THE NEW ZEALAND MATHEMATICAL SOCIETY (INC.)

NEWSLETTER

CONTENTS

Number 43 August 1988 ISBN 0110-0025

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:

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

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NOTICES

FELLOWSHIP OF THE ROYAL SOCIETY OF NEW ZEALAND

The Royal Society of New Zealand elects up to seven Fellows each year at the AGM of the Fellows in May. Nominations should be sent to the Executive Officer by 15 November of the previous year. Candidates must be resident in New Zealand and must have been so during at least three years of their scientific careers.

Nominations can be made in two ways; either by member bodies (of which the NZMS is one), or by a group of not less than three Fellows. Nominations stand for five years. Candidates who have not been elected after this time cannot be renominated until a further three years have passed.

A nomination should be supported by a curriculum vitae and a full bibliography. The nominators should name a candidate's six most important papers. Supporting documents written by the candidate are not acceptable. The fellowship selection advisory panels are: Animals Sciences; Biochemical, Cellular and Molecular Biology; Chemical Sciences; Earth Sciences; Engineering and Technology; Human Sciences; Medical Sciences; Mathematical and Physical Sciences; Plant Sciences.

Those in the mathematical community of New Zealand who wish to be nominated or who have suggestions for others to be nominated should write to the Secretary or President of the NZMS.

NZ MATHEMATICS OLYMPIAD TEAM SCORES WELL
A Silver Medal Obtained

The first ever NZ Mathematics Olympiad team showed a very good result at the 29th International Mathematics Olympiad in Canberra this week (July 11-16), the first time that a NZ team has ever entered this prestigious competition. Many countries (for example Italy) obtained a team score of nil on their first attempt. This year the team members David Wallace, Rongotai College; Karl Tomlinson, Edgewater College, Auckland; Roger Tiedemann, Auckland Grammar; John Marshall and William Jones, Logan Park High, Dunedin; and Roger Beggs, Naenae College, Lower Hutt scored a total of 47 points (maximum possible 252). This included an outstanding performance by Wellington (Rongotai College) student David Wallace, who scored an outstanding result of 24 (maximum 42) as an individual effort. This earned a silver medal for David which was presented by the Australian Prime Minister, Mr Bob Hawke at the closing ceremony in Canberra on the morning of Wednesday 20 July. The total team score for the 6 member NZ team placed them 34th out of the 49 countries who sent complete teams. Overall 58 countries were represented. The team leaders were Professors Derek Holton (Otago) and Gordon Hookings (Auckland).

1989 NEW ZEALAND MATHEMATICS COLLOQUIUM
15-17 May, 1989

We have been successful in gaining some sponsorship for invited speakers, and we are currently negotiating with several prominent overseas mathematicians who hope to attend. We would still welcome suggestions for further invited speakers, in particular any visitor who may be in our region at this time.

The first circular of the Colloquium will be mailed to all members of NZMS, university departments and others in September. A second circular is planned for early February and a third at the beginning of May. The

formal meeting programme has been arranged to commence at 9 a.m. on Monday May 15, although a special occasion is planned for the Sunday evening.

On Wednesday we intend to have a "Maths Education" day focusing on maths education at all levels. A separate one-day registration would be available for members who wished to come only for that day.

Accommodation in Palmerston North in May is difficult with thousands of extramural students attending vacation courses at Massey. We have made a block booking at Palmerston North Teachers' College hostel, Blair Tenant Hall, in Fitzherbert Avenue about 2 km from the colloquium site. There are some motels closer, however members would need to make their own bookings with deposits by early March.

More details will be provided in the first circular. [**STOP PRESS:** It appears likely that the venue and accommodation for the 1989 Mathematics Colloquium will now be on the Massey University Campus.]

Mike Hendy, Massey University.

NATIONAL COMMITTEES OF MATHEMATICS

There was a joint meeting of the New Zealand and Australian National Committees for Mathematics (NCM) in Canberra during the Mathematical Sciences Congress in May. The current members of the New Zealand NCM are Dr Michael Carter, Dr Rod Downey, Dr Murray Jorgensen, Professor Roy Kerr, Dr Wilf Malcolm, and Dr Gloria Olive (Convener).

E C ZEEMAN

Prof E C Zeeman, FRS, the first Forder Lecturer, has become Principal of Hertford College, Oxford.

SELECTED PAPERS OF BERNHARD AND HANNA NEUMANN

Bernhard Neumann receives the first set of *Selected Papers* from Ralph G Stanton. *(Photos: GJ Tee)*

Bernhard Neumann founded the Research Department of Mathematics at the Australian National University in 1962, and in the following year his wife Hanna Neumann was appointed as Reader. She then became Professor and Head of the Department of Pure Mathematics. [cf. Michael F. Newman, 'Hanna

Neumann (1914-1971)' in Louise S. Grinstein and Paul J. Campbell (editors), *Women of Mathematics : A Biobibliographic Sourcebook*, Greenwood Press, New York, Westport and London, 1987, 156-160.]

The Neumanns together attended some of the early New Zealand Mathematics Colloquia, before Hanna Neumann's untimely death in 1971.

The National Mathematical Sciences Congress was held at ANU, on 1988 May 16 to 20. On the evening of May 17, in a ceremony at Bruce Hall, Dr. Ralph G. Stanton, Director of the Charles Babbage Research Centre (University of Manitoba), presented to Professor Bernhard Neumann the first copy of the *Selected Papers of Bernhard and Hanna Neumann*, in 6 volumes, published by the Charles Babbage Research Centre. (That copy had been specially bound, for presentation to Bernhard Neumann).

Those 6 volumes include commentaries by Bernhard Neumann on the papers, some of which were written jointly by Bernhard and Hanna. The 6 volumes are published at the remarkably low price of US $156, including shipping. (Sets with more expensive binding for library use are available, at a higher price.) The publisher's address is: *The Charles Babbage Research Centre, P.O. Box 272, St. Norbert Postal Station, Winnipeg, Manitoba, Canada R3V 1L6.*

G J Tee

VICTORIA UNIVERSITY OF WELLINGTON
Senior Lectureship in Financial Mathematics

Applications are invited for a senior lectureship in Financial Mathematics in the Department of Mathematics. This position is funded for an initial 5-year period, with possibility of renewal, through the New Zealand Society of Actuaries. The successful applicant will be expected to play a leading role in the development of a new graduate Diploma in Financial Mathematics, centred round material in the first part of the actuarial professional qualifications. It is the intention that this programme, developed in collaboration with the Money and Finance group of the Faculty of Commerce and Administration, will generate further cross-Faculty developments in this area.

Preference will be given to applicants with an established record of teaching and research in financial mathematics. However, applicants with an established record of teaching and research in Statistics and/or Operations Research and a demonstrated interest in some aspects of financial mathematics such as stochastic risk theory, financial statistics, or applications of OR techniques in financial contexts, are also encouraged to apply. The successful applicant will be expected to play a full part in the Department's teaching, research and consulting activities in the general area of Statistics and Operations Research.

The new Diploma will be operated by the Institute of Statistics and Operations Research, an interdepartmental grouping of staff with responsibilities for graduate level courses in Statistics and Operations Research. The Institute's staff and students have access to a wide range of computing facilities. The Institute also enjoys extensive contacts with scientific organizations, government departments and business groups around Wellington and, in particular, has close links with the Applied Maths Division of the New Zealand Department of Scientific and Industrial Research and the New Zealand Department of Statistics.

Special interests of current staff in the Statistics and Operations Research group of the Mathematics Department include time series, multivariate statistics, stochastic processes, statistical computing and data analysis, queueing and network theory, and simulation. The current leader of the Operations Research group and Chairman of the Institute of Statistics and Operations Research is Professor G.A. Vignaux; the leader of the Statistics group is Professor D. Vere-Jones. Special interests of current staff in the Money and Finance group of the Faculty of Commerce and Administration, led by Professor D.K. Sheppard, include capital market theory, corporate financial policy and macroeconomic modelling.

Enquiries concerning academic aspects of this position may be made to Professor G.A. Vignaux or Professor D. Vere-Jones, Department of Mathematics.

Commencing salary will be within the (interim) range $NZ44,600 - NZ56,600 per annum with a possible starting date of February 1, 1989. The closing date for applications is **30 September 1988.**

For conditions of appointment and method of application, prospective applicants should write to the Administrative Assistant (Appointments), Victoria University, P.O. Box 600, Wellington, New Zealand.

SEMINAR ON CAREERS IN THE MATHEMATICAL SCIENCES

Shortly after nine o'clock on Thursday May 26, nearly three hundred young women and educators from over fifty high schools in the Auckland region gathered in a large lecture theatre at Auckland University. They were to spend the day at a seminar exploring possible careers related to the mathematical sciences.

Members of the Organising Committee were Barbara Reilly and Jo Williamson (Computer Science), Margaret Morton and Helen Scott (Mathematics and Statistics), Barry Brennan and Michele Morris (Physics), Margaret Blakeley (Theoretical and Applied Mechanics), Christine Hammett (Liaison Office). The departments represented are concerned about the low number of females among their students and feel that positive action should be taken to encourage more women into these areas of study. The financial burden on these departments was significantly reduced by a grant of $3000 from the University Block Grants Supplementation (Item 6) under "Outreach Initiatives". Interest in the seminar had been very high, but because of space restrictions only a limited number of people could be accommodated.

The day began with a panel presentation by a current computer science student and three women who had studied the mathematical sciences at Auckland University and were now applying this knowledge to their careers. The first, Margaret Mutu-Grigg, had been torn between mathematics and languages, studied mathematics at Auckland University and then used the logical skills developed to carry out pioneering work in the use of computers in the linguistic analysis of Polynesian languages, thus combining both her interests. The second speaker, Robyn Lee-Joe, had completed an engineering degree, worked for several years in a geothermal field and is currently working for the ARA investigating the problem of bus scheduling. The talk by the current student speaker, Clare West, gave the audience a realistic view of a university student's life. On entering the university she had been unable to decide between engineering and computing but after her first year decided on computing. The last speaker, Barbara Simpson, had studied physics at Auckland University and then hydrology in Israel. She had also worked in geothermal fields and was involved in the controversial decision to monitor the hot springs and geysers at Rotorua. The audience appreciated the slides of her in action in the field. She now works on a range of geohydrological problems in the Auckland area. The common theme stressed by all the speakers was that you should study the subjects which you enjoyed and be flexible about changing direction if opportunities arose which really interested you. There is no absolutely rigid path that you must follow for a particular career.

Most of the remainder of the day was taken up by visits to the four departments involved. Each department had a different format but the common approach was to have examples of the type of material studied in the department and role models with careers in the mathematical sciences who explained their professions and answered questions. Some had brought display material related to their work. Participants had been given written biographical sketches on each role model to help them choose those women they particularly wanted to talk to. Current students helped with displays related to the subject area and also chatted with the participants. Other students acted as tour guides taking groups of participants from department to department. The university students took the opportunity to broaden their own career knowledge by talking with the role models.

Specific items in the departments were; for Computer Science a variety of programs illustrating computer coursework at all levels of the degree programme; for Mathematics and Statistics a talk with slides on being a statistician, a computer program demonstrating a blood alcohol research project, a talk on how to earn a living by solving (at a slightly more advanced level) typical high school mathematics 'word' problems and a short video on being an actuary; for Physics a laser display, a talk on geophysics and a video on the supernova; and for Engineering Science computer displays on mathematical modelling (e.g. sailmaker, crew rostering and heart research) and a video about "Women in Engineering".

The closing session brought all the participants together again in a large lecture theatre. They were asked to imagine that they were attending an actual lecture and with the help of some role playing from the facilitator they contributed to a discussion on how they would feel and what they might do if they couldn't hear and/or understand the lecturer. Particular points brought out were: that it was unlikely in a class of that size that the lecturer would know each individual and how she was progressing, and consequently it was mainly up to the student to monitor her own progress and seek help if she had problems. Discussion followed on how she would actually do this. They then had the opportunity to talk individually with the Science Deans on course related matters.

All attendees were asked to fill out an evaluation form before they left. Many of the teachers made specific suggestions for more material to be available for use in the schools at the fourth form level to encourage all students to keep their maths/science options open. In particular it was felt that short videos of women speaking about their various careers in these areas would be effective. As would be expected, some parts of the seminar appealed more to some than others, but overall there appeared to be a good balance. The main complaint was that there just wasn't enough time to absorb everything and possibly the seminar should run for two days!

M J Morton, Auckland

NEW ZEALAND STATISTICAL ASSOCIATION 1988 Publications Catalogue

Statistics at Work (1982; edited by S. Gubbins, D.A. Rhoades and D. Vere-Jones) $13.50. A handbook of statistical studies for the use of teachers and students. Includes eleven case studies accompanied by exercises, numerous references for further reading together with suggestions for class work and projects. Illustrates the practical importance and range of statistical ideas in a New Zealand context.

StatLab (1987; by W. Douglas Stirling) $108.90 (including GST). StatLab is a computer program for teaching statistical concepts to students in introductory statistics courses. StatLab runs on the Apple Macintosh and covers most topics taught in such courses. It can be used by students in practical classes or by teachers in classroom demonstrations. StatLab is sold with a 180-page book containing detailed instructions for 16 practical classes and a full manual about the program. Site licenses are available.

Understanding Surveys (1988; edited by V. Duoba and J.H. Maindonald) $10.00. This booklet provides a non-technical introduction to sample surveys and the many ways in which surveys are used. The focus is on the design of a survey and on the collection of survey data. It has been adapted for New Zealand needs from a document prepared by the American Statistical Association and contains many examples of New Zealand surveys. It includes exercises and can be used in statistics, social science and other courses to give students a brief introduction to sample surveys.

Quotes, Damned Quotes, and ... (2nd edition 1986; compiled by John Bibby) $7.00. An anthology of sayings,epithets, and witticisms—several of them something to do with statistics!

Notes Towards a History of Teaching Statistics (1986; by John Bibby) $12.50 . This book examines the development of a subject and the evolution of a profession. Three key themes relate to the institutional development of numeracy, continual 'identity crises' in statistics, and the agonising emergence of a new profession. These themes are illustrated using a wide variety of episodes including Florence Nightingale's designs for an Oxford professor, Karl Pearson, and many, many more. Useful historical background.

Further information on these publications can be obtained from *NZSA Publications, Department of Mathematics and Statistics, Otago University, PO Box 56, Dunedin.* Send orders indicating the quantity of each item desired with payment to the same address. (Note that, with the exception of StatLab, no GST is payable on NZSA publications.)

200 LEVEL LINEAR ALGEBRA TEXT

Kee Teo (Massey University) and I are completing work on a Stage Two level Linear Algebra text. We began with an attempt to solicit opinions from possible users at each of the New Zealand universities and to incorporate suggestions and pet topics from each. A set of notes used at Massey University and another set used at Auckland University were integrated and rewritten to produce the current manuscript which is being class tested and proofread by a small class at Auckland this year. The result, to be published by NZMS and printed by December 1988, will be available for use in 1989. The text is written at a level that presupposes only a modest acquaintance with vectors and matrices and the geometry of 2- and 3-dimensional euclidean space at a level equivalent to that of a number of our first year algebra papers. We have striven for the elusive but proper balance between formality and informality, theory and applications, simplicity and completeness; and we hope

that the result will be a useful adition to the range of avialable resources.

