at school, we used to be asked 'What is New Zealand's greatest resource?'. The correct answer was 'grass'. True enough in its way, but more and more one would see the significant resource as 'people'—an intelligent and ingeneous people. Not a people numerous enough, however, to cover the whole of technology, in addition to the plainly essential agricultural sector. However, if it is not possible to cover everything, neither is it necessary to relive history—to repeat in sequence all the historic stages of development of the industrialised countries, as some seem implicitly to think. Surely for a country with New Zealand's human resources the right course is to leapfrog evolution—to choose some small significant area of technology and to pursue this at the most advanced level, making the area its own. What the area should be, I have no idea. But the tactics seem adapted to the national qualities and temperament: not to fight the whole front, but to filter through and take a single strategic high point, well forward. If it is not well forward, it will not be strategic.

I have said that New Zealand's greatest resource is its people: A vigorous people, formed by heritage and by the moulding effects of these islands. It is for this reason, among others, that I remain a New Zealander, that I am proud to acknowledge myself a New Zealander on all occasions, that I am eager to return to New Zealand when I can and renew contacts when I can, and because of this, that I am deeply moved by the honour the Victoria University of Wellington has bestowed upon me today.

GRANTEE REPORT

Ingrid Rinsma

From 20 January until 5 February 1988 I attended the Summer Research Institute (SRI) held at the University of Newcastle, New South Wales. This was organised by the Australian Mathematical Society and attracted just under 100 participants including three other New Zealanders.

The areas covered were combinatorics, graph theory, computing and applied statistics. In the mornings, lectures were given by invited speakers. The afternoons were kept free, allowing time for group discussions and individual research. An adjunct workshop entitled "Short Course in Cancer Survival Analysis" was presented by Professor Timo Hakulinen throughout the first four days. This was limited to twenty-five participants.

My principal interest was combinatorics and graph theory and I attended all these lectures.

During the first week, Henry Pollack, formerly of Bell Laboratories, gave three talks. Most interesting was his third, which described how an engineering problem in 1971, that of addressing loops in a data transmission scheme, led to a new branch of graph theory.

Ron Graham continued this topic in his first lecture during the second week. He is a superb speaker and his various lectures on combinatorial and discrete mathematics were both stimulating and well-presented. Also thought-provoking that week were the four talks by Paul Erdös on combinatorial problems in graph theory, number theory and geometry. During each he discussed theorems and proposed conjectures, often with accompanying prize money.

Rudolf Lidl and Claude Berge each presented five lectures in the final week. Professor Lidl's were on properties of finite fields with applications to secret ciphers. Graph theory (in particular perfect graphs and path partitions) was the theme of Professor Berge's talks.

These lectures were valuable in extending my knowledge of graph theory and trends in current research. Also profitable was the feedback gained from discussions with Brendan McKay, Ron Graham and Mike Dale about my work as a Post Doctoral Fellow on aligning DNA sequences. Those regarding longest common subsequences in random strings were particularly useful.

Due to the bicentennial celebrations in Australia, the social activities were restricted to two excursions—one to Tyrell's winery in the Hunter Valley, the other a cruise on Lake Macquarie on the eve of the final day.

I was stimulated by the lectures, aided in my own research and left with a variety of new ideas to explore. I am pleased I was able to attend the SRI and have informal talks with so many people. Also I was particularly fortunate in some interesting discussions with Paul Erdös.

I would like to thank the New Zealand Mathematical Society for their financial help in assisting me to attend this SRI.

Ingrid Rinsma
Department of Mathematics and Statistics
Massey University

BOOK REVIEWS

Classifying Immersions into $\mathbb{R}^4$ over Stable Maps of 3-Manifolds into $\mathbb{R}^2$, by Harold Levine, Lecture Notes in Mathematics 1157, Springer Verlag, New York (1985), 163 pp

Stratified Mappings—Structure and Triangulability, by Andrei Verona, Lecture Notes in Mathematics 1102, Springer-Verlag, New York (1984), 160pp.

These two research monographs both have their origins in the work, largely attributable to Rene Thom and John Mather, on the stability of smooth (C^∞) mappings between manifolds. This is the theory that provides the mathematical basis for Thom's elementary catastrophe theory, among other things. By *stability* of a map $f \in C^\infty(M,N)$ is meant that every f_1 in some neighbourhood of f in the Whitney C^∞ topology is equivalent to f in the sense that there are smooth diffeomorphisms $g : M \to M$ and $h : N \to N$ such that $f_1 = h \circ f \circ g^{-1}$. In particular, the equivalence classes are open. It is also of interest to know whether the set of stable maps is dense in this space (are stable maps *generic*?). Levine and Thom [1] showed that this is not so for *all* pairs of dimensions of M and N, and later Mather described precisely the "nice" dimensions [2]. Thom, instead, conjectured that if smooth diffeomorphisms were replaced by *homeomorphisms* in the equivalence relation, then stable maps would be dense. Once again, Mather completed the proof (the Topological Stability Theorem) using the theory of stratified spaces and maps [3].

Levine's book concerns stable (in the smooth sense) maps f from a compact 3-dimensional manifold M into $\mathbb{R}^2$. One aspect of the general theory is the listing of canonical local forms for stable maps in the neighbourhood of a singular point. The three inequivalent local normal forms in this case, the definite and indefinite folds and the cusp, are due to Morin [4], using the Malgrange Preparation Theorem. (Earlier results of this form by Whitney for maps from the plane to the plane [5] were obtained without this powerful tool.) In addition there are global conditions on the set $S(f)$ of singular points, namely that f is an immersion on $S(f)$-{cusps}, and its only double points are normal crossings at indefinite folds.

In Chapter 1, Levine investigates the nature of the fibres of f and how they fit together around $S(f)$. The description is facilitated by factoring f through the quotient space W_f whose points are the connected components of fibres. The local topological type of W_f at regular points, definite fold points and cusps is unique. However at indefinite folds the topological type differs depending on the orientability of M. Moreover, at double points, there are five distinct types (two for M orientable and three for M non-orientable). Ultimately, it is shown that M is decomposable into a union $B(\mathfrak{R})$ of circle bundles over a finite collection $\mathfrak{R}$ of surfaces of regular points, certain bundles $B(c)$ over arcs c of simple fold points, and sets $B(v)$ diffeomorphic to $(-1,1) \times T_v$ where T_v is a surface with boundary associated with each vertex (i.e. double fold point or cusp) v belonging to a finite list of types.

Chapter 2 is devoted to showing how the normal forms of the function in the neighbourhood of a singular point can be extended along arcs of fold points or along the singular set in the neighbourhood of vertices. This is essentially a technical result, complicated but not requiring deep theorems; much of the proof is relegated to an Appendix.

The final chapter, which forms the bulk of this book, gives an application of the previous results to the problem of determining whether a stable map $f : M^3 \to \mathbb{R}^2$ can be lifted to an immersion $F = (f,h) : M \to \mathbb{R}^4 = \mathbb{R}^2 \times \mathbb{R}^2$. Indeed, Levine classifies such liftings up to an equivalence (f- regular homotopy) where $(f,h)=(f,h')$ if and only if there is a homotopy H between h and h' such that (f, H_t) is an immersion for all t.

