



NEWSLETTER

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PUBLISHER'S NOTICE

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

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Garry Tee	Mathematics (University of Auckland)

Websites

The homepage of the New Zealand Mathematics Society with URL address:

<http://www.math.waikato.ac.nz/NZMS/NZMS.html>

This newsletter is available at: <http://smis-www.massey.ac.nz/~maths/NZMSnews.html>

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EDITORIAL

Compulsory Retirement Savings Scheme

At this time we are being requested to consider the issue of compulsory retirement savings for the forthcoming referendum. What can we, as professional mathematicians, add to this issue? The compulsory superannuation savings scheme introduced by the Labour government in the 1970's was supported by a mathematical model developed by the Applied Mathematics Division of the DSIR. I am unaware of any similar modelling that has been done this time, indeed if such an exercise had been done, credibility might have been added.

Contrary opinions about the long term viability of the current universal superannuation scheme are being aired. This issue is surely one that ought to be modelled. When one contemplates the factors involved it quickly becomes apparent that the ability of the working population to sustain the scheme is dependent on more than just the relative numbers of the working and the retired populations. For example with the current level of unemployment, each retiree creates a vacancy that can be filled by a job seeker. Such a move would be fiscally neutral if the unemployment and pension support costs were similar. Also the numbers moving through pre school and student categories will introduce both immediate and long term effects. A change in fertility and parental age structures again influences the numbers in the work force immediately (workers taking parental leave or moving between full and part time employment) and in the longer term (the numbers in the workplace decades later).

Hence a model would need to be broad based, taking into account society's ability to afford the social welfare, education and health costs. These factors are not independent. Although the numbers in the retired category may be easy to predict, several scenarios of different demographic trends need to be modelled.

It is not just numbers that are pertinent either, the skills of the work force must also be part of the model. I am concerned at potential changes. We are frequently reminded that New Zealand's economy depends on increasing work skills. At a personal anecdotal level I report that in the last

month I have had one student state that she cannot afford to take a postgraduate scholarship overseas and two others who do not intend to return from overseas, each citing the burden of their student loan. Perhaps a rethink of the student loan scheme, at least in regard to postgraduate study, is warranted. To continue charging interest on their undergraduate loan is a great disincentive to postgraduate study. It might seem magnanimous, but it would probably be a very sound investment, for postgraduate students to be forgiven their loans on their return to New Zealand with postgraduate qualifications, at least in strategic areas.

Given the number of changes regarding superannuation that have occurred during my working career, many motivated more by political expediency, than by long term practical consideration, we should expect some scepticism to the claim that this new scheme would be exempt from interference. It is hard to see how such meddling could be modelled, but perhaps a feedback loop could be incorporated.

When I returned from my overseas postgraduate studies I was not attracted back to New Zealand by competitive salaries, indeed like many returning Kiwis, I had a sense of commitment and loyalty to the country that had supported me through my education. I suspect few of today's returning graduates will share a similar sense of duty. Student loan repayment will be in addition to compulsory retirement savings which cannot be capitalised or transferred. How can New Zealand compete for the members of an internationally mobile work force with countries that can offer better working conditions and salaries?

I would like to see the whole issue of superannuation properly modelled, taking into account both demographic and social factors. This should be done under the umbrella of the superannuation accord, so that some security against petty political interference might be available. But alas, where is the AMD when we need them?

Mike Hendy

LOCAL NEWS

AgRESEARCH

Rob Pringle becomes the Chief Executive Officer of the Dairying Research Corporation Ltd (DRC) on 21 July. He is the second statistician to hold this position. The first was Ken Jury, who retired last year.

Rob holds a PhD in biometrics from the University of Natal and his distinguished career in statistical research was highlighted by his election at a young age to the International Statistical Institute. In his formative years Rob was a bit of a matrix nut. His PhD thesis was on generalized inverses, which led to his 1971 book with Arthur Rayner (a New Zealander by birth) "Generalized Inverse Matrices with Applications to Statistics", which became a standard reference on the subject. Rob spent twelve years in Natal, first as Regional Biometrician for the Department of Agricultural and Technical Services, then as researcher and lecturer at the University of Natal. In 1977 Rob and his family moved to New Zealand. Rob lectured in statistics at Massey University before joining MAF in 1980 as a biometrician based in Palmerston North. He soon became involved in science management and has held a number of senior positions. He moved to Hamilton in 1993 as AgResearch Corporate Science Manager. He is currently acting CEO of AgResearch.

Ruakura hosted a one-day meeting of statisticians working in CRIs and others with similar interests on April 4, the day after the Hunter workshop on Statistical and Engineering Process Control.

Subsequent to the ceeding of the Whatawhata Research Centre to the Tainui tribe, the AgResearch Technology Systems Division "Modelling Group", consisting of Dave McCall, Tony Pleasants, Mike Rollo, Simon Woodward, Tian Yongqian and Kumar Vetharanim, has been relocated at Ruakura.

At Lincoln, the biometricians have been busy running their annual winter one-day statistics workshops. David Baird and Lesley Hunt have run introductory and more advanced courses on Genstat for Windows, and Dave Saville has run courses on anova, regression, ancova, design and the geometry of statistics.

Neil Cox, Harold Henderson, Mick Roberts and Martin Upsdell presented papers at the recent meetings in Auckland.

Mick Roberts

UNIVERSITY OF AUCKLAND SCHOOL OF MATHEMATICAL and INFORMATION SCIENCES

Three professors of the School of Mathematical and Information Sciences were invited speakers at a meeting at the International Solvay Institutes for Physics and Chemistry on "Integrability and Chaos in Discrete Systems", at Brussels in early July. They were Professors Cris Calude (Computer Science), Boris Pavlov (Mathematics), and Graeme Wake (Mathematics). The conference was held at the Solvay Conference Hall of the University Libre de Bruxelles. The renowned Solvay Institute is directed by the Nobel Prizewinner biophysicist Il'ya Prigogine. Themes for the conference were: aspects of nonlinear dynamics and complexity, including integrable and chaotic discrete systems, information processing and computational mathematics.

Department of Computer Science

At the conference on "Computability and Complexity in Analysis", held at Dagstuhl, Germany, in April 1997, there were 3 invited speakers from New Zealand: Professor Douglas Bridges (Waikato University), Professor Cris Calude and Dr P. Hertlinger (University of Canterbury). Cris Calude also was an invited speaker at the Solvay conference on "Integrability and Chaos in Discrete Systems".

Seminars

Robert Amor (IT Research and Application Building Research Establishment, Watford and University of Auckland), "A generalised framework for design and construction".

Dr Alan Blackwell (MRC Applied Psychology Unit, Cambridge), "Programming with Pictures (and Thinking with Diagrams)".

Professor Bob Doran, "The Gray code - a different way of counting".

Dr Martin C. Henson (University of Essex), "Informal methods for program development".

Dr Carroll Morgan (PRG, University of Oxford) "Probabilistic imperative programming: a rigorous approach".

Dr Patricia Riddle, "Datamining - miracle or mirage?".

Keith Wansbrough, "Modular monadic action semantics".

Dr Yong Sun (Queen's University of Belfast),

Belfast),"Transition diagrams to LOTOS specifications".

Professor Biswanath Mukherjee (University of California - Davis), "Optical (WDM) networks".

Robert Sheehan, "Scooting through EdMedia 97".