One feature of the text is its attempt to impart a numerical consciousness, as evidenced by sporadic forays into operation counting, sections on numerical methods for eigenproblems, QR factorizations, and matrix conditioning, and its de-emphasis of determinants (which are relegated to an appendix). Another important feature of this text results from its local origins, word processor-based format, and relatively modest production scale which we hope will give us considerable flexibility at incorporating subsequent changes in response to users' needs. Another important feature will be its low price, estimated at between $25 and $30.

Draft copies have been sent to each New Zealand university, and will give some indication of what the finished product will be like subject to such refinements as proofreading, index, appendices, exercises, binding, cover and title.

We would be grateful if intending users would let us know approximately how many copies they may require as soon as an estimate can be made.

Contents: Chapter 0: Sets, functions groups, fields. Chapter 1: Linear Equations, matrices. Chapter 2: Vector spaces. Chapter 3: Linear transformations. Chapter 4: Inner product. Chapter 5: Least squares, generalized inverses. Chapter 6: Eigenvalues. Chapter 7: Quadratic forms. Chapter 8: Normed spaces. Chapter 9: Numerical methods for eigenproblems. Appendices: Matrix algebra, partitioned matrices, determinants.

David Smith
Mathematics and Statistics Dept.
University of Auckland.

LOCAL NEWS

UNIVERSITY OF AUCKLAND

Computer Science

A one-day seminar, intended for female secondary students who are interested in the mathematical sciences, was held at the University of Auckland on May 26. The Departments of Computer Science, Theoretical and Applied Mechanics, Physics, and Mathematics and Statistics cooperated to run the seminar, to encourage those girls to explore the wide variety of careers which are possible after training in those areas.The 240 participants were able to talk to female university students who operated displays in each department, and to some women graduates working in those sciences. The evaluation forms returned by the participants showed that they had found the seminar to be very well worth attending.

Dr. Peter Gibbons attended the Toronto Experience Conference from May 9 to 13, celebrating 20 years of research in the Department of Computer Science at the University of Toronto. All graduates, faculty members and visitors had been invited, and about 200 people attended. Some distinguished researchers gave talks on all areas of computer science, with a highlight being the survey lecture by Professor Steve Cook (Turing Award winner) on "Complexity Theory and Parallel Computation".

The 3rd New Zealand Expert Systems 1988 Conference was held in Wellington from May 11 to 13. Chris Fromont and Phillip Watkinson spoke on "A knowledge-based system on the selection of adhesives for wood or wood-based substrates"; John Hamer, John Hosking and Rick Mugridge presented a paper on "The evolution of Class language"; Werner Staringer and Herbert Groiss spoke on "The Productions System Language RuleC"; Rick Mugridge and John Hosking spoke on "The development of an expert system for wall bracing design"; Mark Lee and Chris Price spoke on "Towards deeper systems: When will they ever understand?"; and Rick Mugridge was a speaker in the Panel Discussion on "Expert systems in New Zealand".

John Butcher was an invited speaker at the National Mathematical Sciences Congress, held at ANU from May 16 to 20, where he gave a Plenary Address on "Numerical ordinary differential equations and mathematics". He gave a lecture at Monash University on "Linear and nonlinear stability" and a lecture at Melbourne University on "Singly implicit methods for ODEs", and then he attended the International Conference on Numerical Mathematics at Singapore (May 31 to June 4), where he spoke on "Improving the efficiency of singly implicit methods".

A few weeks later John Butcher and Kevin Burrage went to the University of Toronto, for the 1988

Conference on the Numerical Solution of Initial Value Problems (from June 20 to 24). John Butcher gave an invited talk on "Linear and nonlinear stability of general linear methods"; Kevin Burrage, John Butcher, Chris Carter and Fred Chipman presented a paper on "Progress with singly-implicit methods"; and Kevin Burrage spoke on "(k,l)-Algebraic stability of Runge-Kutta methods". Kevin then went to the 1988 IMACS Conference on Scientific Computation at Paris (July 18 to 22), where he gave an invited lecture on "Nonlinear stability of methods for ODEs". He is now a Fellow of the Institute of Mathematics and its Applications (*the* IMA—not another institution which has recently adopted the same name!).

John Whale attended the ANZAAS Centenary Congress, held at Sydney from May 16 to 20.

Garry Tee attended the National Mathematical Sciences Congress, where he spoke on "The history of mathematics in New Zealand", and he gave a lecture at Monash University on "The origins of computers". He then went to the University of Melbourne for the 1988 Annual Meeting of the Australasian Association for the History, Philosophy and Social Studies of Science, where he was elected as the New Zealand Vice-President of AAHPSSS.

Niall Teh has left, and Peter Dance is now the Electronics Technician for the Department.

Seminars

Dr. Peter Fenwick (University of Auckland), "Measurements on a 39km extended Ethernet".

Dr. Michael Dowling (Braunschweig Universität), "Code parallelisation using integer programming techniques".

Professor Hans J. Stetter (Technical University of Vienna), "Recent developments in software for scientific computation".

Barbara Reilly (University of Auckland), "Women and computers".

Dr. Ingrid Granstam (Linköping University), "The girls and technology project".

G J Tee

Mathematics and Statistics

We've had several visitors from overseas during the last few months. Dragan Jankovic is here from Yugoslavia for a year on a Postdoctoral Fellowship. Max Ganster is visiting from the Technische Universität Graz in Austria for several months. In July and August Mary Ellen and Walter Rudin from the University of Wisconsin visited and gave a series of lectures on set theoretic topology and several complex variables. They are University of Auckland Foundation visitors. We also said goodbye to Jock Mackay. He certainly popularised mathematics while he was here by visiting schools and talking enthusiastically with children and teachers. He has special skills in this area developed as part of his duties at the University of Waterloo.

An evening for mathematics teachers from the local region was held at the end of June. The main purpose was to discuss some of the new topics which have been introduced over the last few years into our first and second year courses. There were three twenty minute talks, George Seber described changes that have evolved in the statistics courses, Helen Scott discussed some developments in cryptograhy and Chris King gave an overview of Julia and Mandelbrot sets, enhanced by some very colourful slides. Afterwards there was informal discussion over light refreshments.

Two other events of note that are written up separately in the newsletter are Peter Lorimer being made a FRSNZ and the careers seminar for senior high school girls that we held.

Seminars:

Dr Peter Neumann (Queen's College, Oxford), "Computing with finite groups", "The memoirs of Evariste Galois" and "Breakthrough in algebra 1980".

Professor Robert Bumcrot (Hofstra University, New York), "Surprising results of 'obvious' observations".

Dr K J Worsley (McGill University), "Spatial correlation of tomographic images in the human brain".

Professor T M F Smith (University of Southampton), "Total survey error".

Dr A M Skene (University of Nottingham), "Some thoughts on the use of Bayesian methods in data analysis".

Professor George Styan (McGill University), "On balance and imbalance for block effects in BIB designs, and some related matrix-theoretic properties".

Dr Mary Wilcox (CSIRO), "Top quaility control: an Australian perspective".

M Morton

Theoretical and Applied Mechanics

Life goes on as usual. Assoc Prof Dan Bogen (Bioengineering, University of Pennsylvania) is working on cardiac mechanics problems with Peter Hunter and Dr BH Smaill (Physiology) from 21 May to 3 August. Dr Tony Watts (Mathematics, University of Queensland) spent two weeks with David Ryan working on operations research models and applications. The OR people spend their Wednesday lunchtimes talking informally about their work.

Seminars:

Prof T Belytschko (Northwestern University) "Non-monotonic stress-strain laws: Bizarre behaviour and its repercussions on numerical solutions" and "Finite elements for linear and nonlinear shells."

Dr G Zyvoloski (Los Alamos National Lab.) "FEHM: A heat and mass transfer reservoir simulator."

Prof I Percival (Queen Mary College, University of London) "Chaos in Hamiltonian systems."

Prof EJ List (Cal Tech) "Buoyancy and turbulence."

Richard Sullivan (Graduate Student, TAM) "Yacht velocity design."

Alistair Young (Graduate Student, TAM) "Epicardial surface estimation from coronary angiograms."

Dr J Graham-Eagle (TAM) "Reaction-diffusion equations."

Dr DM Ryan (TAM) " Computational aspects of the solution of set partitioning problems."

David Bullivant (Graduate Student, TAM) "A reservoir flow field model for analysing tracer tests."

D A Nield

UNIVERSITY OF CANTERBURY

Mathematics

Dr Peter Neumann (Queen's College, Oxford) visited us in April and gave two talks, the first a Science Faculty Prestige Lecture about the classification of finite groups, and the second a more specialized account given as a departmental seminar. He also spoke at Lincoln College.

Another Science Faculty Prestige Lecture was given by Professor Ian Percival, our Erskine Fellow. His talk was about a relatively new area of applied mathematics, "Chaos and its applications."

Profesor Lee Peng Yee (Singapore) visited us in April too and gave a talk about some recent work generalizing the Riesz representation theorem.

Richard Laugesen, one of our honours graduates, has left to study for his Ph.D. at Washington University in St. Louis.

Departmental seminars have resumed with two independent (mutually exclusive?) series of talks, one of

general mathematical content and the other statistical.

Graham Wood and David Saville hope to have their book "Statistical Methods: The Geometric Approach" published soon.

And finally, we have had what must surely be the first stolen telephone from a mathematics department—an inevitable consequence of deregulation?

Other Seminars:

Chris Gibson "A motion of simple machines."

Graham Wood "A ramble from statistics to optimization and back to pure mathematics."

Frank Lad "The operational-subjective theory of probability.

H-Q. Bui "Littlewood-Paley decomposition of function spaces and differential operators."

Professor Wenci Yu (Waikato) "On Powell's conjugate direction method."

J Hannah

MASSEY UNIVERSITY

Mathematics and Statistics

Dr Alex McNabb's recent retirement from AMD (Wellington) after a long and most distinguished career did not signal a slow-down in his mathematical activity—far from it. In June he took up an appointment as a Research Fellow at Massey, and his presence is already proving a great stimulus to research activity here. A one-day symposium on Differential Equations is being held in his honour on 11 August, led by Alex himself and by Dr Grant Keady from the University of Western Australia, who is visiting Massey during July and August.

August also sees Massey hosting the 1988 Statistical Association conference, featuring the Minister of Statistics as one of the invited speakers. Since August is also the season of vacation courses for our extramural students, it looks like being a busy time.

Charles Little recently spent two weeks in Germany (at a conference on graph theory) and in Austria where he was able to renew the collaboration with Franz Rendl of the Technische Universität Graz, begun when they were both on leave at Waterloo. Franz almost immediately paid a return visit, bringing his wife and children with him to Palmerston North, where he is spending July and August working with Charles.

Mike Steel was invited to talk to the annual meeting of the Society for the Study of Evolution (in Asolomar, California), on his work on evolutionary trees. He reports exciting events there, as the title of his seminar (the last on the list below) suggests. [See also his report elsewhere in this Newsletter.]

Graeme Wake was away for three weeks in May and June, participating in part of a year-long symposium on Reaction-Diffusion Equations at Heriott-Walt University in Edinburgh, and working with Andrew Lacey.

Gordon Knight and Hugh Morton are away at the time of writing (July)—Gordon is taking a short leave in Europe to attend the Sixth International Congress on Mathematical Education in Budapest, while Hugh is taking his sabbatical in Vancouver.

Seminars:

Hugo Varela (Massey Computer Centre), "Linear programming applications in biology."

Graham Oddie (Massey Philosophy Department), "The problem of truth-likeness (and the solution)."

Bruce Murtagh (Univ of NSW), "Industrial applications of mathematical programming."

Chris Gibson (Melbourne), "Motions of a simple machine."

Lee Peng Yee (Singapore), "Mathematical education in China."

Peter Neumann (Queen's College, Oxford), "Breakthrough in Algebra, 1980."

John Koolard, "Effects of training on athletic performance."

Robert J Bumcroft (Hofstra Univ, New York), "Surprising consequences of 'obvious' observations."

Charles Lawoko, "Sampling properties of some estimators of mixing proportions."

Alistair Hall, "A mathematical journey: From cell growth modelling to combinatorics and statistics."

Wenci Yu (University of Waikato and Fudan University, Shanghai), "DFP algorithm convergence for not necessarily convex functions," and "Some results on vehicle routing problems."

Franz Rendl (Technische Univ. Graz), "Quadratic assignment problems and subgradient optimization."

Mike Steel, "Evolution, research fraud, and slanderous allegations: scientists fight it out at Asilomar."

M R Carter

OTAGO UNIVERSITY

Mathematics and Statistics

CASM (the Centre for the Application of Statistics and Mathematics) is now officially in operation. This year it is being coordinated and administered by Prof Vernon Squire (Director), Prof Derek Holton, and Dr Frederic Lam.

Dr R E L (Tank) Aldred, our Beverly Research Fellow and husband of Karen (our department secretary for the past ten years), has accepted an assistant professorship at Southern Illinois University at Carbondale, and hence will be leaving Dunedin with our secretary in August.

Dr Akira Saito (Sendai University, Tohoku, Japan) is visiting our department this year in order to work with Prof Derek Holton on some problems in graph theory.

Our four newest graduate students are Marianne Dyrkacz who comes from Canada and is studying statistics with John Rayner; Chen-Jian from Inner Mongolia, studying Group Theory with John Curran; Raymond Scurr, Mathematics Honours graduate of Otago University studying combinatorics with Gloria Olive; and Hongying (Pearl) Huang from Beijing, studying finite element methods with Ray Enlow.

Mr Russell Dear (1988 Otago Teaching Fellow) has recently returned from his visit to Australia as a Woolf Fisher Fellow to learn about programs for extending talented students in mathematics, especially in the area of mathematical modelling. He comments: (1) "Extension activities for talented students are considered to be elitist by many Australians, and unfortunatley the same is felt by many in this country." (2) "There seems to be more of a climate for innovation in the mathematics classroom in New Zealand than Australia. However, our best students come out of school knowing less mathematics than their Australian counterparts because of the syllabuses laid down for the last two years of schooling."

University Extension courses entitled "Problem solving in mathematics" (directed by Derek Holton) and "Essential mathematics for arts, commerce and the sciences" (diredcted by Bram Evans) were held in April and May. The problem solving course was broadcast from Dunedin to eleven other centres throughout Otago and Southland using the University of Otago's teleconference system. There were about 50 students enrolled in the essential mathematics course which was based on Sharleen Forbes' book, *Basic Skills in Mathematics*. Various members of the Department served as tutors.

The Otago and Southland Mathematics Associations have helped to organise a radio quiz for Form 3 students on stations 4ZA and 4ZB.

The mathematics department again conducted the National Bank Junior Mathematics Competition, and there was even more participation than last year. Prizegiving ceremonies will take place in the various centres.

Prof Vernon Squire and his wife Dr Pat Langhorne, a lecturer in the physics department, are delighted to announce the arrival of Jonathan, who had a very mathematical birthday (22.4.88).