The original idea for the classification seems to be a result of Eliasberg and Gromov [6] on lifting submersions. This gives the classification for $f \mid B(\mathfrak{R})$. Using similar ideas, for example measuring the total turning produced by the tangent map of h on the tangent spaces of surfaces transverse to $S(f)$ as one travels between vertices along an arc of simple fold points, further homotopy invariants are defined, distinguishing classes in the other components of the decomposition of M. One further invariant is found to determine which of these *local* classes can be extended to all of M, and to distinguish f-regular homotopy

classes of such extensions.

The book continues some earlier work of the author and others, but is self-contained, at least assuming some knowledge of differential and algebraic topology and given the initial characterisation of stable maps (the proof of which plays no part here). There is an informative introduction, summaries of the forthcoming results in Chapters 2 and 3, a glossary of notation with brief definitions or explanations of the terms and an index—not always found in such a book. All these things are distinctly helpful to the book reviewer and render the work fairly accessible to the non-expert.

Verona takes up the theme of *topological* stability. His main theorem is that all topologically stable maps are triangulable. Invoking the Topological Stability Theorem of Mather, this confirms the conjecture of Thom that "almost all" smooth maps between manifolds are triangulable.

A topological space is triangulable if it is homeomorphic to (the geometric realisation of) a simplicial complex (in $\mathbb{R}^n$, some n). Likewise, a continuous map $f: A \to B$ between topological spaces is triangulable if A,B are triangulable and f is represented, via the triangulations, by a simplicial map. A useful appendix contains the necessary PL topology.

The triangulability of smooth manifolds was proved by Cairns [7], (this is not true for topological manifolds). Subsequently, more general spaces have been proved triangulable, in particular, the class of *abstract stratifications*, which are Mather's formulation of Thom's stratified sets [3,8]. These are topological spaces, A, which are decomposable into a locally finite union of disjoint smooth manifolds (*strata*) in such a way that if a stratum X meets the closure of another stratum Y, then $X \subseteq \mathrm{cl}\, Y$, $\dim X < \dim Y$ and the differential topological structure of Y in a neighbourhood of X is the same in any slice of A transverse to X (*regularity conditions*). The canonical way to try to stratify a given space is to take as the top-dimensional stratum those points with neighbourhoods that are smooth manifolds of maximum dimension; then at each subsequent stage, delete from the remainder the set of points at which previously defined strata fail to satisfy the regularity conditions.

Chapters 1 to 3 of the present work review Mather's theory of abstract stratifications (*cf* Gibson *et al* [9], Chapters 1 and 2 of which present similar results using Thom's formulation). Chapter 7 proves their triangulability via a slight generalisation of permissible strata. Chapter 6 investigates the structure of stratified mappings, and the triangulability of a certain class of these is proved in Chapter 8, the above stated theorem following as a corollary.

A small criticism of these books is that in neither is any example of the theoretical structures given. Examples and counterexamples can provide insight into the abstract formulation and suggest their practical limitations: How easy is it to compute f-regular homotopy classes or to stratify a map between smooth manifolds? Some day I may need to know.

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7. S. Cairns, Triangulation of the Manifold of Class One, *Bull. Amer. Math. Soc.* **41** (1935), pp 549-552.
8. R. Thom, Ensembles et morphismes stratifies, *Bull. Amer. Math. Soc.* **75** (1969), pp 240-284.
9. C. Gibson *et al*, Topological Stability of Smooth Mappings, Lecture Notes in Mathematics **552**, Springer-Verlag, New York (1976).

Peter Donelan, VUW

PROBLEMS AND QUERIES

A few contributrions have brightened an otherwise gloomy summer. We will adapt the state of our PQ's in August 1988. In the meantime we have two new problems.

PROBLEMS

P9. *From Emeritus Professor Ted Zulauf, University of Waikato:*

Let m be a given integer, $m \geq 2$. Let S be the set of all non-negative integers n for which the equation

$$x^4 - (mn + 1)x^2 + n^2 = 0$$

has four integer solutions x. Find a recurrence relation for the sequence

$$(n_k)_{k=1}^{\infty}$$

of all elements of S arranged in ascending order of magnitude.

P10. *From Dr Mike Hendy, Massey University:*

A printer is cutting large rectangular sheets of paper of sides a, b, cm. She wishes to cut these sheets into smaller rectangles of sides m, n, cm, (with a, b, m, n positive integers) using a guillotine which can only cut parallel to any side and completely across. Describe a procedure by which she can minimise the wastage.

SOLUTIONS

We have received two items as solutions to problems of previous Newsletters. First, with regard to our published solution to the 28th IMO Problem No. 4 [NZMS Newsletter **41**, December 1987], Ted Zulauf (Waikato) writes: "There is a mistake in it, and moreover two vital ingredients are missing. I had a go at the problem myself and enclose my findings in case you are interested." Indeed we are, so here is his solution to a genralisation of the original problem.

Arithmetical functions f satisfying f(f(n)) = N + a.

Let a be a given positive integer, and let $\mathbb{N}$ be the set of all non-negative integers.

(i) A function $f: \mathbb{N} \to \mathbb{N}$ such that $f(f(n)) = n + a$ for all $n \in \mathbb{N}$ exists only if a is even.

(ii) If a is even then there exist exactly $a! / (a/2)!$ functions f with the property in (i).

Proof of (i): Suppose that $f(f(n)) = n + a$ for all $n \in \mathbb{N}$. Then

$$f(n + a) = f(f(f(n))) = f(n) + a \text{ for all } n \in \mathbb{N}. \qquad (1)$$

Further, f must be one-to-one since

$$f(s) = f(t) \Rightarrow s = -f(f(s)) - a = f(f(t)) - a = t.$$

Now let

$$R = \{0, 1, 2, \ldots, a - 1\};\ S = \{s \in R :\ f(s) < a\};\ T = R - S.$$

Then $f(s) \in T$ if $s \in S$ since $f(f(s)) = s + a \geq a$. Conversely, if $t \in T$ then $t = f(s)$ where $s = f(t) - a \in S$, because if $t \in T$ and $s = f(t) - a$, then

$$2a > t + a = f(f(t) = f(s + a) = f(s) + a,$$

by (1). Hence T is the map of S under f which is one-to-one. It follows that S and T have the same number of elements, which obviously is possible only if a is even.

Proof of (ii): Suppose that a is even, say $a = 2b$. If $f(f(n)) = n + a$ for all $n \in \mathbb{N}$, then as our proof of (i) shows, there exists a set of b pairs of integers

$$P = \{(s_1,t_1),\ (s_2,t_2),\ \ldots,\ (s_b,t_b)\} \qquad (2)$$

in which each element of $R = \{0, 1, 2, \ldots, a - 1\}$ is used exactly once, such that

$$f(s_i) = t_i \text{ and } f(t_i) = s_i + a \text{ for } i = 1, 2, \ldots, b;$$

whence it follows from (1) by induction on k, that

$$f(s_i + ka) = t_i + ka \text{ and } f(t_i + ka) = s_i + (k+1)a, \text{ for all } k \in \mathbb{N} \text{ and } i = 1, \ldots, b. \qquad (3)$$

But there are exactly a!/b! ways in which a set P of the form (2) can be chosen so that each element of R is used exactly once. Conversely, it is easily verified that for any such P, the function f defined by (3) does indeed have the property of (i).