Department of Mathematics

Fifth Australasian Mathematics Convention

The 5th Australasian Mathematics Convention was held at the University of Auckland Conference Centre, from July 7 to July 11. It incorporated the Annual Meetings of the Australian Mathematical Society, the Australia-New Zealand Industrial Applied Mathematics Group (New Zealand division) and the New Zealand Mathematical Society. It was attended by 160 mathematicians from New Zealand, Australia and elsewhere. Invited addresses were given by:

Professor John C. Butcher (University of Auckland) NZMS Lecturer, "Traditional and non-traditional numerical methods for ordinary differential equations".

Professor Urban Cegrell (University of Canterbury), "Pluripotential theory".

Dr Robert DeVille (University of Bordeaux), "Smooth variational principles and non-smooth analysis in Banach spaces".

Dr Peter Hall (ANU) "Estimating a boundary in an image".

Professor Peter J. Hilton (SUNY Binghamton) Mahler Lecturer, "The legacy of Henry Whitehead".

Professor A. Hinkkanen (University of Illinois, Urbana-Champaign), "Dynamics and zeros of meromorphic functions".

Professor Kathy Horadam (RMIT, Melbourne), "Cocyclic matrices and their codes".

Dr Arun Ram (Princeton University), "Combinatorics and representation theory: recent results for Hecke theory".

Professor Hyam Rubinstein (University of Melbourne), "Extending 3-dimensional topology to dimension n ".

Dr Rodney Weber (Australian Defence Forces Academy), ANZIAM speaker, "Combustion waves".

Professor G. Weiss (Washington University, St Louis), "Some basic properties of wavelets and their connectivity properties".

Professor Herbert S. Wilf (University of Pennsylvania), "Computer proofs of identities: the state of the art".

Professor Keith J. Worsley (McGill University), "The geometry of random images".

The Invited Addresses by Peter Hall and by Keith Worsley were given under the joint auspices of the NZ Statistical Association and

the 5th Australasian Mathematics Convention. Members of the Department of Mathematics at the University of Auckland gave the following Contributed Talks:

Dr Jianbei An, "Dade's conjecture for the Chevalley Groups $G_2(q)$ ".

Britta Basse, "Population dynamics of endangered species".

Dr Bruce Calvert, "An o.d.e. on a closed cube and equilibrium points of neural nets".

Jiling Cao, "On the completeness of hyperspaces".

Tina Ming-hua Chan, "Graph-theoretic structures for Runge-Kutta and other methods".

David Chen, "ESIRK methods and variable stepsize".

Professor Marston Conder, "Inner reflectors and non-orientable regular maps".

Robyn Curtis, "Subgraphs of hypercubes containing no small even cycles".

Dr Michalis T. Diamantakis, "An extension of singly-implicit methods for solving stiff initial value problems".

Sina Greenwood, "Microbundles, manifolds and metrisability".

Dr Vivien Kirk, "Noise and heteroclinic cycles".

Emily Lane, "Chaos near structurally stable heteroclinic cycles".

Dr Tim H. Marshall, "Sphere packing in Euclidean and hyperbolic space".

Dr Warren Moors, "Topological games and semi-topological groups".

Dr Margaret Morton, "Growth of infinite planar graphs".

Louise Parsons, "Mathematical models for the foraging strategy of dairy cows".

John Pearson, "Some minimal obstructions to planar embeddings with three face vertex covers".

Filip Saidak, "New analytical methods in number theory".

Garry J. Tee, "Modelling cometary impact with planetary atmospheres".

A-Professor M. K. Vamanamurthy, "Distortion functions and quasiconformal maps".

Professor Graeme Wake, "Industrial Mathematics Clinic: a model for applied mathematics teaching".

Dr Mark Wilson, "Associative rings satisfying the Engel condition".

Shinji Yamamoto, "Epidemic modelling for gender class".

Professor Peter Lorimer was presented with the New Zealand Mathematical Society's Research Award for 1997, with the citation: "for a lifetime of achievements in mathematical research, especially for his contributions to the application of group theory in geometry and

combinatorics, and to the structure and classification of finite projective planes".

The Aitken Prize for the best lecture given by a student, awarded by the New Zealand Mathematical Society to honour the memory of Alexander Craig Aitken, was awarded jointly to Robyn Curtis and Louise Parsons, both of whom are Masters Students in the Department of Mathematics of the University of Auckland. Robyn gave her lecture on "Subgraphs of hypercubes containing no small even cycles", and Louise gave her lecture on "Mathematical models for the foraging strategy of dairy cows". Each receives a certificate, and they share the prize of \$250. The Australian Mathematical Society Medal was awarded to Dr Michael K. Murray, for his research on Differential Geometry.

As a prelude to the 5th Australasian Mathematics Convention, twelve analysts attended a mini-conference in our Department on "Analysis of Banach spaces: Geometry, Differentiability theory, etc.", from Thursday July 3 to Saturday July 5. The invited speakers included Robert Deville (Bordeaux), Jon Vanderwerff (Seattle), John Giles (Newcastle), Brailey Sims (Newcastle), Ian Doust (Sydney), Vladimir Pestov (Wellington) and Jerry Koliha (Melbourne).

LOGOS 2

A Symposium on "History and Historians of Mathematics" was held at the University of Auckland Conference Centre on May 27, as the second LOGOS Seminar (Local and Overseas Guest Occasional Seminar). George Joseph (visiting from the University of Manchester) spoke on "Confessions of an Unfinished Maths Historian", Monica Perez (visiting from Imperial College) spoke on "A Mathematician's Quest for Truth", and Garry Tee spoke on "Mathematics Outside the Greek Tradition". George Joseph was a British Council Visitor to New Zealand, and the Symposium was supported by the British Council.

7th Conference of the Australasian Bridging Maths Network

The 7th conference of the Australasian Bridging Maths Network was held at the University of Auckland, from July 12th to 14th. The organizing committee had members from almost all tertiary institutions in the Auckland region, with Barbara Miller-Reilly as Convenor. There were 75 delegates, including 50 from New Zealand and 25 from Australia; whereas the previous meetings in Australia had never had as many as 10 attending from New Zealand. Ivan Reilly

comments that "There is clearly a significant group of people working in this area in New Zealand, and by hosting this conference the Mathematics Education Unit and the Department are providing leadership in a newly emergent field of research and study".

The Vice-Chancellor has awarded Professor John Butcher a promotion within the Professor range, for his contributions "not only to Mathematics but to the reputation of the University".

Dr Tatyana Sobeleva has been an Honorary Research Fellow in our Department for two years. She has now been awarded a prestigious AgResearch Fellowship to work on genetic/kinetic models of animal growth, and other ecological models of invasive weed ecology, using stochastic models. Before coming to New Zealand she was a Professor of Physics in the Ukraine, with research interests including stochastic biological models. Only five of these awards are made annually, and only rarely has any such Fellowship been awarded to anyone other than AgResearch staff. She will hold the Fellowship as part of the cooperation embodied in the cooperative agreement between the University of Auckland and AgResearch in the recently agreed MATHEMATICAL BIOLOGY RESEARCH UNIT, and she will continue to be based jointly in the Applied group based at our Tamaki Campus and at Hamilton.

Dr Michalis Diamantakis and his wife Dr Monica Perez de Diamantakis (both with degrees from Imperial College) are visiting for this year. Michalis is working with John Butcher on his Marsden Fund Projects on Runge-Kutta methods, and Monica will teach a part of the paper 445.310 on History of Mathematics. Michalis will then become a Research Associate at Imperial College.

Dr George Gheverghese Joseph (University of Manchester), the eminent historian of non-European mathematics, came as a British Council Visitor for the first semester. He gave the 1997 Aldis Lecture on "Calculating Peoples", and he gave lectures at the other universities in NZ. With Dr Ramankutty we had two Malayalam-speaking mathematicians in offices on the same floor - there are very few universities outside southwest India where that happens.