Seminars:

Dr Peter Neumann (UGC Commonwealth Prestige fellow from Queen's College, London), "Did Galois deserve to be shot?", "Computing with finite groups", "Enumerating finite groups."

Mr Victor Flynn (Graduate student at Cambridge University), "Curves of genus 2."

Professor Lee Peng Yee (National University of Singapore), "The Riemann-type integrals."

Dr Chris Gibson (University of Melbourne), "Motions of simple machines."

Professor G T Herman (University of Pennsylvania), "Inversion of Radon transforms with medical applications."

Dr R E Moritz (Polar Science Center, University of Washington), "Synoptic scale air-sea-ice interactions in the Ross Sea."

G Olive

VICTORIA UNIVERSITY OF WELLINGTON

Mathematics

Dr Peter Smith has been appointed to the vacant lectureship in Statistics; we shall be welcoming him in September. He has a Ph.D. from London and is currently lecturing at Glasgow. His field is stochastic processes and their applications to time series and telecommunications.

There are two other vacancies at present. An advertisement appears on page 5 of this Newsletter for a Senior Lectureship in Financial Mathematics (financed by the actuarial profession), and the applications for a Lecturship in Pure Mathematics are being considered at the time of writing.

Congratulations to Mark Bebbington (now doing an M.Sc. on percolation processes) for the Commonwealth Scholarship he has been awarded to do a Ph.D. in Cambridge under Dr Frank Kelly.

Our first-year statistical courses have now both been approved for Commerce students; for many years they had to do either our second-year course or an Economics Department first-year one. The mathematics courses are now alternatives to the latter.

David Vere-Jones will be away until the beginning of August, working on seismological statistics in Rome and at a conference on statistics teaching in Budapest. He and Peter Thomson have both been awarded grants to visit the Institute of Statistical Mathematics in Tokyo at the end of the year.

Terence Nonweiler is back from his year's leave in Cambridge.

J F Harper

GRANTEE REPORT

MICHAEL STEEL

Last June with the help of a grant from the New Zealand Maths Society, I attended and presented papers at two conferences in Northern California. Both conferences related directly to work I am undertaking towards a Ph.D. on problems that arise in reconstructing evolutionary trees from DNA sequence data.

The first conference, hosted jointly by the Society for the Study of Evolution and the American Society of Naturalists, was held at the Asilomar Conference Center, set in coastal bush near Monterey. It was a lively four-day event with sometimes heated exchanges between speakers—including, at one stage, allegations of research fraud. On a somewhat higher plane John Maynard Smith gave a far-ranging keynote speech on some of the central theoretical questions in biology.

The conference gave a heavy emphasis to mathematical taxonomy, and I had several useful discussions with one of its main critics—Seattle-based genetisist and statistician, Joe Felsenstein. Felsentein and co-workers have been interested in similar questions to work being undertaken at Massey University by Mike

Hendy, David Penny, Ian Henderson and, more recently, Ingrid Rinsma and myself. Combining our results at the conference, one of Felsenstein's co-workers Jim Archie was able to answer a question he and others had been looking at for some time. In return I was able to discover more precisely what was known in this area, who was working on what, and the key questions remaining.

The second conference on discrete mathematics was hosted by the Society for Industrial and Applied Mathematics (SIAM), and held in San Fransisco. A large portion of the four-day event was devoted to graph theory and combinatorics, both of which relate to my work. There were also several intriguing papers on cryptography, which attracted a number of people from defence and security organisations. The conference included a major presentation on random graphs by Ronald Graham who also attended my talk, and offered useful comments afterwards. Stephen Smale, Herbert Wilf, Donald Knuth and Daniel Kleitman also gave presentations on a wide variety of topics related to discrete mathematics. Both conferences provided ample scope for discussion with other participants which I found particularly useful.

I would like to thank the New Zealand Maths Society for sponsoring me to attend these conferences.

Michael Steel
Massey University

NEWSLETTER READERS' QUESTIONNAIRE RESULTS

In the August 1987 issue of the Newsletter, Mark Schroder enclosed a Readers' Questionnaire which invited readers to express their opinions about the layout, content and format of the Newsletter. Replies were received from only 37 of the approximately 200 NZMS members. The replies were tabulated on computer at the University of Waikato. What follows is a summary of the opinions received, based on a report to Council prepared by Dr Margaret Morton.

It was very clear that the Newsletter should be continued, and that it was considered to have significant value to the majority of the readers. Several people commented that an important aspect of the Newsletter was to keep widely dispersed mathematicians in touch and in human contact. The current number of issues per year, layout and number of features suited most people. There were favourable comments about its professional appearance and suggestions that there should be a paid production assistant because of the amount of work now involved. Suggestions for categories of new material which received strong support were:

Interactions with industry	71%
Employment guide	66
Teaching column	65
Applications within mathematics	54
Product reviews	50

A further suggestion was 'It would be nice to get some general mathematical gossip about things making a splash in the mathematical world if timely, e.g. who got the Fields medal, Faltings work on the Mordell conjecture'.

Current articles in the Newsletter read or used regularly by nearly half or more of the respondents were:

Centrefolds	92%
Local news	89
General news	83
Feature articles	78
Issues and debates	65
Table of conferences	62
Book reviews	54
List of visitors	53
Society business	50
Minutes of general meetings	49
Minutes of council meetings	46

There were a number of specific comments on the existing regular features:

Centrefolds: 'An honour we can aspire to, to be the subject of one', 'This is helping me to learn about the "old guard" of NZ maths', 'Interesting records of endeavors by our peers—I enjoy seeing them and seeing people being acknowledged' and 'As with local news, they bring some personality to the world of the mathematicians. Keep on producing them'.

Local news: 'Perhaps as well as births, deaths marriages more emphasis on current concerns, new courses and reasons for introduction, relations with other university departments, frustrations etc.', 'More of what might interest members in other cities, less of what is of interest only to the department' and 'I do get tired of reading who's gone overseas or just returned as if this is the only noteworthy thing we do'.

Feature articles: 'Perhaps more of them. Also suggest perhaps having "notices AMS" or "Bull LMS" type articles discussing recent events in world research'.

Issues and debates: 'Mathematicians need to be more politically aware and more politically active', 'Latest Forum type articles stimulate debate at morning tea, even if not much feedback to Newsletter. Thus good'.

Visitor list: 'My one complaint about such lists is that they invariably appear too late for any action to be taken. We need a list of "hoped for" visitors a year in advance'.

Book reviews: 'On the whole, these also help me to keep up with other areas, which I think is important'.

Problems and queries: 'Good idea—but time alas is lacking' , 'I rarely attempt the problems, too many of my own! But I often read them and their solutions' and 'I would be far more interested in "open questions" of a general nature, especially those being looked at by others in NZ'.

Crosswords: 'Don't usually get a chance—those I've done I've enjoyed'. Perhaps a good summary comment on the problems and crossword was 'Quite frankly I just don't have the time. I enjoy checking over the problems and crossword but I rarely get further than that. Keep them going though, maybe when I retire....'.

Just over half the respondents felt professionally isolated in NZ. As previously mentioned many felt the Newsletter helped to reduce the isolation a little: 'It is a very useful contact point. Given our apparent inability to find resources so people can travel to each other's universities, I find it an ideal way of maintaining valuable contact'. From one respondent, 'I do however feel that this is not just the physical isolation of NZ but to some extent the lack of internal interaction amongst NZ mathematicians. More small meetings might help but it is not clear that others want such'. Several mentioned that electronic mail was helping to reduce the feeling of isolation.

One final quote: 'The Newsletter has an important "esprit de corps" role for NZ mathematicians'.

BOOK REVIEWS

SPRINGER-VERLAG PUBLICATIONS

The following Springer-Verlag publications are available for review. Interested members should contact

David Alcorn
Department of Mathematics and Statistics
University of Auckland.

Algorithms and Combinatorics

1.	Borgwardt K.H.	The simplex method. 268 pp.
2.	Grötschel M (et al)	Geometric algorithms and combinatorial optimization. 362 pp.
3.	Murota K.	Structural solvability and controllability of systems. 281 pp.

Applied Mathematical Sciences

63.	Grasman J.	Asymptotic methods for relaxation oscillations and applications. 321pp.

Applied Probability

Resnick S.	Extreme values, regular variation and point processes. 320 pp.
Shedler G.S.	Regeneration and networks of queues. 223 pp.

Ergebnisse der Mathematik und ihrer Grenzgebiete

8.	Mané R.	Ergodic theory and differentiable dynamics. 330 pp.
12.	Bochnak J. (et al)	Géométrie algébrique réelle. 373 pp.

Graduate Texts in Mathemtics

109.	Lehto O.	Univalent functions and Teichmüller spaces. 257 pp.
111.	Husemöller D.	Elliptic curves. 350 pp.
117.	Serre J-P	Algebraic groups and class fields. 207 pp.

Grundlehren der Mathematischen Wissenschaften

286	Andrianov A.N.	Quadratic forms and Hecke operators. 374 pp.

Lecture Notes in Mathematics

1238.	Holz M (et al)	Injective choice functions. 183 pp.
1239.	Vojta P.A.	Diophantine approximations and value distribution theory. 132 pp.
1241.	Garding L.	Singularities in linear wave progagation. 125 pp.
1244.	Müller W.	Manifolds with cusps of rank one. 158 pp.
1245.	Rallis S.	L-functions and the oscillator representation. 239 pp.
1249.	Van den Berg I	Nonstandard asymptotic analysis. 187 pp.
1253.	Fischer J.	An approach to the Selberg trace formula via the Selberg zeta-function. 184 pp.
1254.	Gelbart S (et al)	Explicit constructions of automorphic L-functions. 152 pp.
1257.	Wang X.	On the C*-algebras of foliations in the plane. 165 pp.
1258.	Weidmann J.	Spectral theory of ordinary differential operators. 303 pp.
1259.	Cano Torres F.	Desingularization strategies for three-dimensional vector fields. 89 pp.
1260.	Pavel N.H.	Nonlinear evolution operators and semigroups. 285 pp.
1261.	Abels H.	Finite presentability of S-arithmetic groups. 178 pp.

1269.	Shiota M.	Nash manifolds. 223 pp.
1272.	Livsic MS, Waksman L.L.	Commuting nonselfadjoint operators in Hilbert space. 115 pp.
1274.	Phillips N.C.	Equivariant K-theory and freeness of group actions on C*-algebras. 371 pp.
1280	Neher E.	Jordan triple systems by the grid approach. 193 pp.
1300	Seligman G.B.	Construction of Lie algebras and their modules. 190 pp.
1301	Schappacher N.	Periods of Hecke Characters. 160 pp.
1304	Gouvea F.Q.	Arithmetic of p-adic modular forms. 121 pp.
1307	Murai T.	A real variable method for the Cauchy transform, and analytic capacity. 133 pp.

Perspectives in Mathematical Logic

Soare R.I.	Recursively enumerable sets and degrees. 437 pp.

Springer Series in Soviet Mathematics

Dezin A.A.	Partial differential equations. An introduction to the general theory of linear boundary value problems. 165 pp.
Faddeev LD, Takhtajan L.A.	Hamiltonian methods in the theory of solitons. 592 pp.

Undergraduate Texts in Mathematics

Lang S.	Undergraduate algebra. 256 pp.

Universitext

Goldblatt R.	Orthogonality and spacetime geometry. **190 pp.**
Lafontaine J. (et al)	Riemannian geometry. **248 pp.**
Montensinos J.	Classical tesselations and three manifolds. **230 pp.**
Rybakowski K.P.	The homotopy index theory on metric spaces with applications to partial differential equations. **208 pp.**
Smith K.T.	Power series from a computational point of view. **132 pp.**
Tondeur P.	Foliations on Riemannian manifolds. **247 pp.**

Miscellaneous

Borg I, Lingoes J.	Multidimensional similarity structure analysis. **390 pp.**
Bourbaki N.	Topological vector spaces. **365 pp.**
Lang S.	Introduction to complex hyperbolic spaces. **271 pp.**
Mikhlin S.G., Prössdorf S.	Singular integral operators. **528 pp.**
Ribenboim P.	The book of prime number records. **476 pp.**
Zeidler E.	Nonlinear functional analysis. IV : Applications in mathematical Physics. **975 pp.**

D P Alcorn

ISSUES/OPINIONS

SEVENTH FORM MATHEMATICS (WITH CALCULUS)

Imagine having to choose among three school leavers on the basis of their seventh form mark in Mathematics; perhaps you want to employ one of them, or you have an award to give, or you are deciding entry to a professional school. The only information you have is that two of them got 96% and 84% in the Bursary Mathematics with Calculus exam and the third got 60% in the Scholarship exam for the same subject.

If you believe in the objectivity of exams you would probably choose them in the order I described

them: after all 96 is better than 84 and 84 is better than 60, though you might have some qualms about comparing different exams.

As 96 is the highest mark possible in Bursary, your first choice looks like the right one. In 1986, 84 was the 98th percentile mark in Bursary, and 60 was somewhere around the 82nd percentile in Scholarship. As there are six times as many entries in Bursary as in Scholarship and the better students sit Scholarship, you might guess that the 82nd percentile in Scholarship is the 97th percentile in Bursary; your second choice looks pretty good too.

I have to admit that I chose my examples rather carefully. It so happens that in Bursary in 1984 one raw mark of 98 was scaled to 96 and one of 99 to 84. By selecting the 96 student you chose the one with the lower raw score. Actually, I don't believe an exam of the Bursary or Scholarship type (or any other type for that matter) distinguishes in any meaningful way among the top students.

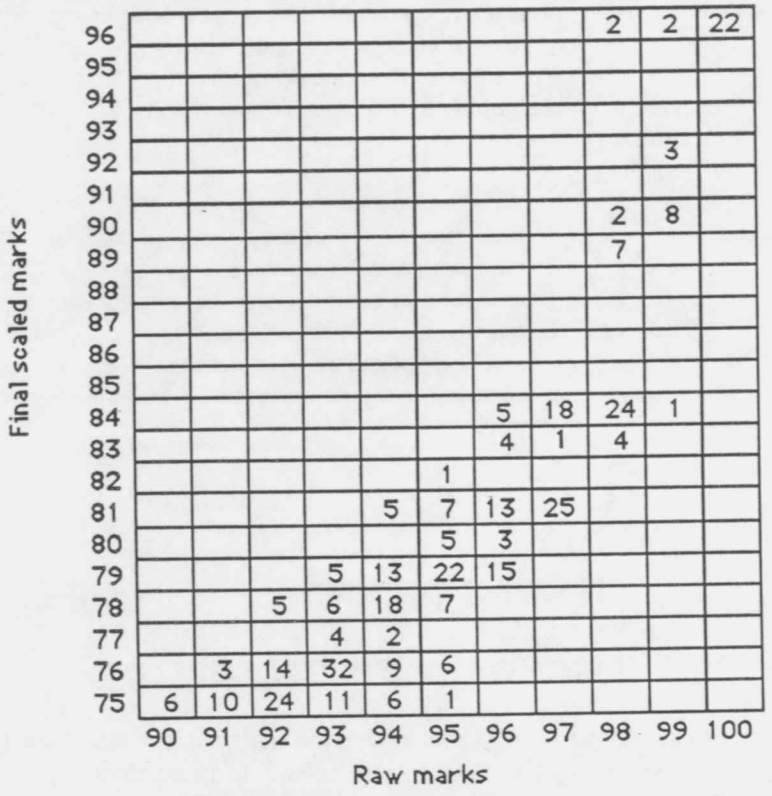
What about the mark of 60 in Scholarship? I have seen students with 96 in a Bursary exam and 60 in the corresponding Scholarship; it could be that the first student and the third you chose were actually the same person! Students with these marks gets two messages: from their Bursary mark of 96 they learn that no student in the country is better than they are at the subject, and from the Scholarship they learn that about 18% of those who sat Scholarship are better than they.