A Zulauf,
University of Waikato.

Professor David Gauld, University of Auckland, adds a partial solution to Problem 15 (Old Series) *"3816547890 and all that"* of NZMS Newsletter **32** (December 1984). He finds:

(i) $N(14) = 1$;
(ii) if $b = 2n(2n - 1)$ for $n > 1$, then $N(b) = 0$;
(iii) $N(b) = 0$ for $10 < b \leq 30$, $b \neq 14$.

Details are:

(i) A computer search finds the unique solution

$$9\gamma3\alpha5476\beta812\delta0_{(14)}$$

where $\alpha = 10$, $\beta = 11$, $\gamma = 12$, $\delta = 13$ (base 10).

(ii) If b is even, then as 2k is a divisor of $a_{b-1}a_{b-2} \ldots a_{b-2k\ (b)}$, the even indexed digits must be even, and so the odd indexed digits must be odd. Now suppose $b = 2n(2n-1)$, and let $k = (2n - 1)^2$, for $n > 1$. Since k-1 is a divisor of $a_{b-1}a_{b-2} \ldots a_{b-k+1\ (b)}$, it follows that

$$ba_{b-k+2}a_{b-2} + a_{b-k+1} \equiv 0 \pmod{4n},$$

so $a_{b-k+1} = 2na$, say, where a is odd, $1 \le a \le 2n - 3$. Since k is a divisor of $a_{b-1}a_{b-2} \ldots a_{b-2k(b)}$, it follows that

$$a(2n)^2(2n - 1) + a_{b-k} \equiv 0 \pmod{k}.$$

Noting that $(2n)^2 \equiv 1 \pmod{k}$, and that $a(2n - 1) + a_{b-k}$ is less than $2k$, we must have

$$a_{b-k} = k - a(2n - 1)$$

which is even, a contradiction.

(iii) A computer search amongst all even bases up to and including 28 verified that $N(b) = 0$ in the range indicated, and $N(30) = 0$ by (ii). [See also NZMS Newsletter 33.]

DB Gauld
University of Auckland

The editors of the Problems/Queries section welcome contributions. These should be sent directly to:

Mike Hendy or Graeme Wake,
Department of Mathematics and Statistics,
Massey University, Palmerston North.

MATHEMATICAL VISITORS IN NEW ZEALAND

One of the main aims for this listing is to enable institutions other than the principal host institution to invite visitors to spend time with them. Anyone wishing to issue such an invitation should do so through the listed principal contact.

Please Note: The production of these lists is dependent upon my receiving information. When you have information about a visit, whether it be definite, very likely or possible, would you please forward the information to me at the earliest convenience:

Gillian Thornley
NZ Mathematical Society Visitors' Coordinator
Department of Mathematics and Statistics
Massey University

List No. 19: 10 March 1988

The information is arranged as follows: Name of visitor; home institution; whether accompanied; principal field of interest; dates of visit; principal host institution; principal contact; comments.

Definite Visits

Dr Maximilian Ganster; Technische Universität Graz, Austria; topology; July - October 1988; University of Auckland; Associate Professor I.L. Reilly.

Dr C.G. Gibson; Liverpool University; wife; singularity theory; geometry of robotics; March - April 1988; Victoria University; Peter Donelan.

Professor Shanti Gupta; Purdue University; decision theory, reliability theory, order statistics, multivariate distributions; 5 September - 17 October 1988; University of Canterbury; Professor John Deely; Professor Gupta is an Erskine Fellow.

Dr Gabor T Herman; University of Pennsylvania; Mathematics of medical imaging; March-May 1988; University of Canterbury; Prof RHT Bates, Department of Electrical and Electronics Engineering; Dr Herman is an Erskine Fellow.

Professor D.S. Jankovic´; East Central University, Ada, Oklahoma; topology; July 1988 - June 1989; University of Auckland; Associate Professor Reilly.

Professor Michael J. Kallaher; Washington State University; finite projective planes; January - July 1988; University of Auckland; Peter Lorimer.

Dr Grant Keady; University of Western Australia; non-linear partial differential equations; 26 July - 16 August 1988; Massey University; Prof GC Wake.

Dr Bruce Murtagh; University of New South Wales; operations research/information science software, optimisation; 1 April - 31 October 1988; University of Auckland; Dr DM Ryan, Department of Theoretical and Applied Mechanics.

Dr John Nash; University of Ottawa; computational methods, management applications; January 1988 - June 1988; DSIR/AMD Mt Albert Research Centre; Dr J.H. Maindonald.

Dr M. Nyman; Alma College, Michigan; wife and 2 children; modelling; February - August 1988; University of Otago; Professor D.A. Holton.

Professor Ian Percival; Queen Mary College, University of London; chaos and dynamics; February - 23 April 1988; University of Canterbury; Professor Roy Kerr; Professor Percival is an Erskine Fellow.

Dr Franz Rendl; Technische Universität Graz; wife and 2 children; applied graph theory, optimisation; July - August 1988; Massey University; Charles Little.

Professor Mary Ellen Rudin; University of Wisconsin, Madison; spouse (see next entry); topology; 9 July - 13 August 1988; University of Auckland; Associate Professor I.L. Reilly; Professor Rudin is a University of Auckland Foundation Visitor.

Professor Walter Rudin; University of Wisconsin, Madison; spouse (see previous entry); real and complex analysis; 9 July - 13 August 1988; University of Auckland; Associate Professor I.L. Reilly; Professor Rudin is a University of Auckland Foundation Visitor.

Dr Akira Saito; Tohoku University, Sendai, Japan; wife and one child; graph theory; April 1988 - March 1989; University of Otago; Professor Derek Holton; Dr Akira Saito is a William Evans Visiting Fellow.

Professor George Styan; McGill University, Montreal; wife; matrix algebra for statistics; 20 June - 10 July 1988; University of Auckland; A.J. Scott.

Professor Lee Peng Yee; National University of Singapore; wife; integration theory; April 1988; University of Auckland; Peter Lorimer; New Zealand Mathematical Society Visiting Lecturer.

Professor Yu Wenci; Fudan University, People's Republic of China; operations research, optimisation, differential equations; February - July 1988; University of Waikato; Professor L. Foulds, School of Management Studies, and Professor R.J. Hosking.

Dr Keith Worsley; McGill University, Montreal; wife and son; statistical inference on change-points; 20 May - 17 June 1988; University of Auckland; A.J. Scott.

Very Likely Visits

Dr Malcolm Quine; University of Sydney; wife and children; stochastic processes; May - August 1988; University of Auckland; A.J. Scott.

Dr Bruce Richmond; University of Waterloo, Canada; spouse and child; asymptotics in combinatorics; 15 September - 15 December 1988; University of Auckland; N. Wormald.