Professor David Tall, the Professor of Mathematics Education at Warwick University, came for June as an Auckland Foundation Visitor. His visit was also supported by The British

Council, as part of their 1997 Link programme. He gave lectures at Auckland, Waikato, Victoria, Canterbury and Otago universities; and he was an Invited Speaker at the MERGA Conference.

Dr Jagdish Prakash, from the University of Botswana (Department of Mechanical Engineering) is visiting Tamaki Campus as an Honorary Research Fellow in Mathematics from June to August. He has worked extensively in Medical Fluid Dynamics, including blood flows and human body dynamics.

Dr Ron Gribben is at Tamaki Campus for the second semester, visiting Graeme Wake and helping to teach the Advanced Applied and Computational Mathematics paper 445.367. He is a member of the Mathematics Department at the University of Brunei, Darussalam.

Dr Patty McKenna is here for two years on an Auckland University Postdoctoral Fellowship (funded by the AU Research Committee), and she is working with Paul Bonnington, Margaret Morton and Graeme Wake. She has a PhD in Applied Mathematics (Graph Theory) from the University of Colorado at Denver, and she will be helping to teach the Discrete Mathematics paper 445.225 this semester.

In April, three PhD students of Professor Urban Cegrell from Umea University (visiting him at the University of Canterbury) visited our Department, and they gave general talks on certain areas in analysis. Frank Wikstrom spoke on "Representing measures for the ball algebra", Ewa Berqvist spoke on "Different types of convexity", and Magnus Carlehed spoke on "Comparison of different Green functions".

Dr Andy Macintosh, of the Department of Fuel and Energy at the University of Leeds, was a Marsden Fund Visitor at the Tamaki Campus in February.

Other recent visitors include Dr Uri Srebro (Technion-Haifa), Professor A. Hinkkanen (University of Illinois, Urbana-Champaign), Professor Len Bos (University of Calgary), Professor Christer Kiselman (Uppsala University), Professor Mark Gotay (University of Hawaii), Professor Lev Nikitin (Lomonosov State University, Moscow), and Professor J. P. Calvi (University of Toulouse - Paul Sabatier).

In June, Marston Conder took part in the meeting on computational group theory at the Mathematical Research Institute at Oberwolfach, and he also gave lectures at the

Universities of Tübingen, Oxford and Warwick. In July he was an Invited Speaker at the Third International Conference on Combinatorial Mathematics and Computing, held at the University of Melbourne. In June, Graeme Wake gave lectures in Amsterdam (CWI) and at the Solvay Institute in Brussels.

Boris Pavlov has been on leave, giving lectures at the following conferences: "Calculation of Szego-Kac determinant via fractional model" (with John MacCormick), contributed talk at Steklov Institute, St Petersburg; "Functional model methods for determinants of Wiener-Hopf operators", Invited Address at Moshe Lifschic Conference at Rehovot, Israel; "Functional model of dissipative operators and some practical problems of spectral theory", Invited Address at conference on "Mathematical questions of quantum mechanics and theory of complex systems", Solvay Institute (Brussels); "Dynamics of complex systems and invertibility", Invited cycle of lectures at the conference on "Modern progress in Lax-Phillips scattering theory", Peiresc (France); "Dynamics on Markov background and Demidov stabilization", poster display at the University of Queensland; "Symposium on fractional analysis", at the conference on "Lax-Phillips scattering theory after Lax-Phillips", UNSW.

Arkadii Slinko is on leave in Argentina, organizing Mathematical Olympiads there. Vamanamurthy is on leave, visiting Lansing, Helsinki, Bangalore, Hangzhou and Adelaide. David Gauld is on leave, at the University of York and at Youngstown State University, Ohio. Paul Bonnington is on leave, at Bratislava, Ottawa and Burlington, Vermont. Philip Sharp has gone on leave to Queen's University (Ontario), and John Butcher has been appointed as Acting Head of the Applied and Computational Mathematics for the rest of 1997.

Maxine Pfannkuch was on leave for the first semester. She visited Dr Rolf Biehler at the Institut für Didaktik der Mathematik (Bielefeld University) and Professor Heinz Steinbring at the Institut für Didaktik der Mathematik (Dortmund University).

Alexander Krageloh was awarded one of 6 Dean of Science Prizes for 1996. Those prizes and the Fowlds Memorial Prize are awarded to the best students completing either BSc(Hons) or MSc in the official year of the award. Alexander completed BSc(Hons) with First Class Honours in Mathematics in 1996, and he is now enrolled for a one-year MSc in Mathematics.

Local News

Professor Ian Buckle was the guest of honour at the Tamaki Campus on July 30, when a small celebration was held to mark the upgrading of the server and main computer engine of the scitec network at the Tamaki campus, known as aitken (aitken.scitec.auckland.ac.nz).

The Mathematics Department on the City Campus recently decided to use aitken as its server and computer engine, and it obtained funds from the University Research Grants Committee to upgrade aitken. As a result aitken now has six 250 megahertz processors, and it is one of the most powerful Sun computers in New Zealand.

Seminars

- Associate Professor Peter Hunter (Department of Engineering Science), "Soft tissue mechanics".
- Sina Greenwood "Microbundles, manifolds and metrisability".
- Dr Sergei Federov "On the angle between certain function subspaces of a weighted L_2 space on the unit circle".
- Dr Ken Russell (University of Wollongong), "Examining the robustness of crossover designs to error mis-specification".
- Professor Graeme Wake, "Critical initial conditions for thermal ignition".
- Professor John Butcher, "SIRK methods for numerical ordinary differential equations".
- Robyn Curtis, "Subgraphs of a hypercube containing no small even cycles".
- Professor J.J.H. Miller (Trinity College, Dublin), "On the importance of Shishkin meshes for the accurate numerical solution of flow problems".
- Dr Uri Srebro (Technion-Haifa), "Uniformization of maps with folds".
- Dr Eamonn O'Brien, "Investigating group representations".
- Dr Margot Gerritsen (Department of Engineering Science), "Designing an efficient solution strategy for fluid flows: local grid adaptation and error estimation".
- Professor Cris Calude (Department of Computer Science), "Some applications of automata to physics".
- Dr Douglas G. Rogers (East-West Center, Honolulu), "From radio telescopes to pool-ball triangles".
- Dr Monica Perez de Diamantakis (Imperial College, London), "Mathematics and the unity of knowledge: scientific and philosophical influences in 16th century architecture - El Escorial".
- Dr Mark Wilson, "Associative rings satisfying the Engel condition".
- Dr Norm Levenberg, "Polynomial hulls", and "Orthogonal polynomials in CN ".
- Professor Richard Wilson (Universidad Autonoma Metropolitana - Mexico), "Dense subspaces satisfying stronger separation axioms", "A review of some recent results on submaximal spaces", and "Dimensions of digital spaces".
- Dr Brent Everitt (University of Warwick), "Automorphisms of hyperbolic manifolds".
- Bob Valkenburg (Industrial Research Limited, Parnell), "Mathematical modelling in videometrics".
- Professor L. V. Nikitin (Moscow Lomonosov State University), "Differential equation changing type: well-posed boundary problem".
- Professor Kevin McLeod (University of Wisconsin-Milwaukee) "Sobolev regularity of solutions of parabolic equations", and "Mathematical quantum field theory".
- Professor Mike O'Sullivan (Department of Engineering Science), "Current problems in computer modelling of geothermal fields".
- Dr David Yost (Universite de Lyon 1), "Reducible convex sets".
- Dr Arkadii Slinko, "Coding and design of experiments: two faces of the same problem."
- Dr Henrik Bresinsky (University of Maine - Orono) "Generating sets for polynomial ideals and their radicals".
- Dr George Gheverghese Joseph (Manchester University), "Multicultural mathematics, anti-racist mathematics: what can that be?", and "Infinite series across cultures: background and motivation."
- Dr Vincent Moulton (Massey University), "Motions of points in two-dimensional complex space", and "T-theory: The Mathematics of Similarity."
- Britta Basse "The analysis of a simple predator-prey system when one of the terms is replaced by a delay".
- Dr Philip R. Smith (Osaka University School), "Cybernetic drift and the evolution of pleiotropy".
- Dr David L. Johnson (University of Nottingham), "Embedding some recursively presented groups".
- Dr Bruce Calvert, "Asymptotically stable equilibrium points of neural nets for ultrahigh gain".
- Ulf Backlund (Umea University, Sweden), "The Gleason property for Reinhardt domains".
- Professor Peter Nyikos (University of South Carolina), "Some consistency results in topology", "Higher cardinality analogues of the Cantor set, etc" and "Trees, manifolds and special axioms".
- Associate Professor Brian Mace (Department of Mechanical Engineering), "Wave