We are led to believe that external exams provide an "objective standard" against which students can measure themselves; in fact, they provide nothing of the sort. It would be bad enough, but at least consistent, if 98 went to 96 and 95 to 84 but this example makes nonsense of everything we are ever told about the objectivity of external exams.

Over the last four years or so I have some experience with seventh form mathematics as a Bursary marker, a father of a Bursary and Scholarship candidate and a tutor of others, in a classroom and out of it. I have stood at the chalkface and I have become an admirer of the job the teachers are doing with our children.

BURSARY SCALING

My feelings about Bursary are dominated by what I have found out about the scaling. This may seem rather surprising, given the large number of factors involved in the Institution which is seventh form mathematics, but, read on.



7 at (95,81) means that 7 students with raw mark 95 were given a final mark of 81.

FIG. 1

In 1984 I helped mark the Bursary Pure Mathematics paper. I collected the final marks of all students who got 75 or more, and when the Chief Examiner was away, I broke into his office and compared these with their raw scores. The result is Figure 1. It shows, for example, the student who was scaled from 99 to 84 and the four who were scaled from 98 to 83. All those who got 100 in the exam were scaled to 96, those who got 99 went to a mark between 96 and 84, and those with 98 from 96 to 83. Now, it is a great achievement to score 100% in an exam like Bursary. On the whole I don't suppose that it is too objectionable to scale it to 95, if it is well known that that is the highest score possible. However, given all the variations in performance caused by such things as nervousness, insomnia, troubles at home and so on, I can't see that there is any significant difference between marks of 100 and, say, 95, yet one student with 95 lost 20 marks and went down to 75. The attitude of the Entrance Board is neatly described in their newsletter: "Raw scores ... are simply the device which is used to obtain a rank order for each subject in the examination". So much for the tears shed in the generation of those raw scores.

How does this weird scaling come about? According to the University Entrance Board Newsletter to Schools of 7 October 1985, "the raw scores for each marker in each subject are normalised to the same mean and standard deviation", presumably with the intention of removing variations among markers. In Mathematics, during my marking years, the scripts were assigned to markers in blocks of student numbers: for example in 1984, I got from 530000 to 533985. As these numbers are assigned alphabetically, this means that the first scaling is done in blocks chosen alphabetically. Each student is in a small competition with others in the same part of the alphabet, which appears to explain the nature of Figure 1. If you got 98% and no one from your part of the alphabet got higher you were scaled to 96; if you got 99% but one or two close to you in the alphabet got 100, then tough luck, they were put on 96 and you were put down, perhaps to as low as 84.

This adds a whole new dimension to the problem of attaching significance to exam marks. Along with the standard things known to affect results in exams, like feelings of well-being while sitting it, teachers' facility in picking the questions and, dare I add, ability in the subject, can now be added, position in the alphabet. Who can doubt that this discovery will rank among the great advances in the Theory of Educaton?

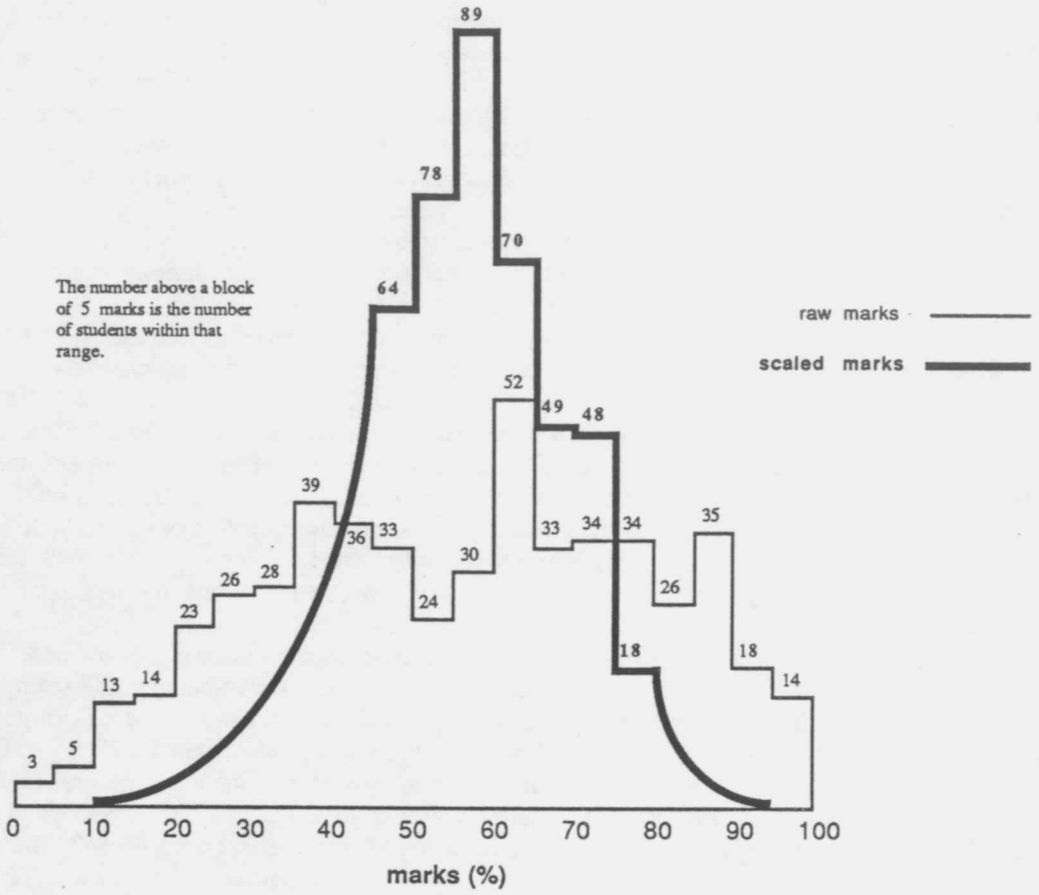
What message do students get from the marks sent to them by the Universities Entrance Board? What message should they get? Imagine one of the students referred to above who scored 99% and was perhaps even confident of having got 100%. What should he or she read into a final mark of 84? This student may have to use it to decide whether to continue with Mathematics or, perhaps, abandon it in favour of, say, Architecture. How can rational decisions be made? Do students get disappointed in receiving marks considerably lower than they feel they have achieved? Yes! Do they lose confidence? Yes!

My comments here have been confined to the highest scoring students; for many reasons they happened to be the ones that interested me when I worked out Figure 1. I would guess that the worst injustices are done to them but I would love to see the rest of the table. I make no apology, though, for publishing incomplete data; it is enough of a scandal in itself.

Figure 2 shows the raw and scaled marks of the 515 students whose scripts I marked in 1984. The raw marks are spread more or less uniformly from 20 to 90 with a drop-off at the ends: the scaled marks are sharply peaked with very sharp drop-offs. How can a change from one distribution to a completely different one be justified?

(The graph of Figure 2 below shows the raw and scaled marks of all the scripts I marked in the 1984 Bursary exam. The scaled graph is not entirely accurate as it is based on only 27 different observations; the curved sections at the ends indicate only that 13 students ended up wlith more than 50% and 77 with less than 45%.)

FIG. 2



The overall percentiles for scaled marks in Pure Mathematics in 1984 were presented in the UEB Newsletter of 7 October:

Percentile	10	25	50	75	90	99
Mark	41	49	57	65	72	84

In 1984, 127 pupils or 25% of the pupils whose scripts I marked scored more than 75% in the exam, thus achieving A passes under the standards I am used to. This seems to me to be a great achievement and one that they and their teachers can be proud of. But it is not good enough for the Universities Entrance Board. After scaling, only 31 or 6% of them were left above 75%; the rest were downgraded to B's with 75 going down to 65. While I don't want to labour the point, it is important that our successful students be told they are successful and be given marks which reward their success. With our system, a student's result for a whole year is compressed into one number which they are told is an objective measure of their achievement. It just doesn't make sense.

SCHOLARSHIP

In 1969, 62,564 children were born in New Zealand, and seventeen years later in 1986, 5,517 sat Mathematics with Calculus for Bursary and 923 for Scholaship. This indicates to me that about 9% of the age group sits the Bursary paper and about 1.5% the Scholarship.

The top 1.5% of our children are a pretty important bunch and we might ask: what are the principles guiding their study of Mathematics?

The prescription for the Scholarship exam is: "The material as set out for the Bursaries prescription for Mathematics with Calculus, but with questions set to a higher standard and with greater emphasis on problem-solving and logical skills, including proofs by induction".

In their reports, various examiners have commented in these terms: "its intentions (are) to provide a high level of achievement for the most gifted students", "this was a testing examination with plenty to

challenge the best candidates", "the top 40 candidates have been nicely ranked by this examination form 76% to 100% of the raw marks", "the aim of the examiner was to produce a challenging paper ... a few candidates scored poorly, leading me to wonder about the value of encouraging students with little ability to enter the scholarship examination", "the examination achieved its purpose of testing the most able students".

One part of the syllabus is complex numbers and perhaps the deepest part of it is de Moivres' Theorem. In 1986 the Bursary candidates were asked to plot on an Argand diagram the number

$$\left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6} \right)^{14} .$$

In the same year the Scholarship students were asked the following:

Let $z = \cos\theta + i \sin\theta$; this means that z lies on the unit circle $|z| = 1$.

(1) Use de Moivres' Theorem to show that

$$\frac{1}{z} = \cos\theta - i \sin\theta ,$$

and find similar expressisons for z^n and $1/z^n$.

(2) Hence show that

$$z + \frac{1}{z} = 2\cos\theta , \quad \text{and} \quad z^n + \frac{1}{z^n} = 2\cos n\theta .$$

(3) Assuming that z lies on $|z| = 1$, solve

$$5z^4 - 11z^3 + 16z^2 - 11z + 5 = 0 .$$

In my opinion the Bursary question and the first two parts of the Scholarship one form an adequate test of a seventh former's knowledge of de Moivres' Theorem. Part (3) was presumably chosen to "provide a high level of achievement for the most gifted students and test the most able students". According to the examiner it "required insight and inspiration with fewer than 10 candidates succeeding with it". As it appears to have been worth about 2.5 marks a student could devote about 4 minutes to it and in this time would have to recognize the symmetry of the expression, divide by z, and so on. In other words, this is the sort of question that could only be answered in an appropriate amount of time by someone who has seen something like it before! And here we come to the crux of the matter. Given that almost all the students who sit the Scholarship exam are very bright, the ones who do well and are rewarded by high marks are not the gifted among them, nor the most able but those who are trained to sit the exam. This is borne out by the results each year. Some schools, typically big or with the power to choose their intake at Form 3, tend to dominate the results. They use strategies like guiding a class through the Bursary syllabus in four years, leaving the fifth for polishing the techniques for scoring well: in the words of the Principal of one of them, "We believe in examinations (and) we teach to them". It is a successful way of getting results but it is hard to see what it has to do with educating our brightest students in Mathematics.

In his book "A Mathematician's Apology" G.H. Hardy writes of mathematics in terms of its seriousness, its significance, its importance and its depth. Without doubt, the study of the solutions of polynomial equations comes under all these headings; is it not one of the classical studies of mathematics? It must be rated highly as a subject of study for the best of our seventh forms, so let us examine part (3) of this question in Hardy's terms. The real game being played is given away by the condition at the beginning: "Assuming that z lies on $|z| = 1$". Clearly the question has been made up for the exam; the polynomial has carefully chosen linear factors and the student's task is to unravel what the examiner has knitted. Of course exam questions must be carefully made up and the examiner has used a proper technique but they must test something beyond the ability to answer the type of question they happen to be. I assert that this one has no significance beyond its role as an exam question; it does not test a general method of solving polynomial equations, nor does it lead the student into an important field of mathematics, nor does it act as a guide for the

classes of future years. It is an instance of what Hardy calls "trivial mathematics".

Another point is illustrated by Question 1 in the same Scholarship paper:

> If the line $px + qy = 1$ is a tangent to the parabola $y^2 = 4a(a-x)$, what conditions must the constants p, q and a satisfy?

According to the examiner's report, "It was expected that candidates would eliminate one variable from the two equations and then apply the zero discriminant condition for equal roots to give $p = a(p^2 + q^2)$ as the condition for tangency. This was done but many instead found dy/dx for each equation and equated those expressions. Only one candidate followed this procedure to a successful conclusion". To comprehend this question you need to do four things: work through the question using both the methods suggested and then do the same things with $y^3 = 4a(a - x)$ instead of $y^2 = 4a(a - x)$.

Roughly speaking it is the top 1.5% of the age group that is sitting this paper. It is at least their second year at calculus and the paper is called "Mathematics with Calculus". My feeling is that these students should now be associating the words *tangent* and *derivative*; when they see one, they should be taught to think of the other. Compared with understanding the link between tangents and derivatives, the facility to deal with special properties of quadratic equations is as nothing. Again we have a question which is of little relevance outside the exam room, but this one is worse because it punishes the student who has developed the deeper knowledge of the subject. To add another word to Hardy's list, the fertile idea has been displaced by a sterile one.

The edition of Hardy's book that I own has a foreword by C.P. Snow and, to tell the truth, I find it more interesting than the book itself. He has this to say about Hardy's undergraduate days in Cambridge.

> Almost since the time of Newton, and all through the nineteenth century, Cambridge had been dominated by the examination for the old Mathematical Tripos. The English have always had more faith in competitive examinations than any other people (except perhaps the Imperial Chinese): they have conducted these examinations with traditional justice: but they have often shown remarkable woodenness in deciding what the examinations should be like ... It was an examination in which the questions were usually of considerable mechanical difficulty—but unfortunately did not given any opportunity for the candidate to show mathematical imagination or insight or any quality that a creative mathematician needs ... It had only one disadvantage, as Hardy pointed out with his polemic clarity, as soon as he had become an eminent mathematician and was engaged, together with his tough ally Littlewood, in getting the system abolished: it had effectively ruined serious mathematics in England for a hundred years.
>
> In his first term at Trinity, Hardy found himself caught in this system. He was to be trained as a racehorse, over a course of mathematical exercises which at nineteen he knew to be meaningless. He was sent to a famous coach ...(who) knew all the obstacles, all the tricks of the examiners, and was sublimely uninterested in the subject itself.

How well these few paragraphs describe our Scholarship exam: its competitive nature, the mechanical questions, substitute the famous schools for the famous coach. Who knows, maybe the Scholarship exam has been responsible for ruining mathematics in New Zealand for a hundred years or however long it has been instituted!