CONFERENCES

** 1988 **

May 9-13 (Marseille, France)
Algorithmique et Programmation
Contact Mme A. Zeller-Meier CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

May 16-20 (Canberra)
1988 Mathematical Sciences Congress and 32nd Annual Meeting of the Australian Mathematical Society
Contact Prof CC Heyde, Department of Statistics, Institute of Advanced Studies, Australian National University, GPO Box 4, Canberra, ACT, 2601, Australia.

May 16-20 (Canberra)
Ninth Australian Statistical Conference
Contact Prof CC Heyde, Department of Statistics, Institute of Advanced Studies, Australian National University, GPO Box 4, Canberra, ACT 2601, Australia.

May 16-20 (Sydney)
ANZAAS 1988 Centenary Congress
Contact Mr B O'Rourke, Organising Secretary, 1988 ANZAAS Centenary Congress, 118 Darlington Road, University of Sydney, New South Wales 2006, Australia.

May 16-21 (Marseille, France)
Theorie des Representations des Groupes Finis
Contact Mme A. Zeller-Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

May 23-26 (Marseille, France)
Economic Mathematique
Contact Mme A. Zeller-Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

May 23-26 (Madison, Wisconsin)
Third SIAM Conference on Applied Linear Algebra
Contact SIAM, Third SIAM Conference on Applied Linear Algebra, 14th Floor, 117 South 17th Street, Philadelphia, Pennsylvania 19103-5052, U.S.A.

May 23-27 (Chiangmai, Thailand)
Conference on Mathematical Methods and Applications
Contact Prof Suwom Tangmanee, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand.

May 24-27 (Geneva)
Computer Graphcis International 88
Contact W. Magnenat-Thalmann, General Chairperson, CG International 88, MIRALab, HEC, 5255 Decelles, Montreal, Canada H3T 1V6.

May 29-31 (Madrid)
Eighteenth International Symposium on Multivalued Logic
Contact E. Trillas, Consejo Superior, Investigaciones Cientificas, Serrano 117, 28006 , Madrid, Spain.

May 29-June 4 (New York)
Symposium on the Legacy of John von Neumann
Contact John Baletto, American Mathematical Society, Meetings Department, P.O. BOX 6248, Providence, Rhode Island 02940, U.S.A.

May 30-June 3 (Singapore)

International Conference on Numerical Mathematics

Contact Secretary, International Conference on Numerical Mathematics, Department of Mathematics, National University of Singapore, Kent Ridge, Republic of Singpore 0511.

May 30-June 3 (Kalamazoo, Michigan)

Sixth International Conference on the Theory and Applications of Graphs

Contact Directors, Sixth International Graph Theory Conference, Department of Mathematics and Statistics, Western Michigan University, Kalamazoo, Michigan 49008-3899, USA.

May 30-June 3 (Marseille, France)

Theorie des Nombres

Contact Mme A. Zeller - Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

May 30-June 3 (Burnaby British Columbia)

Canadian Applied Mathematics Society Conference and Workshop on Continuum Mechanics and its Applications

Contact C. Graham, Department of Mathematics and Statistics, Simon Fraser University, Burnaby, British Columbia, Canada V5A 156.

May 30-June 4 (L'Aquila, Italy)

Conference on Hyperplane Sections and Relatd Topics

Contact E. Livorni, Dipartimento di Matematica, Universita degli Studi dell 'Aquila, Via Roma, Italy.

June 5-9 (Ann Arbor, Michigan)

IEEE Computer Society's Conference on Computer Vision and Pattern Recognition

Contact R. Jain, Department of Electrical Engineering and Computer Science, 3215 Electrical Engineering and Computer Science Building, University of Michigan, Ann Arbor, Michigan 48109-2122, U.S.A.

June 5-12 (Peñiscola, Spain)

Third International Symposium on Differential Geometry

Contact Departmento de Geometria y Topologia, Facultad de Matemáticas, Universidad de Valencia, Burjasot (Valencia), Spain.

June 6-10 (Turku, Finland)

Twelfth Nordic Conference on Mathematical Statistics

Contact L. Nordberg, ABO Akademi, SF-20500, Turku, Finland.

June 6-10 (Marseille, France)

Algorithmique

Contact Mme A. Zeller-Meier , CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

June 6-10 (Iromso, Norway)

Second International Conference on Vector and Parallel Computing Issues in Applied Research and Development

Contact Conference Secretary, Berit Hilt, Bergen Scientific Centre, IBM, Allegaten 36, 5007 Bergen, Norway.

June 8-10 (Antibes, France)

Eighth International Conference on Analysis and Optimisation of Systems

Contact INRIA, Service des Relations Exterieures, Bureau des Colloques, Domaine de Voluceau-Rocquencourt, B.P. 105, F-78153 Le Chesnay Cedex, France.

June 11-14 (Columbus, Ohio)

International Conference on Almost Everywhere Convergence in Probability and Ergodic Theory

Contact G Edgar, Department of Mathematics, Ohio State University, Columbus, Ohio 43210, U.S.A.

June 12-18 (Minneapolis,Minnesota)

Workshop on Coding Theory and Applications

Contact A Friedman, Institute for Mathematics and its Applications, University of Minnesota, 514 Vincent Hall, 206 Church Street Southeast, Minneapolis, Minnesota 55455, U.S.A.

June 13-17 (Talence, France)

Nonlinear Hyperbolic Problems Conference

Contact A Polzin, D Département de Mathématiques Appliquées, Université de Bordeaux I, 351 cours de la Libération, 33405 Talence Cedex, France.

June 15-17 (Ensendada, Mexico)

Seventh Pacific Coast Resource Modeling Conference

Contact H. Heras, Ecologia Marina, CICESE, P.O. Box 4844, San Ysidro, California 92073, U.S.A.

June 16-23 (Banff, Canada)

Canadian Mathematical Society Annual Seminar—Banach Spaces and the Geometry of Convex Bodies

Contact N. Tomczak-Jaegermann, Department of Mathematics, University of Alberta, Edmonton, Alberta T6G 2G1, Canada.

June 19-24 (Kobe, Japan)

1988 IEEE International Symposium on Information Theory

Contact T. Kasami, Faculty of Engineering Science, Osaka University, Togonaka, Osaka 560, Japan.

June 19-25 (Minneapolis, Minnesota)

Workshop on Design Theory and Applications

Contact A Friedman, Institute for Mathematics and its Applications, University of Minnesota, 514 Vincent Hall, 206 Church Street Southeast, Minneapolis, Minnesota 55455, U.S.A.

June 20-24 (Lisbon)

International Algebra Conference

Contact Centro de Algebra, Universidade de Lisboa, Rua Ernesto Vasconcelos, Bloco C1, 30 Piso, 1700 Lisboa, Portugal.

June 20-24 (Shanghai, China)

BAIL V - Fifth International Conference on Boundary and Interior Layers—Computational and Asymptotic Methods

Contact Pauline McKeever, Conference Management Services, PO Box 5, 51 Sandycove Road, Dun Laoghaire, Co. Dublin, Ireland.

June 20-24 (Tornoto)

The Numerical Solution of IVPs for ODEs

Contact Professor W.H. Enwritht, Department of Computer Science, University of Toronto, Toronto, Ontario M55 1A4, Canada.