- transmission and energy flow in structures: modelling and control".
- Dr Fridrich Sloboda (University of Bratislava) "On approximation of Jordan surfaces: a topological approach".
- Dr Stan Gudder (University of Denver), "Sharp and unsharp quantum effects".
- Dr Bryan Cain (Iowa State University), "How Sylvester's theorem and Lyapunov's theorem grew together".
- Dr David McIntyre, "Countable metric spaces".
- Professor Naixing Chen (Chinese Academy of Sciences), "An inverse method for 2 and 3 dimensional aerodynamic design of turbomachinery".
- Alain Vandal (Department of Statistics), "Minimal covers of maximal antichains for interval orders".
- Professor John R. Collins (University of Calgary), "Robust M -estimators of scale: minimax bias versus maximal variance".
- Professor John Butcher and David Chen, "The effective order of singly implicit methods for ordinary differential equations".
- Dr Stuart Scott, "An unexpected occurrence of the reals".
- Dr David Riley (University of Alabama), "Burnside-type problems for groups, rings and Lie rings".
- Dr Carlo Laing (Cambridge), "Coupled oscillator networks and their symmetries".
- Professor David O. Tall (Warwick University), "Visual aspects of formal analytic concepts", and "Symbolic and visual thinking in calculus".
- Dr Ian Coope (University of Canterbury), "Spherical objects: the least circle, best sphere and GPS navigation problems".
- Brian van Dam, "Resolutions revisited".
- Dr Mike Hirschhorn (UNSW), "The magic of Ramanujan".
- Dr Michalis Diamantakis (Visiting Research Fellow), "Stiff initial value problems and their numerical solution using Diagonally Extended Singly Implicit Runge-Kutta Methods".
- Professor Len Bos (University of Calgary), "Bivariate Kergin interpolation".
- Sina Greenwood "Type I manifolds and their skeletons".
- Professor Christer Kiselman (Uppsala University), "Lineal Convexity"

Department of Statistics

The 48th Annual Conference of the New Zealand Statistical Association was held at the University of Auckland from July 9 to 11, and a Report is published elsewhere in this Newsletter.

Congratulations to Alain Vandal, Andrew Balemi, Bonnie Law and Paul Murrell for their success in the Student Talks Competition at the NZ Statistical Association annual conference in July. The titles of the talks were:

- Alain Vandal, "The effect of new therapies on AIDS surveillance-based modelling of HIV epidemics".
- Andrew Balemi, "Covariances in generalised estimating equations: to model or not to model?".
- Bonnie Law, "Testing for Hardy-Weinberg equilibrium".
- Paul Murrell, "Layouts: A simple way to arrange multiple plots on a page".

Thanks to Ray Hoare for donating the \$1000 prize, split equally between the four winners.

All in all a good week for Auckland doctoral students in the mathematical sciences, with 2 prizes awarded at the Mathematics meeting, and 4 at the Statistics meeting!

Dr Geoff Pritchard and Dr Thomas Yee are now lecturing at the Tamaki Campus. Chris Triggs is on leave at the University of Washington - Seattle, and Brian and Vera Eastwood are on leave at the University of Utah.

The recent Visitors to the Department were: Luke Tierney (University of Minnesota) for July, Keith Worsley (McGill University) for February to July, Terence Chan (Heriot-Watt University) for July, John R. Collins (University of Calgary) for June, Heinrich Schwarte (Essen University) for July, Klaus J. Miesck (Chicago) for November and Carl Schwarte (University of Essen) for August 1997 to July.

Seminars

- Dr Terence Chan (Heriot-Watt University), "Large deviations and quasi-stationarity for density-dependent birth-death processes".
- Professor Luke Tierney (University of Minnesota), "Lisp-Stat: an environment for statistical computing and dynamic graphics"
- Professor J. Durbin (London School of Economics and Political Science), "Time series analysis of non-Gaussian observations based on state space models".
- Professor Keith J. Worsley (McGill University), "Signal detection in very noisy images".
- Professor Peter C.B. Phillips (Yale University), "Developments on Hannan regression".
- Dr Heinrich Schwarte (University of Essen), "Spectral densities and modality".

Garry J. Tee

Department of Engineering Science

Your correspondent has just returned from leave (Duke University, writing the second edition of Nield and Bejan, *Convection in Porous Media*, Springer, 1992), so this item covers all of 1997.

Last year Peter Hunter was elected a FRSNZ. Now he has been appointed to a personal chair, in recognition of the outstanding bioengineering research group which he has built up in our Department and the links which he has built up with colleagues in the Medical School and overseas. In February he returned from leave spent at various places in Europe and the US.

Chuanyin Dang had resigned his lectureship to take up a position in Hong Kong. Earlier this year we welcomed Murray Smith (Senior Lecturer, engineering statistics) from University of Canterbury, Margot Gerritsen (Lecturer, computational fluid dynamics) from Delft via Stanford University, and David Budgett (Lecturer, bioengineering) from the University of Canterbury via Bath and Glasgow. Steve Hoysan, who has a PhD from Carnegie Mellon and who is presently working for a United States firm called Metal Container Corp., has accepted a position in solid mechanics and is due to arrive later this year. Shane Henderson, an Auckland ME graduate with a PhD from Stanford University, is returning from Michigan to a lectureship (OR) at Auckland on 1 October.

As visitors we have Professor Zvi Drezner from California State University Fullerton (21 July -30 August) and Dr Tiru Arthanari from the Indian Statistical Institute, Calcutta (July 97-July 98), each working with David Ryan on OR, and also Dr Vitali Babakov, from Russia (July 97-July 98) and Dr M. Boulibane from Lille (Sept 96-June 98, FRST Research Fellow), each working on solid mechanics (plasticity) with Ian Collins.