CONCLUSION

The Universities Entrance Board has the solution to these difficulties in its own hands. In May 1985 it gave general support to the following broad principles:

(1) That there should be a national examination at Form 7, and that teachers in schools should provide a significant proportion of the marks awarded.

(2) That in the long term such an examination should be achievement based rather than rank oriented.

(3) That the examination should serve both to provide candidates with the right to enter university and as the basis of merit awards or scholarships.

I feel that a sensible Seventh Form examination can be worked out within these guidelines. Broadly speaking, I believe that some things can be measured well by examinations and some can't, and that examinations should be restricted to testing the things they can measure with some degree of reliability. The sorts of thing I have in mind are the straightforward skills that might be tested by a question such as

$$\text{Use the substitution } y = e^x + 1 \text{ to find } \int e^x \sqrt{e^x + 1}\ dx\ ,$$

but nothing as complicated as

$$\text{Compute the integral } \int e^x \sqrt{e^x + 1}\ dx\ ,$$

which appeared in 1985 Bursary, and certainly nothing like

$$\text{Find } \int \tan^3 x\ dx\ ,$$

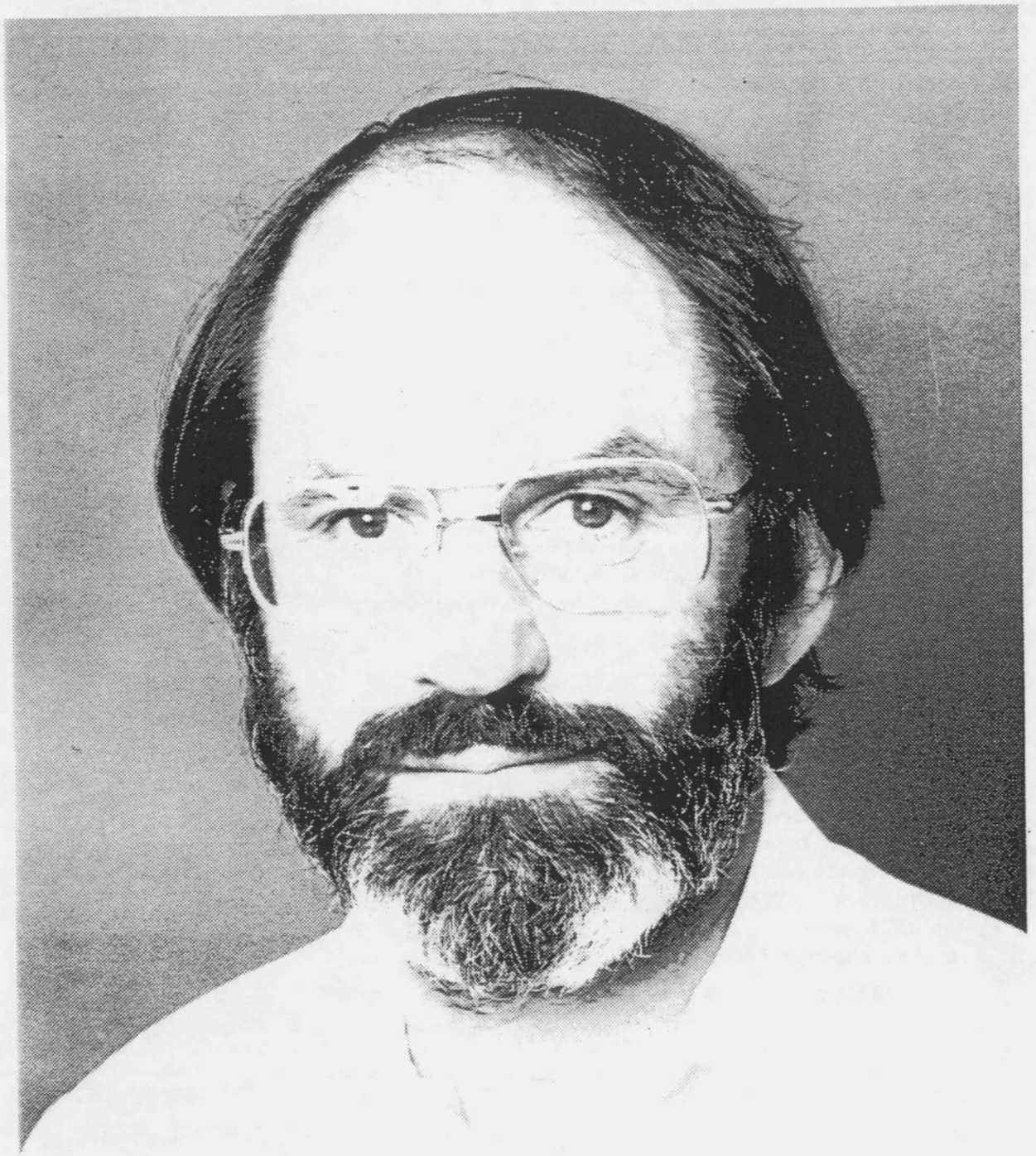
which was in 1986 Scholarship and appears to test little except whether the pupil sitting the exam has seen it before.

It is not that there is anything wrong with being able to answer questions like these but there are other more desirable things that might be included in a student's training—things that require imagination, initiative, original thought and an understanding of what mathematics is about.

If there is to be a national exam, let it be of this type and let it count for no more than 25% of the final mark. The other 75% could be judged by internal assessment, properly moderated by an external authority.

Peter Lorimer
University of Auckland

[Ed. Note: The above article was sent to Mr M Murtagh, Universities Entrance Board Secretary, for his comment. He replied verbally that he wished to make no formal comment about the article, that he had no objection to its publication, that the Board was aware of most of the issues raised in the article, that much of what was said had been raised in its Newsletter to Schools over the last five years, and that he felt that personally he was philosophically close to Peter Lorimer.]



Professor Peter Lorimer

PETER JAMES LORIMER

by JC Butcher

Peter Lorimer was born in Christchurch and studied at the University of Auckland and at McGill University in Montréal. After obtaining the PhD degree from McGill, he held lectureships there and at the University of Canterbury. He moved to Auckland as a Senior Lecturer in 1966 and was promoted to an Associate Professorship in 1973. He has also held visiting positions in a number of overseas universities.

Peter's research has been in group theory, projective geometry and combinatorics. In addition to his research and teaching, he has played many important roles in the development of Mathematics in New Zealand. He is a strong advocate of such curriculum reforms as would render Mathematics more accessible to a wide range of student abilities and interests. He is also a strong supporter of the principle that Mathematics and its applications are intimately connected and should be taught in relationship with each other.

Peter played a central part in the planning leading up to the formation of the New Zealand Mathematical Society. After the Society was formed he continued to play an active role and in particular has served as a council member and treasurer.

His work in the theory of groups ranges from abstract questions about the structure of groups to applications of group theory especially to geometry. Groups, especially those with a finite number of elements, have been studied intensively for the last 50 or 60 years. Peter Lorimer's contribution to this subject began with his doctoral thesis at McGill and continued over the next decade. During this time of active publication on group theory, he became increasingly interested in finite projective planes and also started making contributions to this area.

It is well known that for each prime number p and positive integer n, there exists a projective plane of order p^n, but it is extremely difficult to determine which other numbers are possible as orders of projective planes. Furthermore, the classical projective planes are based in a simple way on the properties of Galois fields, and it is an interesting and difficult question whether other types of planes of order p^n might exist. Peter Lorimer has made important discoveries relating to both of these questions. A famous piece of research by him deals with so-called translation planes of order 16. The most important and interesting plane of this type was discovered and studied by him and eventually led to the classification of all planes of this type and order.

The mathematician D R Hughes, in the middle fifties, classified projective planes in terms of a pair of integers. Although planes of the types $(4,m)$ and $(5,m)$ were already known, Peter Lorimer was the first to discover a plane of the type $(6,m)$. In his plane $m = 2$, and he later also proved that no plane of type $(6,m)$ exists with m greater than 3 (but, as it happens, no plane with $m = 3$ has yet been found). The discovery of a plane of type (6, 2) is regarded as a particularly significant event amongst people working in this part of combinatorics, and it has led to a wealth of activity amongst many mathematicians throughout the world.

Other aspects of algebra, graph theory and combinatorics in which Peter Lorimer has made important contributions include the theory of Ramsey numbers. Ramsey's theorem is one of the central ideas in modern graph theory, establishing the existence of a smallest graph of a certain type under a wide variety of possible conditions. The complexity of this smallest graph is known as a Ramsey number. While it always exists, its actual value is generally not known. Of the relatively few situations where a Ramsey number is known explicity, many were discovered by Peter Lorimer in collaboration with Prof E J Cockayne of the University of Victoria in Canada.

During the last seven or eight years, a further interest of Peter Lorimer has been the study of symmetric graphs. Exploiting a description in terms of double cosets of groups, he has been able to describe graphs of prime valency in terms of the finite simple groups. This has enabled him to describe the seven types of symmetric cubic graphs in a systematic way and, in collaboration with the young Auckland mathematician Dr M D E Conder, he has been able to resolve a number of outstanding questions about these graphs.

In May 1988, Peter Lorimer was elected a Fellow of the Royal Society of New Zealand. Not many workers in the Mathematical Sciences are at present represented in this Society, and in its entire history, the number of Pure Mathematicians gaining this distinction has been a mere handful. In describing Peter's life and work in this newsletter, the New Zealand Mathematical Society associates itself with the recognition of his achievements by the Royal Society of New Zealand.

SECRETARIAL

MINUTES OF THE TWENTY-THIRD COUNCIL MEETING
30 April 1988

The meeting was held in Room 201 of the Mathematics Depatment of the University of Canterbury and began at 10.05 a.m.

1. **PRESENT:** Brian Woods (in the Chair), Derrick Breach, Marston Conder, Robert Goldblatt, Ivan Reilly, John Shanks, Alfred Sneyd, Gillian Thornley, Chris Triggs, Brent Wilson; and for the afternoon session Bill Ellwood representing NZAMT.

2. **MINUTES OF THE PREVIOUS MEETING:** It was **moved** from the Chair that these be taken as read and confirmed.

The motion was **carried.**

3. **MATTERS ARISING FROM THE MINUTES:** It was noted that in the version of the Minutes that appeared in the Newsletter of December 1987 there was an intrusive 0 making it appear that $5000 had been set aside for the forthcoming Combinatorics workshop, whereas the sum agreed upon was $500 (five hundred dollars).

4. **CORRESPONDENCE:** (i) The Secretary reported that he had written to Helen Wily congratulating her on receiving the QSM in the New Year's Honours List and he had received in return a letter of acknowledgement.

(ii) The Secretary reported that he had received a letter from Professor J.T. Campbell with a donation of $500 (five hundred dollars) towards the publications fund. DRB has written to Professor Campbell thanking him for his generous gift. It was **moved** by RIG and seconded by WBW that:

On behalf of the NZMS the Council express its appreciation for the support given to the Society by Professor Campbell both now and in previous years.

The motion was **carried** with enthusiasm.

(iii) The Secretary reported that the New Zealand Association of Mathematics Teachers had sent the Minutes of their recent meeting and other papers including material about the NZAMT Conference being organised for August 1989.

5. **TREASURER'S REPORT:** (i) The Treasurer said that the accounts had been fully audited by Peat-Marwick. He presented the balance sheet of 1986 as published in the December 1987 Newsletter formally to the Council. The first draft of the account for the 1987 financial year has been complicated by GST. There was also the matter of the division of publication profits between our Society and NZAMT. The amount due NZAMT for 1986 had not yet been paid. It was the auditors' opinion that the NZAMT share of publication proceeds should be 50% on the true profit. The assessment of book stocks in hand was yet to be looked at. The auditor's fee was $600 (six hundred dollars). It was **moved** by IR and seconded by GT that:

the annual auditing fee and operating expenses be charged against the publications account before assessing the profit.

The motion was **carried.**

JAS was asked to discuss with the auditors the recognition of administration expenses in the annual accounts. It was **moved** from the Chair that:

it be a recommendation to the AGM that an item of $2000 (two thousand dollars) for administrative costs be included in the 1987 accounts.

The motion was **carried.**

It was agreed that copies of the accounts as to be presented to the AGM should be sent to all members of the Council.

(ii) IR asked if there were plans to develop an endowment fund for the NZMS to carry on after the present influx from publications profits has abated. After discussion BAW undertook to ask the Finance Registrar of the University of Canterbury about the management of endowment funds.

(iii) JAS recommended that the institution of a separate publications account occur when the next Treasurer takes over.

(iv) In the matter of the annual subscription the Treasurer said that for 1987 this had been $30 including GST. For convenience in dealing with overseas members he had taken this as $27 without GST. He recommended that for 1988 the subscription should not be changed. CT disagreed saying there must be a hedge against inflation. WBW pointed out that 1988 would be the first year in which the subscription would not be tax deductible. It was **moved** by RG, seconded by DRB, that:

on the basis of tax changes it be recommended to the AGM that the subscription remain unchanged.

The motion was **carried**.

(v) It was **moved** from the Chair that:

the Treasurer's report be received.

The motion was **carried**.

6. **REQUESTS FOR FINANCIAL ASSISTANCE:** (i) IR asked for a formulation of policy for the allocation of funds. As guidelines for the allocation of the Society's funds to various activities MC suggested the following scheme for future discussion:

(a) Income from subscriptions to be devoted to the costs of producing the Newsletter, of Council meetings, and of miscellaneous running expenses;

(b) Profits from publications to be put aside into a holding account or endowment fund, together with donations which have not been ear-marked for specific purposes;

(c) Interest from the Society's bank accounts and the endowment fund of (b) to be used for grants for visiting lecturers, student travel, conferences and the like;

(d) Specific donations to be dealt with in the manner suggested by the donor.

(IR on his own suggestion was not in the room during the discussion of his and some of the other applications for financial assistance).

(ii) It was **moved** from the Chair that:

(a) M.A. Steel be given a grant of $500 towards the cost of attending the Fourth SIAM Conference on Discrete Mathematics in San Francisco, June 1988;

(b) M. Clark be given a grant of $500 towards the cost of attending the 6th International Conference on Mathematical Education in Budapest, July 1988;

(c) K. Burrage be given a grant of $500 towards the cost of attending the 12th IMACS World Congress on Scientific Computation, in Paris, July 1988.

The motion was **carried**.

(iii) It was **moved** from the Chair that:

C. Little be given a grant of $500 towards the expenses of a visit from Dr Franz Rendl to further their combined research.

The motion was **carried.**

(iv) It was **moved** from the Chair that:

I. Reilly be given $500 towards the support of a visit by Dr Tim Erickson.

The motion was **carried.**

I. Reilly be given $500 for the Topology and Analysis Conference.

The motion was **carried.**

(v) It was **moved** by IR, seconded by RG that:

a grant of $2500 be made towards the cost of sending a New Zealand team to the International Mathematics Olympiad in Canberra, 1988.

The motion was **carried.**

(vi) In connection with an application for financial assistance for the Combinatorial Mathematics Society of Australasia Conference to be held at Massey University in late 1990 it was **moved** from the Chair that:

the Society should write to Charles Little suggesting that he apply at a later date.