June 20-25 (Edmonton, Canada)

Geoffrey J. Butler Memorial Conference on Differential Equations and Population Biology

Contact Differential Equations, Department of Mathematics, University of Alberta, Edmonton, Alberta T6G 2G1, Canada.

June 25-30 (Xian, China)

International Conference on Biomathematics

Contact Prof Lansun Chen, Mathematical Institute, Chinese Academy of Sciences, Beijing, People's Repbulic of China.

June 27-July 1 (Marseille, France)

Geometric Algebrique, Informatique et Complexite

Contact Mme A. Zeller-Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

June 27-July 15 (Berkeley, California)

Microprogram on the Structure of Banach Spaces

Contact Mathematical Sciences Research Institute, 1000 Centennial Drive, Berkeley, California 94720, USA.

July (Beijing, China)

Eighth IFAC/IRORS Symposium on Identification and System Parameter Estimation

Contact Helle Welling, Secretary c/- IMSOR, Building 349, Technical University of Denmark, 2800 Lyngby, Denmark.

July 4-8 (Marseille, France)

Infinite Dimensional Lie Algebras and Groups

Contact Mme Z. Zeller-Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

July 4-8 (Dundee, Scotland)

Tenth Dundee Conference on Differential Equations

Contact Dr R.J. Jarvis, Department of Mathematical Sciences, The University, Dundee DD1 4HN, Scotland.

July 5-8 (Bradford, England)

IMA Conference on Applications of Matrix Theory

Contact the Deputy Secretary, The IMA, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY, England.

July 10-16 (Manchester)

Representation Theory and Group Theory

Contact RTGT, Department of Mathematics, Institute of Science and Technology, University of Manchester, PO Box 88, Manchester M60 2QD, England.

July 11-13 (Strathclyde, Scotland)

IMA Conference on Inverse Problems and Imaging Associated with Pattern Recognition

Contact the Secretary and Registrar, The IMA, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY, England.

July 11-15 (Marseille, France)

Theorie de L'Homotopie

Contact Mme A. Zeller-Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

July 11-16 (Helsinki)

Twenty-Third Internatinal Conference of Actuaries

Contact 23rd International Conference of Actuaries, Congress Management Systems, PO Box 189, SF-00171 Helsinki, Finland.

July 13-15 (Manchester)

IMA Conference on Mathematical Structures for Software Engineering

Contact the Secretary and Registrar, The IMA, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY, England.

July 13-20 (St Andrews, Scotland)

Edinburgh Mathematical Society's 1988 St Andrews Colloquium

Contact J. Langley, University of St Andrews, Mathematical Institute, North Haugh, St Andrews KY16 9SS, Fife, Scotland.

July 17-27 (Swansea, Wales)

Ninth Congress of the International Association of Mathematical Physics

Contact A. Truman, University College of Swansea, Department of Mathematics and Computer Science, Singleton Park, Swansea SA2 8PP, Wales.

July 18-22 (Paris)

International Association for Mathematics and Computers in Simulation: 12th World Congress on Scientific Computation

Contact the Secretary, 12th IMACS World Congress, IDN, BP 48, 59651 Villeneuve d'Ascq Cedex, France.

July 18-23 (Namur, Belgium)

Fourteenth International Biometric Conference

Contact IBC Conference Secretariat, Facultés Universitaires Notre-Dame de la Paix, Centre de Rencontres,, Rue de Bruxelles 53, B-5000, Namur, Belgium.

July 18-29 (Fort Collins, Colorado)

AMS-SIAM Summer Seminar on Computational Solution of Non-linear Systems Equations

Contact Betty A. Verducci, Summer Seminar Conference Coordinator, American Mathematical Society, P.O. Box 6248, Providence, Rhode Island 02940, U.S.A.

July 20-31 (Santiago, Chile)

Ninth Latin American School on Mathematics

Contact Professor Ricardo Baeza, Universidad de Chile, Santiago, Chile.

July 24-30 (Sapporo, Japan)

International Conference on Radicals—Theory and Applications

Contact S Kyuno, Department of Mathematics, Tohoku Gakuin University, Tagajo, Miyagi 985, Japan.

July 25-29 (Pisa, Italy)

Third International Conference on Fibonacci Numbers and their Applications

Contact Gerald Bergum, Department of Computer Science, South Dakota State University, PO Box 2201, Brookings, South Dakota 57007-0199, USA.

July 25-30 (Leuven, Belgium)

International Congress on Computational and Applied Mathematics

Contact Prof Dr F Broeckx, R.U.C.A., Middelheimlaan 1, B-2020 Antwerpen, Belgium.

July 25-30 (Beijing, China)

International Symposium on Engineering Mathematics

Contact ISEMA-88, No 1 Lane 2, Baiguang Road, PO Box 2405, Beijing, China.

July 27-August 3 (Budapest)

Sixth International Congress on Mathematical Education

Contact Dr M F Newman, Department of Mathematics, Research School of Physical Sciences, Institute of Advanced Studies, Australian National University, PO Box 4, Canberra ACT 2601, Australia.

August 1-5 (Atlanta, Georgia)

Fifteenth Annual Conference and Exhibition on Computer Graphics and Interactive Techniques

Contact A. Newton, University of Waterloo, Department of Computer Science, Waterloo, Ontario N2L 3G1, Canada.

August 1-9 (Hamburg and Munich)

XVIII International Congress of the History of Science

Contact Prof. Dr. C.J. Scriba, Institut für Greschichte der Naturwissenschaften der Universität Hamburg, Bundesstr. 55, D-2000 Hamburg 13, West Germany

August 4-11 (Budapest)

Algebraic Logic Conference

Contact I Németi, Department of Mathematics, Iowa State University, Ames, Iowa 50011, USA.

August 8-12 (Providence, Rhode Is.)

American Mathematical Society Centennial Celebration

Contact H Daly, American Mathematical Society, Meetings Department, PO Box 6248, Providence, Rhode Island 02904, USA.

August 9-12 (Coleraine, N Ireland)

International Symposium in Real Analysis

Contact P. Muldowney, University of Ulster, Northland Road, Londonderry BT48 7JL, Northern Ireland.

August 9-13 (Hong Kong)

First International Symposium on Algebraic Structures and Number Theory

Contact R.F. Turner-Smith, Department of Mathematical Studies, The Hong Kong Polytechnic, Hung Hom, Kowloon, Hong Kong.

August 11-14 (Madras, India)

International Conference on Mathematical Modelling in Sciences and Technology

Contact Prof P. Achuthan, Indian Institute of Technology, Madras - 600 036, India.

August 14-18 (Fort Collins, Colorado)

Institute of Mathematical Statistics Annual Meeting

Contact L. Billard, Program Secretary, Department of Statistics and Computer Science, University of Georgia, Athens, Georgia 30602, U.S.A.

August 15-19 (Providence, Rhode Is.)

New Directions in Dynamical Systems

Contact Dynamics Conference, J. Mallet-Paret, Division of Applied Mathematics, Brown University, Providence, Rhode Island 02912, U.S.A.

August 15-17 (Palmerston North, N.Z.)