Don Nield

UNIVERSITY OF CANTERBURY

Bob Broughton started off our seminar series this year with a presentation on developments and the current state of our computing system. After that the presentations have been dominated by an array of welcome visitors. Sunah Kim, who has been with us during her study leave from ChoSun University, Korea, spoke on the generation of maximal ideals in Laurent polynomial rings; Bob Raphael (Concordia University Montreal) on Non-isomorphism of certain sheaves; Gregory Reid (Simon Fraser) on Symbolic and geometric algorithms for partial

differential equations; Norman Levenberg (Auckland) on Orthogonal polynomials in C^N ; David Glynn (our own department) on p -modular counterparts of Cayley's hyperdeterminants; and Paul Ackerley from the NZQA spoke informally on the framework of that accreditation system. The visit of Graeme Wake, who spoke on pattern preservation in spite of scattering was most welcome. During the brief tenure of Urban Cegrell as professor of pure mathematics we also had a stimulating array of presentations by the several doctoral students from Sweden who came to work with him. It has been quite unfortunate for us that Urban has decided to return to Sweden. We shall miss the energy he and his students shared with us. Moreover, we are on the lookout once again to fill the position of professor of pure maths! Still another Swede, Dag Billger has been visiting us, working with David Wall on a research project. We are currently benefitting from Erskine visits on topics in analysis: Guido Weiss (Washington University, St. Louis) is presenting a mini-course on harmonic analysis, and David Armitage (Queen's University, Belfast) is presenting on Wavelets. Prof Jeff Rosoff (Gustavus Adolphus College in St. Peter Minnesota) who specializes in commutative algebra, algebraic geometry and mathematical physics, has recently arrived to spend his study leave year with us. Finally, a very welcome though bittersweet visit in August will be from Kurt Lindner (Auburn) who will speak on a topic in combinatoric algebra, commemorating his long-time collaborator and our dear departed colleague, Derrick Breach.

Good news among our recent graduates include an award to Dr Andrea Piesse for her thesis, *Coherent Predictive Probabilities*, by the International Society for Bayesian analysis as one of world's four best theses in subjective probability for 1996. Dr Phillip Schluter, whose thesis was entitled *Identification of hazardous motor vehicle accident sites: some Bayesian considerations*, has accepted the position as Canterbury Cot-death Society researcher for 1997-98. Dr David Bryant, thesis entitled *Structures in biological classification is now on the road, slowly travelling to Sweden where he will present a lecture series.*

Chris Hann, currently working on his doctoral thesis with Mark Hickman, has recently been awarded the William Georgetti Research Scholarship for 1997. Jennifer Brown, new to our faculty in statistics this year, has received a research award for a study of the effectiveness of acoustic pingers in deterring dolphin deaths in setnet fishing. Darlene Heuff was the spirited

organizer of the department's presentation at the now-annual careers day expo that the university puts on. Mike Steel, who taught on overload throughout the first term, is currently on a research gambit in Bielefeld, Germany.

Rick Beatson

INDUSTRIAL RESEARCH LTD

Applied Maths

It has been a relatively quiet few months at Applied Maths. Everyone has had their heads down completing objectives for the financial year, and preparing bids for the coming bidding round. Roger Young found time for a trip to Tibet where he developed a model of the Nagqu geothermal field. Kit Withers returned from a successful trip to North Carolina, where he worked with Ross Leadbetter on extreme value theory. Robin Willink and Kit attended the NZSA conference in Auckland, where Rob gave a talk entitled "A test for dissimilarity of the spectra of noise processes", and Kit talked on "Confidence intervals for the length of a vector mean. Warwick Kissling has just enrolled for PhD at Auckland University in the Department of Engineering Sciences on large-scale geothermal models.

John Burnell

MASSEY UNIVERSITY

Department of Mathematics

The Department is now using MAPLE and MATLAB in first-year (100-level) teaching programmes in calculus and linear algebra, in addition to most of our papers at 200- and 300-levels.

Staff update: Dean Halford, Gillian Thornley and Charles Little have been admitted to the Fellowship of the NZMS. At the recent AGM of the New Zealand Branch of ANZIAM (Australia New Zealand Industrial and Applied Mathematics, a division of the Australian Mathematical Society), Robert McKibbin was elected Chairperson, and Adrian Swift re-elected as Treasurer.

Visitors: Professor Henrik Bresinsky has now returned to his home, the University of Maine, while Dr Le Tuan Hoa also recently left to go back to Vietnam.

Dr Simon Watt (UNSW, ex Massey University) visited en route back to Sydney after the Convention and gave a seminar in the Department on combustion waves.

Maria Hermannsson is spending the second semester at Massey, working on her thesis for a Master's degree at Roskilde University, Denmark. She is comparing attitudes to mathematical proof in the Danish and New Zealand secondary school systems. While at Massey she will be interviewing teachers and observing classes in local secondary schools. She is also doing some tutoring in our department.

Staff travel/conferences Papers were presented at the 5th Australasian Mathematics Convention in Auckland 6-11 July by Mike Hendy, Igor Boglaev and Charles Little, and by PhD students Kim Hee Kyung and Anton Raviraj Selvaratnam. Other Massey attendees were Adrian Swift, Gillian Thornley and Dean Halford.

Honorary Research Associate Gordon Knight was the keynote speaker at a recent meeting in Rotorua of the Mathematics Education Research Group of Australasia; Glenda Anthony and PhD student Margaret Walshaw presented papers. A highlight of the conference was Gordon Knight's keynote address concerning the role of memory in mathematics education; he made a case for a more positive role for memory in mathematics education research, particularly to increase our understanding into the relationship between memory and understanding.

Glenda has also recently presented mathematics education seminars to the Mathematics Department of Otago University and the Dunedin College of Education. Peter Kelly also attended the MERGA conference. Peter and Gillian Thornley attended a Workshop on Undergraduate Teaching run by the Education Mathematics Unit at the University of Auckland, while Peter attended the Bridging Mathematics Network session also held recently at the same university.

Charles Little travelled to South Africa for some collaborative work at the University of Natal with Dr Mike Henning, who has previously visited Massey University, and to present a paper "Factorising bipartite 3-graphs into Rainbow 3-paths" at a conference in Pretoria. The conference, jointly sponsored by the South African Maths Society, the American Maths Society, the Southern African Mathematical Science Association and the London Maths Society, attracted 400 participants and provided 17 parallel sessions. Charles reports that universities in South Africa are struggling financially even more than here, and protests against student fee levels have been vigorous and violent. While he himself travelled safely, he thinks it only prudent to

Local News

advise potential visitors to be careful and not to assume that media reports received here are exaggerated.

NZAMT 5 Conference As convenor of the national Mathematics Teachers conference NZAMT 5, Glenda Anthony reminds you that registration is now due. Registration forms are available on the web at <http://fims-www.massey.ac.nz/nzamt5/index.html>

Seminars

- Professor Douglas Rogers (University of Hawaii), "An area Pólya missed?"
- Professor John J.H. Miller (Trinity College, Dublin), "On the importance of Shishkin meshes for the accurate numerical solution of flow problems".
- Dr Vincent Moulton (Bielefeld University, Germany), "Analysing finite metrics using T-theory".
- Professor Michael Hendy, "A theory of splits".
- Professor Kevin McLeod (University of Wisconsin at Milwaukee), "Radially-symmetric solutions of semilinear elliptic equations".
- Dr Glenda Anthony, "Students' and lecturers' perceptions of factors influencing success in first-year undergraduate Mathematics courses".
- Mr Tim Burgess (Education), "What's the chance of getting it wrong? Probability misconceptions".
- Ms Margaret Walshaw, "Telling stories of difference: A look at how girls have been constructed as a problem in the learning of Mathematics".
- Ms Jan Savell, "Parents left out of the Junior Mathematics equation?".
- Dr Simon D. Watt (University of New South Wales), "A Weight Function approach for determining watershed initial conditions for combustion waves".
- Ms Fiona Underwood, "Tertiary students' perceptions of Mathematics and where it will take them".
- Dr Igor Boglaev, "Maximum principles for equations of Mathematical Physics".
- Dr Marijcke Vlieg, "Inverse scattering, Lax pairs and the AKNS system".
- Dr Tony Signal (Physics), "Why Quantum Field Theory?".
- Professor Tom Urbanik (University of Wisconsin), "Structural modelling at Forest Products Laboratory, USA".
- Mr R. Selwyn Jebson (Food Technology) and Adrian Swift, "Factors affecting the moisture content of Fritz Process butter".
- Mr Julian Witt (Process and Environmental Technology), "Computational Fluid

Dynamics: Hot Stuff in Cool Stores".