The motion was **carried.**

(vii) In connection with an application for support from the NZMS for the NZAMT Conference in Hamilton, August 1989, it was **moved** from the Chair that:

a letter be sent to Robin Staples conveying the NZMS's enthusiastic support of this conference and also pointing out that there was about to be a payment to NZAMT of their share of the book publishing profits in which case a loan from the NZMS would probably not be necessary.

The motion was **carried.**

(viii) It was **moved** from the Chair that:

the NZMS, as usual, support the NZ Mathematics Colloquium for 1989 by sponsoring one of the invited lecturers.

The motion was **carried.**

(ix) RG and WBW asked that a new form for applying for financial assistance be designed. The Secretary pointed out that the form that some of the applicants had used was in fact a new form; the problem lies not in designing the form but in getting everyone to use it.

7. **PUBLICATIONS:** (i) GT tabled a report on publications. [A copy of this report is appended.] It was suggested that D. Smith and K. Teo be asked to circulate all mathematics departments with a specimen copy of their linear algebra book. IR asked if 'Careers in Mathematics' could be a joint publication with NZAMT. GT tabled a letter from one of the writing groups suggesting that a re-examination of the agreement with NZAMT might be in order. GT undertook to bring a report on the writing groups and their projects to the next Council meeting.

(ii) A report by Margaret Morton on the responses to the Newsletter questionnaire circulated by Mark Schroder was received. It was **moved** from the Chair that:

the Society express its thanks to Mark Schroder for preparing the questionnaire and to Margaet Morton for analysing the replies.

The motion was **carried.**

It was **moved** by IR, seconded by DRB,

that the Society thank Mark Schroder for the time and effort he put into the production of the Newsletter during his time as Editor.

The motion was **carried** with **acclamation**.

(iii) The production of each issue of the Newsletter has become a major task which would be lightened by a word processor. Accordingly it was **moved** from the Chair that:

the Society submit an application to the NZ Lotteries Board for a grant towards the purchase of a Macintosh computer.

The motion was **carried**.

(iv) New House Publishers had written to IR offering to take over the Society's publication ventures. IR pointed out that while a highly professional product could be achieved this way, the NZMS would lose control in return for this. BAW asked IR to answer the letter.

(v) WBW asked if the publications accounts had been separated from the other accounts. In reply JAS said that they were still all together as he thought it appropriate that the separation should begin when a new Treasurer takes over.

8. **NZAMT**: (i) The Secretary reported that there is a continuing exchange of information between the two Societies and that each receives the minutes of the other's meetings. IR spoke of the need to foster relationships with NZAMT particularly in matters related to their 1989 conference. WE filled in on details of this conference.

(ii) The Secretary reported that he had written to all fourteen of the Mathematical Associations about the possibility of reciprocity. He had received replies from two, both expressing some interest. BE said the Canterbury Mathematical Association wanted to know the possible benefits. WBW suggested the possibility of using institutional memberships. A complete discussion was deferred awaiting responses from the other Associations.

9. **SCIENCE AND TECHNOLOGY ADVISORY COMMITTEE'S PROPOSAL:** BAW and IR reported that they had each received copies of a paper from STAC wherein it is proposed to establish research foundations including a Science and Engineering Research Foundation (SERF) and a Social Science Research Foundation (SSRF). It was agreed that mathematics ought to be represented on both. The President said he would write to Mr Arbuckle requesting this. As for the matter of selecting representatives he will give the matter further thought. A good regional distribution and subject balance is desirable. Possibly volunteers could be called for through the Newsletter.

CT reminded the meeting of the RSNZ's request for case histories and success stories in applying science and technology to problems from real life.

10. **VISITORS**: (i) It was **moved** from the Chair that:

the NZMS pay $516.60 (five hundred and sixteen dollars and sixty cents) towards the expenses of Professor Lee Peng Yee's visit as a NZMS Lecturer.

The motion was **carried**.

(ii) In response to a letter from Graeme Wake concerning the Forder Lectureship and NZMS Lectureships and their costs to individual departments, BAW pointed out that the terms of bequest to the London Mathematical Society did not make it feasible to combine a Forder Lectureship with a NZMS Lectureship. However the NZMS does not have to appoint a NZMS Lecturer each year. Also in some years it may be convenient to appoint two or more. It was **moved** from the Chair that:

Ivan Reilly be encouraged to proceed with his suggestion that the NZMS as a gesture of goodwill towards the NZAMT explore the possibility of having a NZMS Lecturer in connection with the 1989

NZAMT conference on Education in Mathematics.

The motion was **carried.**

In connection with the Forder Lectureship it was suggested a detailed itinerary and analysis of costs per day be drawn up prior to the visit and that a schedule of expenses be agreed upon by all concerned.

11. **HUMAN RIGHTS:** It was **moved** by DRB, seconded by AS that:

the meeting receive the report of the Human Rights Officer about the improvement in the plight of Dr Nesin, who was the subject of protests to the Turkish government and who is now working in America.

The motion was **carried.**

A proposal from Bruce Calvert that the NZMS authorise the Bulletin of International Campaigns for Human Rights to list the NZMS as supporting their campaigns was tabled. Due to lack of time, discussion was deferred until the next Council Meeting.

12. **MATTERS CONCERNING THE AGM:** The AGM for 1988 is to be held in Canberra during the Australian Mathematical Sciences Congress of the Bicentenary Year. It was pointed out that having the AGM outside New Zealand is an unwise move since the meeting is likely to be inquorate. Professor Gauld has said that he is willing to take the Chair in the absence of the President. The Treasurer hoped to have a final version of the accounts for the Secretary to present to the AGM. It is to be recommended that the annual subscription should not be changed. MC pointed out that the Secretary, who had been co-opted to his position, could and perhaps should, stand for one of the remaining Council vacancies.

13. **THESIS PRIZE:** This is due to be offered in 1989. At the suggestion of WBW details of the organization were deferred until the next Council meeting (in October or November).

14. **FUTURE COLLOQUIA AND CONVENTIONS:** The 1989 Colloquium will be held at Massey University in May. The Australian Mathematical Society is planning to have an Australasian Mathematics Convention in Townsville in 1990. The Australian universities are now nearly all on a semester system and their optimal times for conferences are now mid-July or late November and early December.

15. **OTHER BUSINESS:** (i) RG reported that there is likely to be a substantial increase in the affiliation fees that Member Bodies pay to the Royal Society of New Zealand.

(ii) Suggestions for candidates for Fellowship of the RSNZ were called for. There were currently two in hand but the NZMS should always have members up for Fellowships. DRB said that a resumé of the election procedure had been put into the December 1987 Newsletter, but since this had been buried towards the end of the minutes he would have it put in again.

(iii) WBW undertook to sound a certain person on the prospect of being Treasurer.

16. **VENUE OF NEXT MEETING:** It was agreed that the next Council meeting should be held at Christchurch in late October or early November of 1988.

The meeting ended at 3.45 p.m.

D.R. Breach
Hon Secretary
25th May 1988

PUBLICATIONS REPORT (To 23rd Council Meeting)

Textbooks:

More than 3½ thousand books have been sold in the past year. We are particularly grateful to the convenors of writing groups and to the Treasurer for the continuing effort they put in to managing sales, keeping accounts and chasing money on behalf of the Society.

'Calculus' is being used in three universities and has sold 1150 copies this year.

'Secondary School Mathematics'

Sales this year: 600. In stock: 900.

For the 1988 edition we reset all the answers and corrected all the errors we knew of. It was possible to do a print run of 1500 from the old plates, and the price has been kept down to $25.30 (including GST) for schools.

'Mathematics with Calculus'

This was reprinted twice this year! The 300 copies in stock plus 1,000 printed in November had sold out by February and another 1,000 were printed.

The Royal New Zealand Society for the Blind sought permission to make copies in Braille of *'Mathematics with Calculus'* and *'Mathematics with Statistics'*. This was granted without a fee, which is the practice of local publishers.

New Project

David Smith and Kee Teo are editing and correcting their 200-level linear algebra book. The whole text is on disc and David printed off copies for his class to use and proof-read this year. It is planned to publish it by December.

Post-graduate Topics in Mathemtics

This was revised by Rod Downey and distributed late last year. It is planned to update it in the second term and distribute it earlier this year.

'Careers in Mathematics'

We hope to rewrite this booklet next summer. Any ideas, suggestions, offers of help are welcome.

Joint Projects with NZAMT

I am currently preparing a report on the three joint projects. This is largely to gather together a record of the projects for the information of NZMS and NZAMT. It is also in response to a request from one of the writing teams for a review of the partnership.

Gillian Thornley
Publications Convenor

MINUTES OF THE FOURTEENTH ANNUAL GENERAL MEETING 19 May 1988

The meeting was held in Room G27 of the Haydon Allen Building at the Australian National University in Canberra and began at 4.30 p.m.

PRESENT: D.R. Breach, J.C.Butcher, M.R. Carter, M.D.E. Conder, J. Curran, M.J. Doherty, S.D. Forbes, D.B. Gauld (in the Chair), A.J. Gomez, S. Goulter, S. Fitzpatrick, M.A. Jorgensen, D.J. McCaughan, G. Olive, P.F. Renaud, G.J. Tee, C. Triggs, D.J.N. Wall, and two others.

In the absence of the President and a Vice-President, on the Secretary's proposal, it was agreed that Professor D.B. Gauld should chair the meeting.

1. **APOLOGIES** were received from B.H. Neumann, I.L. Reilly, K.G. Russell, J.A. Shanks, G.M. Thornley and B.A. Woods. It was **moved** from the Chair that:

the apologies be accepted.

The motion was **carried.**

2. **ANNOUNCEMENT:** Professor J.C. Butcher announced the recent election of Professor P.J. Lorimer to a Fellowship of the Royal Society of New Zealand. It was **moved** from the Chair that:

the NZMS send its congratulations to Professor Lorimer.

The motion was **carried** with applause.

3. **MINUTES OF THE PREVIOUS AGM:** It was **moved** by M.R. Carter (seconded by J.C. Butcher) that:

the Minutes of the Thirteenth Annual General Meeting as circulated in the Newsletter be taken as read and confirmed.

The motion was **carried.**

4. **MATTERS ARISING FROM THE MINUTES:** With reference to item 9(iv) of the Minutes, M.R. Carter asked if a letter had been sent to the Minister of Education and if so what was the reply. The Secretary said that the President had written such a letter; a polite reply had been received but nothing of major substance had eventuated.

5. **PRESIDENT'S REPORT:** this was circulated during the meeting. [A copy of this report is appended.] After a request for clarification of dates in the title it was **moved** by J. Curran (seconded by D.J.N. Wall) that:

the President's report be taken as read and be received.

The motion was **carried.**

Arising from the last paragraph of the President's report there was a discussion about future Australasian Mathematics Conventions. There is a proposal to have one at James Cook University in 1990. The proposed convention at Auckland in 1992 may be too soon after this. To accommodate Australian attendances, in view of their semester system, these should be held in July if possible though there might have to be a change to the summer season. Dates of the New Zealand Mathematics Colloquia may have to be reconsidered. It was **moved** from the Chair that:

the incoming Council look into the possibility of having an Australasian Mathematics Convention in New Zealand in the near future.

The motion was **carried.**

The meeting was reminded of the NZAMT conference on Mathematical Education to be held in 1989 and the ICOTS meeting to be held in Dunedin in 1990.

6. **TREASURER'S REPORT:** In the absence of the Treasurer the Secretary introduced the Treasurer's Report and presented the audited financial statement for the year ending on the 31st December 1987. It was **moved** by J. Curran (seconded by G. Olive) that:

the Treasurer's report and the financial statement be received and adopted.

The motion was **carried.**

[A copy of the Treasurer's report is appended.]

7. **ANNUAL SUBSCRIPTION:** It was the Council's recommendation that there be no change in the annual subscription. It was **moved** by S.D. Forbes (seconded by M.A. Jorgensen) that:

the Council's recommendation be adopted.

The motion was **carried.**

8. **ELECTION OF COUNCIL MEMBERS:** the only candidate for the position of *Incoming Vice-President* being **Dr G.M. Thornley** (proposed by I.L. Reilly, seconded by D.B. Gauld) she was declared **elected.**

For the three positions as *Ordinary Council Members* there was only one candidate **Dr M.D.E. Conder** (proposed by I.L. Reilly, seconded by D.G. Gauld) who was therefore declared **elected.**

It was then **moved** by D.B. Gauld (seconded by M.D.E. Conder) that

whereas **Dr D.R. Breach** originally had been co-opted as Secretary, he now be elected as a *Council Member*.

The motion was **carried.**

Furthermore, from the floor, **Professor J.C. Butcher** was proposed by S. Fitzpatrick (seconded by G. Olive), as an *Ordinary Council Member*. He was declared **elected.**

9. **OTHER BUSINESS:** It was **moved** by S.D. Forbes (seconded by G. Olive) that:

the Council of the NZMS consider the appointment of one of its members as an officer responsible for Mathematics Educaton.

The motion was **carried.**

It was **moved** by J.C. Butcher (seconded by G. Olive) that:

the NZMS congratulate the Australian Mathematical Society on their success in conductng the 1988 Mathematical Sciences Congress.

It was **moved** by C. Triggs (seconded by M.A. Jorgensen) as an amendment that:

after the words 'Australian Mathematical Society', there be added the words 'and the other organisers.'

The amendment was **carried.**
The amended motion was then put and **carried.**

The Chair then **moved** a motion of thanks to the outgoing Council. G. Olive asked that retiring Council Members be sent letters of appreciation for their services.

The meeting ended at 5.10 p.m.

D.R. Breach
Hon Secretary

PRESIDENT'S REPORT 1987-88

I shall report briefly on some of the activities of the Society undertaken since the last AGM. Council met twice in this period; on October 30 1987, and April 30 1988. The minutes of the first meeting have been published, and that of the second appear in this Newsletter.

Financial support for mathematical activity has been approved as follows:

(i) Grants towards conferences expenses, for two students and three ordinary members.

(ii) Grants towards the expenses of two overseas visitors, in the furtherance of joint research with members.

(iii) A grant towards the 1988 Olympiad.

(iv) A grant towards the expenses of Professor John Butcher, who represents the Society as a keynote speaker at this conference.

(v) Grants towards an Analysis and Topology Conference to be held at Auckland later this year, and a Workshop on Combinatorics and Graph Theory to be held in Dunedin early in 1989.

The successful tour of the 1988 NZMS Lecturer, Professor Lee Peng Yee, was also underwritten.

We have continued to communicate with the London Mathematical Society over the Forder Lectureship, following experience gained over the successful tour of Christopher Zeeman in 1987. The second Forder Lecturer is Sir Michael Atiyah, who will visit New Zealand during the first term of 1989.

Following the motion passed at the 1987 AGM, I wrote to the Hon. C.R. Marshall, then Minister of Education, expressing the concern felt by members of the Society about the state of mathematics in New Zealand Education. I received a courteous reply, in which consideration (not in every case satisfactory) was given to all the points I raised).