40th Annual Conference of the New Zealand Statistics Association

Contact Dr R.J. Brook, Department of Mathematics and Statistics, Massey University, Palmerston North, New Zealand.

August 15-20 (Karlovy Vary, Cechoslovakia)

Universal Algebra

Contact L. Bican, MFF, Sokolovska 83, 18600 Praha 6, Czechoslovakia.

August 16-19 (Trieste, Italy)

Summer School on Dynamical Systems

Contact International Centre for Theoretical Physics, Summer School on Dynamical Systems, P.O. Box 586, I - 34100 Trieste, Italy.

August 16-19 (Fort Collins, Colorado)

Institute of Mathematical Statistics Symposium on Probability and its Applications
Contact R. Taylor, Program Chairman, Department of Statistics, University of Georgia, Athens, Georgia 30602, U.S.A.

August 17-24 (Canberra)

Functional Analysis/Optimisation
Contact Prof J.R. Giles, Department of Mathematics, University of Newcastle, New South Wales 2308, Australia.

August 20-26 (Pusan, Republic of Korea)

Groups—Korea 1988
Contact Prof A.C. Kim, Department of Mathematics, The Pusan National University, Pusan 607, Repbulic of Korea.

August 21-27 (Grenoble, France)

17th International Congress of Theoretical and Applied Mechanics
Contact D. Caillerie, Secretary of the International Congress of Theoretical and Applied Mechanics 1988, Institut de Mécanique de Grenoble, Domain Universitaire, BP 68, 38402 Saint Martin d'Heres Cedex, France.

August 21-27 (Krens/Donau, Austria)

International Conference on General Algebra
Contact Rainer Mlitz, Institut für Angewandte und Numerische Mathematik, Techn Universität Wien, A-1040 Wien, Widner Haupststr, 6-10, Austria.

August 22-26 (Prague)

Conference on Categorial Topology and its Relation to to Algebra, Analysis and Combinatorics
Contact M. Husek, Math Inst of Charles University, Sokovolská 83, Prague, Czechoslovakia.

August 22-26 (Alberta, Canada)

International Conference on Operator Theory—Advances and Application
Contact Operator Conference, Department of Mathematics and Statistics, The University of Calgary, Calgary, Alberta, Canada T2N 1N4.

August 22-26 (Trondheim, Norway)

20th Nordic Congress of Mathematicians
Contact Prof. J.F. Aarnes, Department of Mathematics and Statistics, University of Trondheim, N-7055 Dragvoll, Norway.

August 23-30 (Padova, Italy)

1988 Association for Symbolic Logic European Summer Meeting
Contact R. Ferro, Dipartimento di Matematica Pura e Aplicata, Universita di Padova, via Belzoni, 7, 35131 Padova, Italy.

August 28-31 (Glasgow)

European Conference for Mathematics in Industry
Contact Conference Secretariat, Department of Mathematics, University of Strathclyde, Glasgow, Scotland.

August 29-Sept.2 (Copenhagen)

The Orbit Method in Representation Theory
Contact Niels Vigand Pedersen, Mathematics Department, University of Copenhage, Universiteitsparken 5, DK-2100 Copenhagen, Denmark

August 29-Sept.2 (Copenhagen)

Harmonic Analysis in Lie Groups

Contact Niels Vigand Pedersen, Mathematics Depatment, University of Copenhagen, Universiteitsparken 5, 2100 Copenhagen, Denmark.

August 29-Sept.2 (Tokyo)

Thirteen International Symposium on Mathematical Programming

Contact Helle Welling, Secretary, c/- IMSOR, Building 349, Technical University of Denmark, 2800 Lyngby, Denmark.

September 13-16 (Berkeley, California)

Workshop on Arboreal Group Theory

Contact I. Kaplansky, Mathematical Sciences Research Institute, 1000 Centennial Drive, Berkeley, California 94720, U.S.A.

September 12-16 (Marseille, France)

Theorie des Nombres

Contact Mme A. Zeller-Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

September 14-16 (Strathdyde, Scotland)

Fifth IMA International Conference on Control Theory

Contact the Secretary and Registrar, The IMA, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY, England.

September 19-23 (Marseille, France)

Histoire de la Relativite Generale

Contact Mme A. Zeller-Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

September 26-October 1 (Halle, East Germany)

Fifth International Conference on Complex Analysis

Contact Fifth International Conference on Complex Analysis, Martin-Luther Univesity, Department of Mathematics, Universitätsplatz 6, DDR-4010, Halle, German Democratic Republic.

October 17-22 (Marseille, France)

Analyse des Donnees de Duree

Contact Mme A. Zeller-Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

October 31-Nov. 18 (Trieste, Italy)

Workshop in Mathematical Ecology

Contact International Centre for Theoretical Physics, Workshop in Mathematical Ecology, P.O. Box 685, I-34100, Trieste, Italy.

November 18-19 (Sydney)

Quantitative Approaches to Diabetes

Contact Dr A.G. Shannon, School of Mathematical Sciences, New South Wales Institute of Technology, Broadway, New South Wales 2007, Australia.

Nov. 21-Dec.16 (Trieste, Italy)

College on Global Geometric and Topological Methods in Analysis

Contact International centre for Theoretical Physics. P.O. Box 685, I-34100, Trieste, Italy.

December 6-8 (Guangzhou, China)

First International Conference on Matter Elements Analysis

Contact C. Wen, Guangdong Institute of Technology, Guangzhou, People's Republic of China.

December 13-15 (Warwick, England)

Joint IMA/SIAM International Conference on Mathematics of Signal Processing
Contact the Secretary and Registrar, The IMA, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY, England.

**** 1989 ****

January 8-11 (Trinidad)

First Caribbean Conference on Fluid Dynamics
Contact H. Rankissoon, Chairman CACOFD 89, Department of Mathematics, University of West Indies, Saint Augustine, Trinidad, West Indies.

May 15-17 (Palmerston North, N.Z.)

1989 New Zealand Mathematics Colloquium
Contact Dr M.D. Hendy, Department of Mathematics and Statistics, Massey University, Palmerston North, New Zealand.

July 3-7 (London)

Computational Ordinary Differential Equations
Contact The Secretary and Registrar, The IMA, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY, England.

July 5-19 (Berkeley, California)

Microprogram on Noncommutative Rings
Contact Mathematical Sciences Research Institute, 1000 Centennial Drive, Berkeley, California 94720, U.S.A.

July 10-12 (Brisbane)

International Conference on Computational Techniques and Applications
Contact School of Australian Environmental Studies, Griffith University, Nathan, Queensland 4111, Australia.

July 30-Aug.12 (Brunswick, Maine)

Harmonic Analysis on Reductive Groups
Contact W. Barker, Mathematical Sciences Research Institute, 1000 Centennial Drive, Berkeley, California 94720, U.S.A.

August 28-September 1 (San Francisco)

IFIP 89—11th World Computer Conference
Contact IFIP Secretariat, 3 Rue du Marché, CH-1204 Geneva, Switzerland.

August 28-September 1 (Canberra)

Third International Conference on the Theory of Groups and Related Topics
Contact J. Cossey, Mathematics Department, Faculty of Science, Australian National University, GPO Box 4, Canberra ACT 2601, Australia.