Dr Huub H.C. Bakker and Mr Wyatt H. Page (Production Technology), "Using the Third Umpire in cricket LBW decisions".

Ms Lillian B. Ferreira (Process and Environmental Technology), "A study of pervaporation using organophilic membranes and aqueous solutions of alcohols and esters".

Professor Don J. Cleland (Process and Environmental Technology), "A heat pump for simultaneous refrigeration and water heating".

Robert McKibbin

UNIVERSITY OF OTAGO

News George Aitken, son of A C Aitken, died on 30 April after a short illness - 12 days after his 70th birthday.

Research Research continues at a steady pace in the Department, with most staff continuing to publish in journals and many attending conferences to present their work. A particularly pleasing paper that has just been accepted by Journal of Geophysical Research is due to Ray Enlow. Ray has collaborated with the Department of Geology in some modelling work that represents an entirely new research direction for the Department. Long may it continue. Vernon Squire's Marsden and PGSF funded research benefitted considerably from the presence of Colin Fox from Auckland, who visited Otago for the first Semester. Vernon is also very pleased with the bed and metronome shelving system built by Colin for his crib at Purakanui, and with the improvised long drop for which Colin has already been adequately thanked in Vernon's view. Tony Dixon has just joined the Department as a post doctoral fellow funded on the same Marsden grant.

Staff Travel/Conferences Robert Aldred attended the Third International Conference on Combinatorial Mathematics and Combinatorial Computing in Melbourne in June/July. The conference was well attended by a wide cross-section of combinatorics researchers from around the world and provided an appropriate forum for the presentation of some recent results. It was also an excellent opportunity to follow up on some work with international colleagues begun by Robert while he was on leave last year.

John Clark attended a week-long, 4th International Conference on Algebra in July in St Petersburg, Russia.

In early April John Curran and Dennis McCaughan took the high road to St Andrews, Scotland, for a conference/workshop (7-11 April) on the algebraic computing package GAP (Groups, Algorithms, Programming). The latest version 3.4.4 of GAP has emerged recently, and the centre of development is shifting from Aachen, where it was created in the late 80s, to St Andrews. Participants at the workshop ranged from far and wide, from pure computer scientists interested in algorithms, parallel processing and symbolic computation, to pure algebraists interested in calculating (for example) automorphism groups. The conference featured talks on the use and extension of GAP but mainly consisted of intensive hands-on sessions in a large computer laboratory, which were extremely worthwhile. A rather hectic return journey, with classes resuming after the Easter break on 14 April, was complicated by airline problems but all ended well. We have now downloaded the package and run it on a PowerMac for teaching and research purposes.

In June David Fletcher attended a workshop on mark-recapture methods also at St. Andrews University. This was funded by a research programme looking at the sustainable harvesting of titi (muttonbirds) on Stewart Island.

Bryan Manly represented NZ at a meeting of the Statistics Subgroup of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) held at the La Jolla Laboratory, San Diego, California from 14-18 July. He also presented an invited paper on "Testing for latitudinal and other body-size gradients", at the NZSA 48th Annual Conference held at the University of Auckland. Caryn Thompson, Brian Niven (our Statistical Consultant), Charlie Laman (PhD student) and Joanne McKenzie (MSc student) attended the full (or part) of the 3-day (9-11 July) conference. Charlie gave his paper on "Comparing species abundance model of Borneo amphibians using the Akaike information criterion" at the student session. Joanne and Charlie also attended the workshop on Line Transect and Distance Sampling for Estimation of Wildlife Populations.

Vernon Squire convened the IP16 Symposium "Interfacial Processes in Ice-Covered Ocean" at the massive IAMAS/IAPSO Assembly, Melbourne, 2-4 July 1997, where he also gave an overview paper. The paper led into a series of other presentations by members of the New Zealand sea ice research team that attracted quite a lot of interest from international colleagues. Earlier in the year Vernon had also attended, chaired a session, and given a paper

entitled "Ice floe collisions: a neglected attribute of wave dissipation in ice fields" at ISOPE-97 in Honolulu, 26-30 May 1997. There, his time experiencing the delights of Hawaii, was interrupted by the necessary attendance at some very worthwhile sessions. This year's Antarctic Treaty Meeting was in Christchurch, and Vernon attended that for one day (May 21st) in his capacity as Chair of the Environmental Assessment and Review Panel (EARP). Rather different from running a mathematics and statistics department was his only comment, except that the lunch was yummy and he got a nice new free brief case.

Teaching The full effects, both negative and positive, of the extensive structural changes made to the Department's papers in 1997 are beginning to be realised. Some headaches have emerged, with the result that some minor tweaking has become necessary for 1998. Planning for a new Health Science 100-level statistics paper, STAT 115 "Introduction to Biostatistics" is well advanced.

Administration It has finally dawned on the HOD, Vernon Squire, that the administration necessary to run a University Department expands to fill the space available, and that other things tend to give. Vernon groans a lot. Apart from this he convened the review of the Department of Philosophy and is about to review Information Technology Services, a business unit within the University of Otago.

Visitors

- David Baird, AgResearch, Lincoln.
- George Joseph, Reader in Economic and Social Statistics, University of Manchester, U.K.
- Malcolm R Forster, Professor of Philosophy, University of Wisconsin-Madison.
- Professor Stan Gudder, Department of Mathematics and Computer Science, University of Denver.
- Prof David Tall, of Warwick, 1997 University of Auckland Foundation Visitor, sponsored by The British Council.
- Dr Jos Gonzalez, Spain. Interest - computational statistics in relation to biological research management for sustainable agricultural systems. Sponsored by the Organisation for Economic Cooperation and Development (OECD).
- Dr Ian Stewart, Department of Mathematics, University of Warwick.
- Dr Glenda Anthony, Department of Mathematics, Massey University.

Postgrads Carl Berendsen has qualified to graduate MSc with Distinction. He has taken up a position with the SIS in Wellington.

Maths in the Community

The Canadian Mathematical Challenge, a competition for 15 and 16 year olds, was run on 30 April in several centres throughout the country and was coordinated by Derek Holton.

Seminars

David Baird (AgResearch, Lincoln) "Statistical aspects of the Auckland Tussock Moth Eradication programme".

Caryn Thompson, "Variance Estimation for Spatially Distributed Data".

George Joseph (University of Manchester, U.K), "The True History of Mathematics: Countering the Eurocentric Perspective".

Roger Littlejohn (AgResearch, Invermay), "Eriodogram Analysis of Replicated Time Series Experiments".

4th Year Honours Students. Emma Shaw, James Macassey, Shaun Stephenson "Preliminary presentations".

Colin Fox, Visitor from Applied and Computational Mathematics Unit, University of Auckland "Conductivity Imaging via Markov chain Monte Carlo".

Ken Dodds (AgResearch, Invermay), "A bivariate response surface for growth data".

Malcolm R Forster (University of Wisconsin-Madison), "The New Science of Simplicity".

Professor Stan Gudder, (University of Denver), "Sharp and Unsharp Quantum Effects".

Professor David Tall (University of Warwick) , 1997 University of Auckland, Foundation Visitor, "Procedural and Conceptual Aspects of Problem Solving at University".