As members will be aware, it has not been possible to hold a joint Australasian Convention this year, as had been earlier hoped. I have had a proposal from the Secretary of the Australian Mathematical Society that the meeting which they have scheduled for early June 1980, at James Cook University, be a joint one. The timing of this meeting reflects a change in the structure of the university year in Australia, and raises problems which members must now consider.

Professor Brian Woods
President

TREASURER'S REPORT 1987

Accompanying this report are the balance sheet and accounts of the Society for 1987. These have been audited by Peat Marwick, Chartered Accountants.

The assets of the NMZS continued to grow in 1987 due mainly to another profitable year from the Society's publishing endeavours. As in previous years, the income from subscriptions and donations covered the basic costs of running the Society, such as the costs of producing the Newsletter, supporting the NZMS Visiting Lecturer and funding travel associated with Council meetings. Interest from bank deposits supported Travel and Research Grants and donations made by the NZMS to various conferences.

NOTES

1. The Society is moving from what was essentially a cash basis to an accrual system of accounting. This change-over has not been without problems and means that some of the figures from both the 1986 and 1987 balance sheets do not completely represent those years' true business.

2. The 1986 profits for publications were somewhat understated in that not all book stocks nor debtors at the end of 1986 were correctly reported. The 1987 figures are thus correspondingly overstated. Balanced over the two years the profits from all books appear to agree with original predictions.

3. There are still problems with GST reporting to the Inland Revenue Department. While the Society's accounts are accrual based, the GST returns are made on a cash basis and the return periods overlap with the Society's financial year. Some returns have included large errors due to the duplication of claims between the general account and publishing convenors' accounts; it is hoped to prevent these from recurring.

4. Consideration is being given to the auditor's recommendation that the separate 'holding' accounts around the country be closed and all transactions be carried out through one or two accounts under the direct control of the treasurer. This would lead to more accurate information regarding both GST and the current finances of the Society at any time, and also help enormously with end-of-year balancing and auditing.

FINANCIAL STATEMENTS
FOR THE YEAR ENDED 31 DECEMBER, 1987

INCOME AND EXPENDITURE ACCOUNT		1987 $	1986 $
Income			
Subscriptions	3,229		3,192
Interest	7,025		2,837
Donations	854		-
Publications (Note 2)	163,014		247,251
		174,122	253,280
Expenditure			
Newsletter	1,110		1,220
NZMS Visiting Lecturer	500		505
Forder Lecturer	1,103		-
Travel/Council expenses	2,267		2,102
Travel and research grants	3,810		1,492
Competition prizes	-		250
Donations	2,400		1,800
Miscellaneous	306		251
NZAMT share of publishing profits	26,880		31,399
Publications (Note 2)	95,475		194,207
		133,851	233,226
EXCESS INCOME OVER EXPENDITURE		**40,271**	**20,054**

BALANCE SHEET AS AT 31 DECEMBER 1987

ACCUMULATED FUNDS			
Balance brought forward		53,562	33,508
Excess of Income over Expenditure		40,271	20,054
		93,833	**53,562**
REPRESENTED BY:			
Assets			
Bank - General account	34,202		13,815
- Massey	5,080		-
- Canterbury	839		261
- Auckland	22		9
- Wellington	2,691		11,242
- Aitken Memorial Trust	324		294
Debtors	24,935		99
Book stocks on hand	27,313		25,501
Term deposit	70,690		30,000
		166,096	81,221
Less Liabilities			
Subscriptions in advance	-		130
Owing to NZAMT	54,409		27,529
Owing for publications	16,183		-
Owing for GST	1,671		-
		72,263	27,659
		93,833	**53,562**

NOTES TO THE ACCOUNTS

NOTE 1: STATEMENT OF ACCOUNTING POLICIES

General Accounting Policies

The following general accounting policies as recommended by the New Zealand Society of Accountants have been adopted in the preparation of the financial statements:

(i) The measurement base adopted is that of historical cost.

(ii) The matching of revenue earned and expenses incurred using accrual acounting concepts except that interest and subscriptions are accounted for on a cash basis.

Stock

Stocks of books valued at cost.

NOTE 2: PUBLICATIONS

	Income	Expenditure
'Maths Calc'	51,210	31,142
'Maths/Stats'	65,851	37,509
'Calculus'	29,874	17,596
'Sec School Maths'	16,079	8,862
General	-	366
	$163,014	$95,475

John A. Shanks
Hon. Treasurer
17 May 1988

MATHEMATICAL VISITORS TO NEW ZEALAND

One of the main purposes of this list is to enable other institutions to invite visitors to spend time with them. Anyone wishing to issue such an invitation should do so through the principal contact person.

Please note: Production of these lists is dependent on my receiving information. When you know about a visit (whether it be definite, very likely, or possible), would you please forward the details to me at the earliest convenient time. Thank you.

Marston Conder
N.Z. Mathematical Society Visitors' Co-ordinator
Department of Mathematics and Statistics
University of Auckland

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

List No. 20: 1 July 1988

Dr Maximilian Ganster; Technische Universität Graz, Austria; topology; July – October 1988; University of Auckland; Assoc. Prof. I.L. Reilly.

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.

Professor D.S. Jankovic´; East Central University, Ada, Oklahoma; topology; July 1988 – June 1989; University of Auckland; Assoc. Prof. I.L. Reilly.

Dr Grant Keady; University of Western Australia; non-linear partial differential equations; 26 July – 16 August 1988; Massey University; Professor G.C. Wake.

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

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

Professor Cheryl Praeger; University of Western Australia; group theory, combinatorics; October 1988; University of Auckland; Peter Lorimer.

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

Dr Bruce Richmond; University of Waterloo, Canada; asymptotics in combinatorics; 27 Sept – 5 November 1988; University of Auckland; N. Wormald.

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

Professor Walter Rudin; University of Wisconsin, Madison; spouse (see previous entry); topology; 9 July – 13 August 1988; University of Auckland; Assoc. Prof. 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 Yang Cheng-En; Changsha Railway Institute, China; operations research, combinatorial optimisation; July – December 1988; University of Waikato; Prof. L. Foulds, School of Management Studies.

CONFERENCES

**** 1988 ****

September 1-2 (Melbourne) **Sixth Annual Algebra Conference of Victoria**
Contact Dr. P. Higgins, Department of Mathematics, Royal Melbourne Institute of Technology, GPO Box 2476V, Melbourne, Victoria 3001, Australia.

September 5-9 (Sophia-Antipolis, France) **Colloque Bifurcations et Attracteurs**
Contact G. Iooss, Laboratoire de Mathematiques, UA 168, Parc Valrose, 06034, Nice Cedex, France.

September 10-11 (Mashdad, Iran) **Fourth Seminar on Algebra**
Contact M.R.R. Moghaddam, Department of Mathemaics, Statistics and Computer Science, P.O. Box 1159, Mashdad University, Mashdad, Iran.

September 12-14 (Oxford) **Mathematics-Particle Physics Interface**
Contact IMA (see (1) below).

September 12-16 (Marseille, France) **Theorie des Nombres**
Contact Mme A. Zeller-Meier, CIRM, Luminy, Case 916, F-13288 Marseilles Cedex 9, France.

September 12-16 (Minnesota) **Workshop on Solitons in Physics and Mathematics**
Contact Willard Miller Jr., Institute for Mathematics and its Applications, University of Minnesota, 514 Vincent Hall, 206 Church Street SE, Minneapolis, Minnesota 55455, U.S.A.

September 12-16 (Nice, France) **Eurographics '88: Research, Practice and Experience**
Contact INRIA, Service des Relations Exterieures, Domaine de Voluceau-Rocquencourt, B.P. 105, F-78153 Le Chesnoy Cedex, France.

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 13-23 (Chaika near Varna, Bulgaria) **Heyting Summer School and Conference on Mathemaical Logic**
Contact Heyting 1988, Sector of Logic, Mathematics Faculty, Sofia University, boul. Anton Ivanov 5, Sofia 1126, Bulgaria.

September 14-16 (Strathclyde, Scotland) **Fifth IMA Conference on Control Theory**
Contact IMA (see (1) below).

September 18-24 (Regensburg, West Germany) **DMV - Jahrestagung 1988**
Contact Geschäftsstelle der DMV, Albertstr. 2, D-7800 Freiburg, Federal Republic of Germany.

September 19-21 (Oxford) **Third IMA Conference on the Mathematics of Surfaces**
Contact IMA (see (1) below)

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 19-23 (Santiago de Compostela, Spain) **Sixth International Colloquium on Differential Geometry**
Contact Departamento de Geometria y Topologia, Facultad de Matematicas, Universidad de Santiago de Compostela, 15705 Santiago de Compostela, Spain.

September 19-28 (Montevideo) **Third Congress on Probability and Statistics**
Contact Professor Enrique Cabana, Institute de Matematica e Estatistica, Faculdad de Ingenieria y Agrimensura, Av. J. Herrera y Reissig 565, Cabilla nr. 30, Montevideo, Uruguay.

September 25-30 (Paris) **Colloque en I'Honneur de René Thom**
Contact Colloque René Thom, IHES, 35 Route de Chartres, 91440 Bures-sur-Yvette, France.

September 26-27 (London) **Mathematics: The Interface between Industry and Commerce with Academia**
Contact IMA (see (1) below).

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.

September 27-30 (Kyoto, Japan) **Microlocal Analysis of Differential Equations**
Contact RIMS (see (2) below).

September 28-October 9 (Varna, Bulgaria) **Sixth International Summer School on Probability Theory and Mathematical Statistics**
Contact Department of Probability and Statistics, P.O. Box 373, 1090 Sofia, Bulgaria.

September 29-October 1 (Kyoto, Japan) **Fundamental Theories of Numerical Analysis and its Vicinities**
Contact RIMS (see (2) below)

October 11-14 (Kyoto, Japan) **Mathematical topics in Biology**
Contact RIMS (see (2) below)

October 17-21 (Kyoto, Japan) **Solvable Models in Quantum Field Theory and Statistical Mechanics**
Contact RIMS (see (2) below).

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 19-21 (Austin, Texas) **Conference on Iterative Methods for Large Linear Systems**
Contact Center for Numerical Analysis, RLM Building 13.150, University of Texas at Austin, Austin, Texas 78713-8510, USA.

October 24-26 (Kyoto, Japan) **Evolution Equations and their Applications**
Contact RIMS (see (2) below).

October 31-November 2 (Kyoto, Japan) **Mathematical Analysis of Fluid and Plasma**
Contact RIMS (see 2) below).

October 31-November 4 (Nahmitz via Lehnin, East Germany) **Conference on Algebra and Related Topics**
Contact Dr K. Denecke, Bereich Algebra, Sekt. Math./Phys., Päd. Hochschule "Karl Liebknecht", Am Neuen Palais, GDR-1500 Potsdan-Sanssouci, German Democratic Republic.

October 31-Nov. 18 (Trieste, Italy) **Workshop in Mathematical Ecology**
Contact International Centre for Theoretical Physics, Workshop in Mathematical Ecology, P.O. Box 586, I-34100, Trieste, Italy.

November 7-9 (Kyoto, Japan) **Study of Structures of Solutions to Partial Differential Equations**
Contact RIMS (see (2) below)

November 7-11 (Minnesota) **Workshop on Solitons in Nonlinear Optics and Plasma Physics**
Contact Willard Miller Jr. Institute for Mathematics and its Applications, University of Minnesota, 514 Vincent Hall, 206 Church Street SE, Minneapolis, Minnesota 55455, USA.

November 9-11 (Kyoto, Japan) **Real Algebraic Geometry**
Contact RIMS (see (2) below).

November 13-17 (Israel) **French-Israeli Conference on Combinatorics and Algorithms**
Contact C. Weintraub, Appl. Math. & Comp. Sc., Weizmann Inst. of Science, Rehovot 76100, Israel.

November 14-16 (Kyoto, Japan) **Formula Manipulation and its Application to Mathematical Study**
Contact RIMS (see (2) below).

November 17-19 (Kyoto, Japan) **Hirota's Method in Soliton Theory**
Contact RIMS (see (2) below.

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.

November 20-26 (Gorizia, Italy) **International Workshop on Mathematical Community Ecology**
Contact International Centre for Theoretical Physics, P.O. Box 586, I-34100, Trieste, Italy.

Nov. 21-Dec.16 (Trieste, Italy) **College on Global Geometric and Topological Methods in Analysis**
Contact International Centre for Theoretical Physics, P.O. Box 586, I-34100, Trieste, Italy.

November 24-26 (Kyoto Japan) **Sampling Plans in Statistics**
Contact RIMS (see (2) below).

November 28 - December 1 (Kyoto, Japan) **Theory of Numbers and Automorphic Forms**
Contact RIMS (see (2) below).

December 5-7 (Kyoto, Japan) **Operator Theory**
Contact RIMS (see (2) below).

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 7-10 (Kyoto, Japan) **Research on Complex Analytic Geometry and Related Topics**
Contact RIMS (see (2) below).

December 8-10 (Kyoto, Japan) **Mathematical Programming and its Related Fields**
Contact RIMS (see (2) below).

December 12-14 (Kyoto, Japan) **Recent Development of High Technology and Mathematical Science**
Contact RIMS (see (2) below).

December 12-17 (Catania, Italy) **International Course on Computational Geometry**
Contact T. Mora, Dipartimento di Matematica, Universita Via L.B. Alberti, 4 16132 Genova, Italy.

December 13-15 (Warwick, England) **Joint IMA/SIAM International Conference on Mathematics of Signal Processing**
Contact IMA (see (1) below).

December 19-20 (Cambridge, England) **Mathematics and Computation of Deforming Surfaces**
Contact IMA (see (1) below).

December 27-31 (Las Cruces, New Mexico) **Holiday Symposium on Fermat's Last Theorem**
Contact R.J. Wisner, Department of Mathematical Sciences, New Mexico State University, Box 30001, Las Cruces, New Mexico 88003-0001, USA.

** 1989 **

January 2-5 (Ramat-Gan, Israel) **International Colloquium in Ring Theory**
Contact Conference Secretary, Research Institute for Mathematical Sciences. Bar-Ilan University, 52100 Ramat-Gan, Israel.

January 2-20 (Canberra) **Conference on Automatic Continuity and Banach Algebras**
Contact Dr R.J. Loy, Department of Mathematics, Faculty of Science, Australian National University, P.O. Box 4, Canberra, ACT 2601, Australia.

January 3-10 (Minnesota) **Workshop on Two Phase Waves in Fluidised Beds, Sedimentation, and Granular Flows**
Ccontact Willard Miller Jr., Institute for Mathematics and its Applications, University of Minnesota, 514 Vincent Hall, 206 Church Street SE, Minneapolis, Minnesota 55455, U.S.A.

January 4-6 (San Diego) **American Statistical Association Winter Conference: Statistics in Society**
Contact American Statistical Association, 1429 Duke Street, Alexandria, Virginia 22314-3402, USA.

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.

January 9-13 (College Station, Texas) **Sixth International Symposium on Approximation Theory**
Contact L.L. Schumaker, Center for Approximation Theory, Texas A & M University, College Station, Texas 77843-3368, USA.

January 16 (London) **The Mathematics of Estimation Software Reliability.**
Contact IMA (see (1) below).