August 29-September 6 (Paris)

47th Session of the International Statistical Institute
Contact International Statistical Institute, 428 Prinses Beatrixlaan, Voorburg, Netherland.

October 16-20 (Beijing, China)

Sixth World Congress on Medical Informatics
Contacts Ms Shan Huiquin, Medinfo 89, Office of the Secretariat, China Computer Technical Service Corp, 29 Xueynan Nanlu, Haidian District, Beijing, China.

** 1990 **

December 3-7 (Palmerston North, N.Z.)

1990 Australasian Conference on Combinatorics

Contact Dr C.H.C. Little, Department of Mathematics and Statistics, Massey University, Palmerston North, New Zealand.

MR Carter
Massey University

NZMS MEMBERSHIP LIST

Following is a list of members of the New Zealand Mathematical Society, current at 21 March, 1988.

Some entries show a status code which is to be interpreted as follows:

L = Life Member
H = Honorary
S = Student
FS = Free Student
F = Free (ordinary)
R = Reciprocal

All others are Ordinary Members.

Mr D P Alcorn		Dept of Mathematics University of Auckland Private Bag Auckland
Mr R Aldred	S	Dept of Maths & Stats University of Otago P.O. Box 56 Dunedin
Prof G D Anderson		Dept Maths & Stats University of Auckland Private Bag Auckland
Ms J A Anderson	S	NZ Dairy Research Institute Private Bag Palmerston North
Prof G Andrews	R	Dept of Math McAllister Bldg Penn State Univ Pennsylvania 16802 U.S.A.
Dr J H Ansell		Department of Mathematics Victoria University Wellington
Mr G C Arnold		Dept Maths & Stats Massey University Palmerston North
Dr C J Atkin		Dept of Mathematics Victoria University Wellington
Bruce Aubertin		Dept of Maths & Statistics Massey University Palmerston North
Dr Colin Bailey		Dept of Mathematics Victoria University Private Bag Wellington
Dr R D Ball		16 Selwyn Street New Plymouth
Prof R H T Bates		Electrical Engineering Dept University of Canterbury Christchurch
Dr R K Beatson		Dept of Mathematics University of Canterbury Private Bag Christchurch
Dr E W Bowen	R	Maths Dept Univ of New England Armidale NSW 2351 Australia
Dr D R Breach		Dept of Maths University of Canterbury Christchurch
Dr K A Broughan		Dept of Maths University of Waikato Hamilton
Mr R L Broughton		Dept of Maths University of Canterbury Private Bag Christchurch
Ms Marian E Bruns		c/- 88 Mountain Road Epsom Auckland 3
Dr P J Bryant		Dept of Maths University of Canterbury Christchurch
Dr H-Q Bui		Dept of Mathematics University of Canterbury Private Bag Christchurch
Dr R A Bull		Dept of Maths University of Canterbury Private Bag Christchurch
David Bullivant	S	Dept Theoretical & Appl Mech University of Auckland Private Bag Auckland
John Burnell		15 Flers St Karori Wellington 5
Dr K Burrage		Dept Computer Science University of Auckland Auckland
Mr W J Burrows	S	Dept of Maths and Stats Massey University Palmerston North

Prof J C Butcher		Dept of Computer Science Auckland University Private Bag Auckland
Dr S J Byrne		Dept Theoretical & Appl Mech University of Auckland Auckland
Dr B Calvert		Dept of Maths University of Auckland Private Bag Auckland
Mr B K Campbell		App Maths Div DSIR PO Box 1335 Wellington
Prof J T Campbell H		579 Rocks Road Nelson
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Dr E Chacko		Maths Dept University of Canterbury Christchurch
Mr Robert Chan		Dept of Mathematics Auckland University Auckland
Dr C P Chang	L	18 Lilford Pl Bucklands Beach Auckland
Mr D B Christianson	R	Data Connection Ltd Ross House Shirley Rd Enfield Middlesex EN2 6SN UK
Dr J Clark		Dept of Mathematics Univ of Otago Box 56 Dunedin
Megan Clark		Dept of Mathematics Victoria University Wellington
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Dr M D E Conder		Dept of Mathematics Auckland University Auckland
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N R Cox		Ruakura Agri Res Centre Private Bag Hamilton
Mr R A Crawford	S	Dept of Maths and Stats Massey University Palmerston North
Dr John Curran		Dept of Mathematics Otago University Dunedin
Prof W Davidson	H	25 Paddock Close Edwinstowe Notts NG21 9LP England
Mr R B Davies		App Math Div DSIR Box 1335 Wellington
Dr B P Dawkins		Maths Dept Victoria University Wellington
Mr J C W De La Bere		Maths Dept University of Canterbury Christchurch
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Mrs S A Dixon	S	Dept of Maths and Stats MAssey University Palmerston North
G J Dobson		Nz Tech Correspondence Inst PO Box 30-335 Lower Hutt
Mr M J Doherty		Dept of Statistics Private Bag Wellington
Dr Peter Donelan		Dept of Mathematics Victoria University Private Bag Wellington
Dr R G Downey		Dept of Mathematics Victoria University Wellington
H P Edwards		Dept of Maths & Stats Massey University Palmerston North
Dr R L Enlow		Dept of Maths University of Otago Dunedin
Mary D Fama		41 Yarawa St Kenmore Queensland 4069 Australia
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Dr Simon Fitzpatrick		Dept of Maths & Statistics University of Auckland Auckland
Ms S D Forbes		R D 1 Featherston
Prof L Foulds	F	School of Management Studies University of Waikato Private Bag Hamilton
Dr R Fox		Dept of Maths and Stats University of Auckland Private Bag Auckland
Mr A G French		Maths Dept Waikato University Hamilton
F C Gair		Dept of Maths Canterbury University Christchurch
Prof J Gani	R	Dept of Maths University of California Santa Barbara Calif 93106 U.S.A.
Mr R A Garden		Research & Stats Div Dept of Education Private Bag Wellington
Ms H J Gardiner		Dept of Maths University of Waikato Hamilton
Prof D B Gauld		Mathematics Dept University of Auckland Private Bag Auckland
Ms L L Gilmore		Alcohol Research Unit University of Auckland Private Bag Auckland
Prof R I Goldblatt		Dept of Mathematics Victoria University Wellington
Mr A J Gomez		Maths Stats Division Dept of Statistics Wellington
Mr Stephen Goulter		71 Miro Street Trentham Upper Hutt Wellington
Mr A G Gray		Stat Methods Div Dept of Statistics Wellington
Mr J Ha		Divn Maths and Stats CSIRO Private Bag 10 Clayton Vic 3168 Australia
Dr P R Hafner		Maths Dept University of Auckland Private Bag Auckland
Dr W D Halford		Dept of Maths & Stats Massey University Palmerston North
Mr A Hall	S	Plant Physiology Division DSIR Private Bag Palmerston North
Dr J Hannah		Dept of Mathematics University of Canterbury Private Bag Christchurch
Dr J F Harper		Dept of Maths Victoria University Wellington
Dr J A Harraway		Maths Dept University of Otago Box 56 Dunedin
Dr D C Harvie		Maths Dept Victoria University Private Bag Wellington