Dr Glenda Anthony (Massey University) "Students' and Lecturers' Perceptions of Factors Influencing Students' Success in First-year Undergraduate Mathematics Course".

that "eight full-time equivalent academic positions be confirmed for the Mathematics Department in 1997-1999 unless there is a major and sustained increase in student numbers which would warrant a further appointment" has been accepted by the Vice-Chancellor, so the eight of us who will be left in 1998 can breathe a collective sigh of relief for the time being.

There has been some rearrangement of the departmental offices with our secretary, Glenys Williams, staying where she is and the statistics secretary, Karen Devoy, shifting to another office.

Ingrid Melchert has been on sick leave during the first half of the year, but is working half time this semester. Our postdocs, Paul Watson and Graeme Williams, are helping us with the teaching of some of our undergraduate courses.

A number of staff and postgraduate students attended the Joint Mathematics Convention in Auckland. Kevin Broughan presented a talk on the construction of dynamical systems related to Hilbert's 16th problem.

Ian Craig and Alfred Sneyd had Eric Priest, an expert on solar MHD from the University of St Andrews, visiting them for about a week in May. Also visiting Ian and Alfred was Bill Allen from NIWA. Ian Hawthorn has completed his full and final probationary assessment and joined the ranks of the permanent staff. Of course, the meaning of "permanent staff" in the university context has changed somewhat over the last few years.

Douglas Bridges was away for three weeks in Germany in April. He was accompanied on his return by a DPhil student.

Ernie Kalnins and your local correspondent have finished their study leave and are back to the usual grind. In turn, Ian Craig started his leave in July. This lucky man has got a whole year away from usual duties.

Visiting your local correspondent in Hamilton for two weeks in early April was James Lyness (Argonne National Laboratory). They worked on canonical forms for lattice rules.

Seminars

E. Takeuchi (Nippon Steel), "MHD analysis in hydromagnetic casting process of clad steel slabs".

E.R. Priest (University of St Andrews), "Our dynamic sun".

G.G. Joseph (University of Manchester), "The man who knew infinity: the life and work of Srinivasa Ramanujan".

UNIVERSITY OF WAIKATO

Department of Mathematics

Congratulations to Mark and Anica Schroder on the birth of their son Jordan on June 10. He was a big baby, weighing in at 4.8 kg. Mark has now retired from our department. We held a farewell function for him and Heather Rae in early July. Both will be sorely missed and we wish them well for the future.

Heather has now shifted to Wellington. If any of you are in the vicinity, she would be glad to see visitors. Your local correspondent has her address.

The review of the structure of our department has now been completed. The recommendation

J.J.H. Miller (Trinity College, Dublin), "On the importance of Shishkin meshes for the accurate numerical solution of flow problems".

D. Rogers (University of Hawaii), "A problem from the mathematical challenge for young Australians".

Stephen Joe

Department of Statistics

Dave Whitaker is currently on study leave at the University of Queensland, working with John Eccleston. He returns here for a brief spell before heading over to the University of Lancaster where he will be working with Michael Wright on methods in optimisation.

A large contingent (of both academics and students) attended the recent New Zealand Statistical Association Conference held in conjunction with the Australian and NZ Maths Convention at Auckland University. Papers were presented by Jocelyn Dale, Murray Jorgensen, Bill Bolstad, and Judi McWhirter. Harold Henderson (from Ruakura), who is an honorary lecturer in the department, also presented a paper. Two of our senior students, Kathy Ruggerio and Max Whitaker, presented papers in the student section.

Recent visitors to the department have included Kaye Basford (University of Queensland) working with Lyn Hunt and Murray Jorgensen. John Eccleston and also Emlyn Williams (CSIRO) have also been here briefly working with Nye John and Dave Whitaker.

Joan Wood has successfully defended her DPhil thesis on "School Timetabling" and Sharpiee Abd. Rahman has submitted a masters thesis entitled "Statistical Analysis of Forestry Impact Data".

Seminars

Professor Stuart Hunter, (Princeton University), "Statistical and Engineering Process Control" (one-day Workshop).

Professor Keith Worsley (McGill University), "Signal Detection in Images".

Bill Bolstad, "Monte Carlo Methods in Bayesian Statistics".

Professor Kaye Basford (University of Queensland), "Graphical Profiles as an Aid to Understanding Plant Breeding Experiments".

Judi McWhirter, "On Using the EM algorithm to Model Pulsatile Data".

Luke Tierney (University of Minnesota), "Exploring Posterior Distributions using Markov Chains".

Kathy Ruggerio, "Resolvable Block Designs for Factorial Experiments".

Max Whitaker "Finding Efficient Rural Delivery Routes Using a Capacitated Arc Routing Formulation".

Jocelyn Dale, "Environmental Modelling of Indigenous Tree Species Using Zero-Inflated Regression Models".

Arthur Gilmour (NSW Agriculture), "Introduction to ASREML".

Judi McWhirter

STOP PRESS!

Yasumasa KANADA, Computer Centre, University of Tokyo has now computed π to 51,539,600,000 decimal digits. Two independent calculations based on two different algorithms generated 51,539,607,552 ($\approx 3 \times 2^{34}$) decimal digits of π , and comparison of the two generated sequences matched 51,539,607,510 decimal digits, differing in the last 42 places.

Main program run:

Job start :	6th June 1997 22:29:06
Job end :	8th June 1997 03:32:17
Elapsed time :	29:03:11
Main memory :	212 GB
Algorithm :	Borwein's 4-th order convergent algorithm

Verification program run:

Job start :	4th July 1997 22:11:42
Job end :	6th July 1997 11:19:58
Elapsed time :	37:08:16
Main memory :	188 GB
Algorithm :	Gauss-Legendre algorithm (Brent-Salamin)

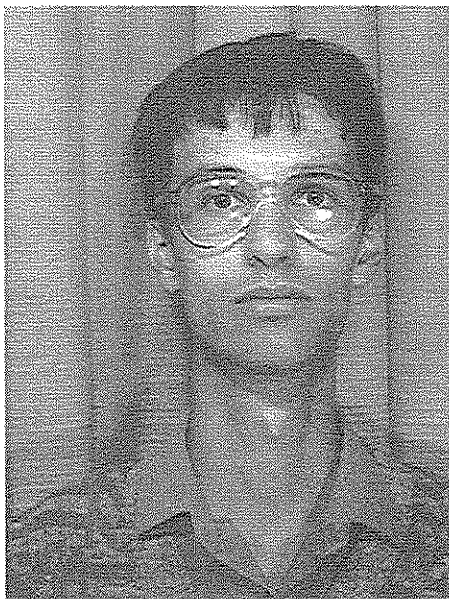
Machine used: HITACHI SR2201 at the Computer Centre, University of Tokyo, with 1024 Processors. Extensive statistical analysis of the digits does not reveal any significant difference from randomness. Much fuller details are available by anonymous ftp to 'www.cc.u-tokyo.ac.jp'

NEW COLLEAGUES

Dr EAMONN O'BRIEN has taken up an appointment as a lecturer in the Department of Mathematics at the University of Auckland.

Most recently an Alexander von Humboldt Research Fellow at the RWTH Aachen, Germany, Dr O'Brien's primary area of research is group theory, with particular reference to computational aspects. He is actively involved in the theoretical development, high-quality implementation, analysis and applications of algorithms for group theory and other areas of algebra. His software is distributed publicly and incorporated in the standard computational algebra systems.