January 17-19 (Kyoto, Japan) **Flow Instability and Structure of Turbulence**
Contact RIMS (see (2) below).

Jannuary 23-27 (Berkeley, California) **Workshop on Algorithms, Word Problems and Classification in Combinatorial Group Theory**
Contact I. Kaplansky, Mathematical Sciences Research Institute, 1000 Centennial Drive, Berkeley, California 94720, USA.

January 30 - February 1 (Kyoto, Japan) **Fundamental Theory of Algorithms and Computational Complexity**
Contact RIMS (see (2) below).

February 5-9 (Ballarat, Vuictoria) **Twenty-Fifth Australian Applied Mathematics Conference**
Contact Dr M.A. Page, Department of Mathematics, Monash University, Clayton, Victoria 3168, Australia.

March 6-10 (Minnesota) **Workshop on Ellipticity in Evolution Equations**
Contact Willard Miller Jr., Institute for Mathematics and its Applications, University of Minnesota, 514 Vincent Hall, 206 Church Street SE, Minneapolis, Minnesota 55455, USA.

April 3-6 (Jerusalem) **IEEE International Conference on Control and Applications**
Contact Y. Bar-Shalom, The University of Connecticut, EECS Department, Box U-157, 260 Glenbrook Road, Storrs, Connecticut 06268, USA.

April 3-15 (Minnesota) **Workshop on Multidimensional Hyperbolic Problems and Computations**
Contact Willard Miller Jr., Institute for Mathematics and its Applications, University of Minnesota, 514 Vincent Hall, 206 Church Street SE, Minneapolis, Minnesota 55455, USA.

May 8-12 (Berkeley, California) **Workshop on Arithmetic Groups and Buildings**
Contact I. Kaplansky, Mathematical Sciences Research Institute, 1000 Centennial Drive, Berkeley, California 94720, USA.

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.

May 17-19 (Sophia Antipolis, France) **Joint IMA/SMAI - GAMNI Conference on Computational Methods in Aeronautical Fluid Dynamics**
Contact IMA (see (1) below).

May 22-24 (Salishan Resort, Oregon) **Sparse Matrix Meeting**
Contact SIAM Conference Coordinator, 117 South 17th Street, Suite 1400, Philadelphia, Pennsylvania 19103-5052, USA.

May 23-27 (Toronto) **International Conference on Computing and Information**
Contact W. Koczkodaj, Conference Secretary, Laurentian University, Sudbury, Ontario, Canada P3B 3X8.

May 29 - June 1 (Tokyo) **Third International Conference in Mathematics: Fractional Calculus and its Applications**
Contact K. Nishimoto, Mathematics Department, College of Engineering, Nihon University, Tamuracho, Koriyama, Japan.

June (Linz, Austria) **Geometry of Banach Spaces**
Contact Dr. Walter Schachermayer, Johannes Kepler Universität Linz, Institut für Mathematik, A-4040 Linz, Austria.

June (Bucharest, Romania) **International Colloquium on Complex Analysis**
Contact Professor C. Andreian Cazacu, Central Institute of Mathamatics, str. Academei 14, Bucharest, Romania.

June 5-16 (Berkeley, California) **Workshop on the Geometry of Hamiltonian Systems**
Contact I. Kaplansky, Mathematical Sciences Research Institute, 1000 Centennial Drive, Berkeley, California 94720, USA.

June 8-16 (Singapore) **Singapore Probability Conference**
Contact J.H. Lou, The Organising Secretary, Singapore Probability Conference, Department of Mathematics, National University of Singapore, Lower Kent Ridge Road, Singapore 0511, Republic of Singapore.

July (Oxford) **Mathematical Theory of the Dynamics of Biological Systems**
Contact IMA (see (1) below.)

July 3-7 (London) **Computational Ordinary Differential Equations**
Contact IMA (see (1) below.)

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 10-14 (Brisbane) **Fifteenth Australasian Conference on Combinatorial Mathematics and Computing**
Contact Professor Anne Penfold Street, Director, CMSA, Department of Mathematics, University of Queensland, St. Lucia, Queensland 4067, Australia.

July 12-14 (Loughborough, England) **Robotics: Applied Mathematics and Computational Aspects**
Contact IMA (see (1) below.)

July 30-August 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 - September (Novosibirsk, USSR) **International Conference on Algebra**
Contact Academician M.M. Laurentjeu, Director of the Institute of Mathematics, Novosibirsk 630090, USSR.

August 1-9 (Hamburg and Munich) **18th International Congress of the History of Science**
Contact Professor C.J. Scriba, Institut für Geschichte der Naturwissenchaften, Bundesstr. 55, D-2000 Hamburg 13, Federal Republic of Germany.

August 10-12 (Brisbane) **International Conference on Computational Techniques and Applications**
Contact School of Environmental Studies, Griffith University, Nathan, Queensland 4111, Australia.

August 13-19 (Rousse, Bulgaria) **Fourth Conference on Differential Equations and Applications**
Contact Organising Committee CDE-IV, Technical University, Konsonolska Street N8, 7017 Rousse, Bulgaria.

August 20 - September 6 (Saint-Flour, France) **Nineteenth Ecole d'ete de Calcul des Probabilities**
Contact P.L. Hennequin, Université Blaise Pascal Clermont-Ferr., Department de Mathematiques Appliquées, B.P. 45-63170, Aubiere, France.

August 21-25 (Prague) **EQUADIFF 7**
Contact Professor Jaroslov Kurzweil, Chairman, EQUADIFF 7, Institute of Mathematics, Czechoslovak Academy of Science, Zitra ul. 25, 115 67 Praha 1, Czechoslovakia.

August 28-September 1 (San Francisco) **IFIP 89—11th World Computer Conference**
Contact IFIP Secretariat, 3 Rue du Marché, CH-1204 Geneva, Switzerland.

August 29-September 6 (Paris) **47th Session of the International Statistical Institute**
Contact International Statistical Institute, 428 Prinses Beatrixlaan, Voorburg, Netherland.

September 11-15 (Lausanne, Switzerland) **Fifth International Conference on Numerical Methods in Engineering**
Contact Professor R. Gruber, GASOV/Centre de Calcul, EPFL, 1015 Lausanne, Switzerland.

September 18-21 (Adelaide) **Traffic Theories for New Telecommunications Services**
Contact Dr. L.T.M. Berry, Director, Teletraffic Research Centre, University of Adelaide, GPO Box 498, Adelaide, SA 5001, Australia.

September 21-22 (Warwick) **Mathematics in the Car Industry**
Contact IMA (see (1) below).

September 25-29 (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.

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 **

May 25-31 (Atlantic City, New Jersey) **Tenth International Conference on Pattern Recognition**
Contact H. Freeman, CAIP Center, 605 Hill, Rutgers University, New Brunswick, New Jersey 08903, USA.

August 21-29 (Kyoto, Japan) **International Congress of Mathematicians**
Contact ICM-90 Secretariat, RIMS (see (2) below).

December 3-7 (Palmerston North, NZ) **1990 Australasian Conference on Combinatorics**
Contact Dr C.H.C Little, Department of Mathematics and Statistics, Massey University, Palmerston North, New Zealand.

Special contact addresses:

(1) **IMA:** Miss Shirley Wardle, Conference Officer, The Institute of Mathematics and its Applications, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY, England.

(2) **RIMS:** Research Institute for Mathematical Sciences, Kyoto University, Kitashirakawa, Sakyo-ku, Kyoto 606, Japan.

M R Carter
Massey University

PROBLEMS AND QUERIES

Again a faithful few have contributed. (Thank you again.) Surely some more of our readers have some answers to our earlier problems (what do you do on these cold evenings?) or some of your favourite problems to contribute. So far the following problems have not been solved:

P3 (The Hendy graph) December 1986.
P4 (Dimensionless ratios) December 1986.
P7 (A bowling problem) April 1987.
P8 (Squares in triangles) December 1987.
P9 (A quartic equation) April 1988.
P10 (Trimming paper) April 1988.

Some new problems have arrived.

PROBLEMS

P11 *From Dr Mark Schroder, who writes from Oberwohlfach!:* **A ROTATING CUBE.**

A cube is held by two corners (in three different ways) and spun around.
(a) Which way sweeps out the least volume?
(b) Only part of this volume is "occupied" at *all* times of each rotation by some points of the cube as it spins. How much?

P12 *From Professor David Gauld, University of Auckland:* **A HOMONYMOUS QUOTIENT GROUP.**

Let G be the group with generators a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z and relations of the form: two words w_1 and w_2 are deemed to be equal if w_1 and w_2 are both words in the English language and the English words w_1 and w_2 are homonyms of each other (i.e. they are pronounced the same but are not just alternate spellings of the same word). For example, tide = tied and dew = due. **Prove that G is abelian.**

(Comment: This group is not very well defined, because it depends upon how you speak. For example, I would not admit the relation do = dew, at least directly, but some people would. Maybe you should rely on your own pronunciation. There must be many variants of this problem; try inventing your own.)

P13 *From Stephen Goulter, Meteorological Office, Wellington:*

Suppose a device only records the maximum Y of a random sample $X_1, X_2, \ldots, X_n$ from the exponential distribution with density function

$$f(x;\lambda) = \lambda e^{-\lambda x}, \quad x \geq 0.$$

1. Show that the estimator of $\mu = 1/\lambda$ given by

$$\tilde{\mu} = \frac{Y}{\log n}, \quad n \geq 2,$$

is modally unbiased, i.e. the mode of the sampling distribution of $\tilde{\mu}$ is μ.

2. Show that the pth cumulant of $\tilde{\mu}$ is

$$\kappa_p = \frac{(-1)^p}{\lambda^p (\log n)^p} \{ \psi^{(p-1)}(1) - \psi^{(p-1)}(n+1) \} ,$$

where

$$\psi^{(0)}(z) = \psi(z) = -\gamma - \frac{1}{z} + \sum_{m=1}^{\infty} \frac{z}{m(z+m)}$$

is the digamma function,

$$\gamma = \lim_{n \to \infty} \left\{ \sum_{i=1}^{n} \frac{1}{i} - \log n \right\} ,$$

and

$$\psi^{(p-1)}(z) = \sum_{m=0}^{\infty} \frac{(-1)^p}{(z+m)^p}$$

is the $(p+1)$ – gamma function. In other words,

$$\kappa_p = \frac{1}{\lambda^p (\log n)^p} \sum_{m=1}^{n} \frac{1}{m^p} .$$

(NB: κ_1 is the mean, and κ_2 the variance.)

3. Hence show that $\tilde{\mu}$ is mean square error consistent (i.e. the error mean and variance tend to zero as $n \to \infty$).

4. If the original observations had been available, show that the efficiency of $\tilde{\mu}$ relative to $\hat{\mu} = \bar{x}$

(defined as the ratio of the mean square errors of the efficient unbiased estimator $\tilde{\mu}$ to that of $\bar{\mu}$) has a maximum of 35.6% when $n = 6,7$.

5. By computing the mean and variance directly, show that

$$\sum_{i=1}^{n} \frac{(-1)^{i-1} \binom{n}{i}}{i} = \int_0^1 \frac{1-(1-x)^n}{x} dx = \sum_{j=1}^{n} \frac{1}{j} ,$$

and

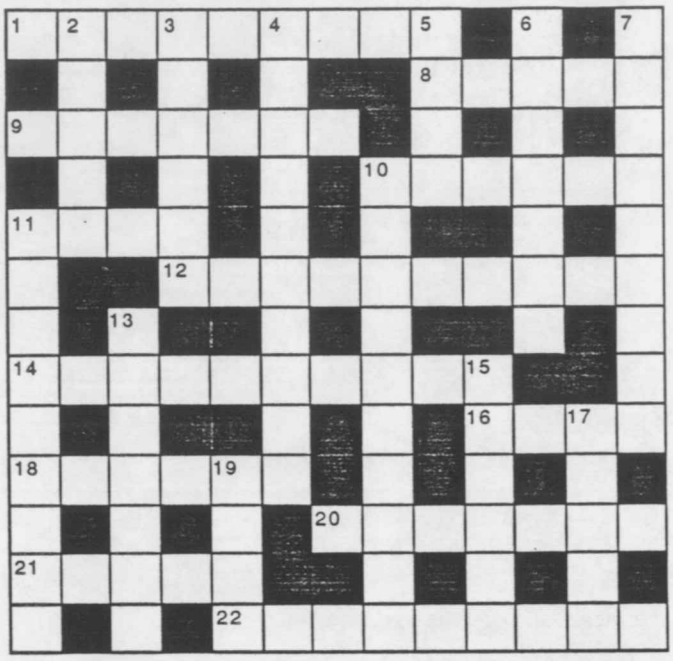
$$\sum_{i=1}^{n} \frac{(-1)^{i-1} \binom{n}{i}}{i^2} = \int_0^1 (\log x) \frac{1-(1-x)^n}{x} dx = \frac{1}{2} \sum_{j=1}^{n} \frac{1}{j^2} + \frac{1}{2} \left(\sum_{j=1}^{n} \frac{1}{j} \right)^2$$

$$= \sum_{j=1}^{n} \left(\frac{1}{j} \sum_{i=1}^{j} \frac{1}{i} \right) .$$

[The writer thanks Dr Terry Moore of Massey University for the elegant digamma function connection of Part 2.]

CROSSWORD

No. 25 ANCIENT KNOWLEDGE by Matt Varnish



Across

1 Where Cicero found a column and a chair broken. (9)

8 Transformed the curtailed fleet in play. (5)
9 Tells how the comma's lot became coin in a slot. (7)

10 Song in the meadow returning signal receiver. (6)
11 Boss king not second grade. (4)
12 They lived near 1. (10)
14 With wrong quarter gnome tries mathematical systems. (10)
16 A 100-to-1 it was studied by 10d. (4)
18 Implants between the L and N berths? (6)

20 Bishop with sour backing is smelly. (7)
21 Powdered flag gold lace near car. (5)
22 Engineer, an Alexandrian one, is set back with cubits around. (9)

Down

2 O for an adjustment of cannon for 10d's esteemed colleague. (5)
3 Hark! Are Greek doctors for polygons? (6)
4 Moist, cured, or Doric mutes make him of Stoic demur. (10)
5 Cutter in a daze. (4)
6 Column's end Rome perhaps. (7)
7 Be it all as broken with catapults. (9)
10 Thrice of principle he misread 'c' but amid cheers riches made. (10)
11 Addressee of the sand-reckoner. (4,5)
13 To assail as with 7 Romans did 12 let 50 be changed of the Germanic invader. (7)
15 Beetle-car in Sabine beginnings. (6)
17 Gold run in insular state. (5)
19 He of ten discussed the solar one. (4)

Crossword No. 24 Solution:

Across: 1 columbier; 8 agate; 9 loading; 10 sagene; 11 ufer; 12 summerings; 16 inks; 18 thumbs; 20 pascals; 21 rioja; 22 mephitism.

Down: 2 on-off; 3 unders; 4 benchmarks; 5 raga; 6 caserns; 7 reversals; 10 scenograph; 11 undometers; 13 escudos; 15 kit-cat; 17 kilos; 19 beam.