Prof B I Hayman		Dept of Maths & Stats Massey University Palmerston North
Tevita 'O. Helu	S	P.O. Box 957 Nukualofa Tonga
Dr H V Henderson		Statistics & Computing Section Ruakura Agricultural Res Cent. Hamilton
Dr M D Hendy		Dept of Maths & Stats Massey University Palmerston North
Prof D A Holton		Dept of Maths & Stats University of Otago Dunedin
Prof R J Hosking		Maths Dept Waikato University Hamilton
N Jeans		Dept of Maths & Stats Massey University Palmerston North
Dr M A Jorgensen		Department of Mathematics Waikato University Hamilton
Prof D Joyce		c/- Huia Post Office AUCKLAND 7
Prof J A Kalman		Mathematics Dept University of Auckland Private Bag Auckland
Dr E G Kalnins		Mathematics Dept University of Waikato Hamilton
Mr A P Kelly		Dept of Maths & Stats Massey University Palmerston North
Mr G H Knight		Dept of Maths & Stats Massey University Palmerston North
Mr J P Koolard	S	Dept of Maths and Stats Massey University Palmerston North
Diane Koorey	S	Mathematics Department University of Waikato Private Bag Hamilton
Dr A A Lacey		Mathematics Dept Heriot-Watt University Edinburgh EH14 4AS Scotland
Dr P Laird	R	University of Wollongong Wollongong NSW 2500 Australia
Prof H O Lancaster	R	Room 174 F04 University of Sydney NSW 2006 Australia
Ass Prof Lee Peng Yee	R	Dept of Maths National University of Singapore Singapore
Dr M J J Lennon		Dept of Maths University of Auckland Private Bag Auckland
Dr R Jonathan Lermit		Nz Elect Dept Private Bag Wellington
Dr Henry Levy		Dept of Mathematics Otago University Dunedin
Dr G F Liddell		Maths Dept University of Otago Dunedin
Dr C.H.C. Little		Dept of Maths & Stats Massey University Palmerston North
Dr R A Littler		Ruakura Agricultural Centre Private Bag Hamilton
Mr R S Long		Maths Dept University of Canterbury Christchurch
Assoc Prof P J Lorimer		Dept of Maths Auckland University Private Bag Auckland
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G B McBride		C/- Water Quality Centre Ministry of Works Private Bag Hamilton
Dr D J McCaughan		Dept of Maths University of Otago PO Box 56 Dunedin
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Dr Mark McGuinness	F	App Maths Div DSIR PO Box 1335 Wellington
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Dr A McNabb		App Maths Div DSIR PO Box 1335 Wellington
Ms J L McWhirter		Dept of Maths University of Waikato Private Bag Hamilton
J H Maindonald		AMD Mt Albert Res Centre DSIR Private Bag Auckland
Prof W G Malcolm		Vice Chancellor University of Waikato Hamilton
Dr S P J Matthews		Flat 1 60 Pilgrims Lane Hampstead London NW3 1SN England
Dr S A Morris		Dept of Mathematics Latrobe University Bundoora Victoria 3083 Australia
Ms L M Morrison		5 Cecil Street Upper Hutt
Dr M J Morton		Dept Maths and Stats University of Auckland Auckland
Dr Mila Mrsevic		Dept of Mathematics University of Belgrade Belgrade Yugoslavia
Mr P R Mullins		P.O.Box 34524 Birkenhead Auckland
Prof B H Neumann	H	Dept of Maths & Stats CSIRO PO Box 1965 Canberra ACT 2601 Australia
Assoc Prof D A Nield		Dept Theoretical & Appl Mech University of Auckland Private Bag Auckland
Dr F M Nolan		Math. Stats Section Dept of Statistics Private Bag Christchurch
Dr A J O'Connor		School of Science Griffith University Nathan Queensland 4111 Australia
Dr G Olive		Dept of Maths University of Otago Dunedin
Dr Kevin C O'Meara		Dept of Mathematics University of Canterbury Christchurch
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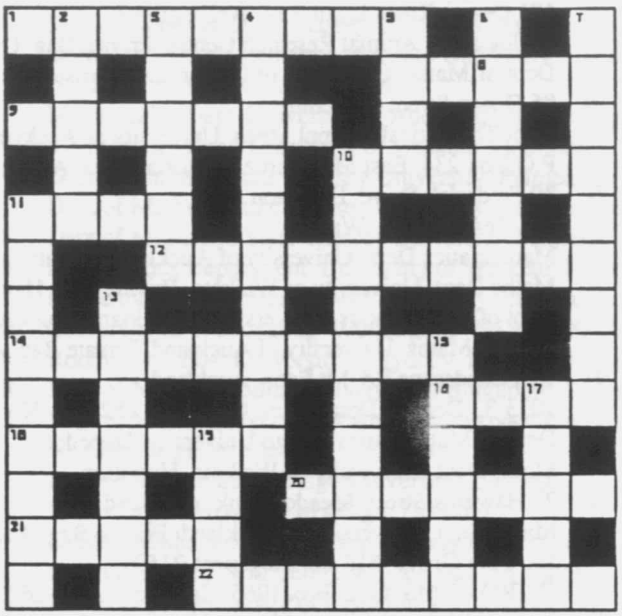
CROSSWORD

No. 24 THE ODD AMOUNT by Matt Varnish



Across

1 About 34½ in × 24 in in an umber coil. (9)
8 First entry of type not called ruby by US. (5)
9 Amount borne by insurer's differences. (7)
10 South American inheritance is a Russian 7ft net. (6)
11 The 20-40ft Pole you ferry endlessly. (4)
12 A season to sing about the arches' curvatures. (10)
14 Artist's achievement is a first thesis. (10)
16 Dyes in thousands? (4)
18 Tots that held quaterns; if down disapproved. (5)
20 Triangular pressure units? (7)
21 Wine from a broken jar with 10. (5)
22 Bad smell from an unidentified midshipmite. (9)

Down

2 Opposites in binary control. (2-3)
3 Less than 8 in pool. (6)
4 Reference points are inverted when below sea-level. (10)
5 Measures of indian music. (4)
6 Boxes about the navy to make little barracks. (7)
7 Setbacks are air-speeds critical to control surfaces. (9)
10 It gave a Victorian perspective of Agnes' porch. (10)
11 They measure downfall of storm due East. (9)
13 "O!Cussed shields! The old crowns' worth".(7)
15 The young before the animal of portrait size. (3-3)
17 Short weights, outsize to end with. (5)
19 Light on the width. (4)

Crossword No. 23: Solution. Across: 1 Boxing; 4 encamp; 9 A Happy New Year; 10 egg-flip; 11 outre; 12 letterknife; 16 aster; 17 gladden; 19 King Wenceslas; 20 pastry; 21 feasts.

Down: 1 brazen; 2 Xmas Greetings; 3 Nepal; 5 new-born; 6 Adeste fideles; 7 parcel; 8 snapdragons; 13 thrower; 14 pack up; 15 gnosis; 18 abele.

Mr Varnish apologises for the error in clue 15 down which should have been described as being in (6), not (4,2).