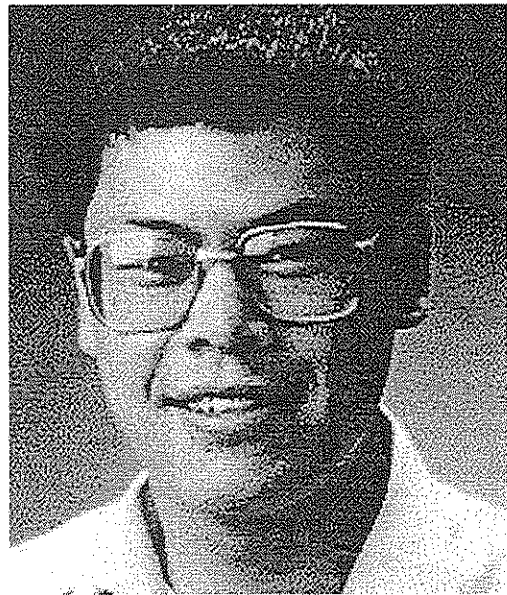
Dr O'Brien received his BSc degree in Mathematics from the National University of Ireland (Galway) and a PhD from Australian National University in 1988. He has held previous appointments as an Assistant Professor of Mathematics and Computer Science at Marquette University, Milwaukee, and as a Research Fellow in the School of Mathematical Sciences at the Australian National University.



DR GEOFFREY PRITCHARD recently returned from the United States to take up his lectureship in the Department of Statistics at the University of Auckland, Tamaki Campus. Dr Pritchard is an Auckland graduate, gaining a BSc(Hons) in mathematics in 1990. His graduate work was completed at the University of Wisconsin at Madison in the USA. He has previously held positions at the University of Delaware and at Texas A&M University.

Dr Pritchard's interests are in probability and stochastic processes, exponential inequalities, Gaussian processes, empirical processes, and stochastic optimization. His recent research has been on Gaussian stochastic linear programming problems.

DR THOMAS YEE took up in July 1997 a lectureship in the Department of Statistics at the Tamaki campus of Auckland University. Thomas is an Auckland graduate, completing a MSc degree in 1987 after which he worked for a time at the former DSIR and lectured part-time. His PhD was in the field of nonparametric regression and quantitative plant ecology.



After graduating in 1994 he spent two years at the medical school as a research fellow working on several epidemiological studies and clinical trials. He then took up a lectureship in Statistics at the Albany campus of Massey University. Thomas recently returned from a period of research at Stanford University where he worked on the development of a reduced-rank multinomial logit model. His research interests also include generalized linear models and environmental science.

Mathematics Research Graduates 1996-7

The information presented below is in the following format: name; degree; institution; thesis title; date awarded; supervisor(s); brief description; current position.

Masters Degree

Berendsen, Carl; MSc with Distinction; University of Otago; "Two Applications of Set Theory to QF Rings; 1997; Dr John Clark; The thesis deals with a range of ring theoretic ideas; SIS, Wellington.

Bowden, Ian; MPhil; University of Auckland; "Optimal lumber marketing under uncertainty"; 1995; -; A stochastic programming model was developed to assist in negotiations of fixed-price contracts for soft-wood lumber in the US market; Coopers and Lybrand.

Broad, Kevin; ME; University of Auckland; "Power generation planning using scenario aggregation"; 1995; A.B.Philpott; A scenario-based stochastic programming model for hydro-thermal power generation was developed and applied to the New Zealand electricity system, in an effort to produce well-hedged water release strategies; CORE Management Systems Ltd.

Broadstock, Neil; MSc with Distinction; University of Otago; "Fractal geometry and hyperbolic iterated function systems; 1996; Dr Peter Fenton; The focus of this thesis is on a particular systematic way of generating sets, loosely termed fractal, which are defined by relations between their parts. All fractals here are attractors, or invariant sets, of hyperbolic iterated function systems; - .

Chen, Jinguo; MSc with Distinction; University of Otago; "Central limit theorems for transfer function estimates"; 1996; Dr Laimonis Kavalieris; Estimation of the influence of one time-series in another through the fitting of a simple transfer model; Government Department in Shanyhai dealing with foreign investments.

Compton, Alistair Allan; MSc; Massey University; "On two problems of Arithmetic Degree theory"; 1997; Professor Wolfgang Vogel; Two problems, one due to Renschuch and the other to Sturmfels, Trung and Vogel, on the arithmetic degree of ideals, are considered; - .

Graduates

Goldie, Andrew P.; ME; University of Auckland; "Optimal airline crew scheduling using dynamic column generation" 1996; D. M. Ryan; This thesis discusses the use of resource constrained shortest path methods for column generation within the linear programming solution of set partitioning models for the Tours of Duty crew scheduling problem. The methods reported in this thesis have formed the basis of a new optimization system which has been put into production at Air New Zealand; Operations Analyst currently on contract at Air New Zealand.

Haines, Maggie, MEdStuds; Massey University; "Influences on practice in the mathematics classroom: An investigation into the beliefs and practices of beginning teachers"; 1996; Associate Professor Gordon Knight; This thesis explores the experiences of first year teachers. The influence of the reality of the classroom on the beliefs and practices of beginning teachers is related to espoused beliefs, especially those related to constructivism, developed in preservice courses"; Senior Lecturer, Auckland College of Education.

Harris, Glen; ME; University of Auckland; "Modelling the auditory brainstem response using an anatomically accurate model of the human head"; 1996; A. J. Pullan and P. J. Hunter; Developed a mathematical model of a human head and auditory brainstem and simulated auditory EEGs; Project Leader for Surgical Systems at ISG Technologies, Canada.

Horsburgh, Mark; ME; University of Auckland; "On the stability of plane Couette and Poiseuille flow with an inclined temperature gradient"; 1996; D. A. Nield; Used a Galerkin method to solve the linear stability equations for a combination of a Hadley circulation with either plane Couette flow or plane Poiseuille flow; PhD study, Cambridge University.

Kirton, Robert; ME; University of Auckland; "A three axis parallel drive microrobot"; Poul Nielsen; 1997; This thesis involved the design, construction, and testing of a three axis parallel drive microrobot. Finite element analysis of the robot ensured that the structure satisfied static and dynamic performance constraints (working tip displacements under maximum load, inertia and resonant frequencies of the moving elements). The accuracy of the model was verified experimentally; PhD study, University of Auckland.

O'Sullivan, Claire; ME; University of Auckland; "Short-term national electricity dispatch subject to uncertain demand"; 1995; A.B. Philpott; A dynamic programming model for daily hydro-thermal power generation with uncertain load was developed and applied to the New Zealand electricity system, in an effort to produce well-hedged thermal unit commitments; CS-First Boston, London.

Redhead, Grant; MSc in Mathematics; Massey University; "On the acoustical theory of the trumpet: Is it sound?"; 1997; Professor Robert McKibbin; Previous assumptions about the air flow between a trumpeter's lips, and about the flow within the trumpet itself are examined. No evidence, based on analysis and experimental data, was found to support the assumption of quasi-steady flow between the lips. An alternative flow equation is proposed, and conditions given for its applicability; Software engineer, PEC (NZ) Ltd, Marton.

Rennie, Sonya; ME; University of Auckland; "A comparison of methods for portfolio optimization; 1995"; A.B. Philpott; A study was made of variations on the classical Markovitz mean-variance model of portfolio optimization, and empirical testing carried out on historical time series data; Boston Consulting Group.

Smith, Shane N.; MSc (First Class Honours); The University of Waikato; "Current sheet formation and magnetic reconnection"; 1996; Assoc-Professor Ian Craig and Assoc-Professor Alfred Sneyd; Postgraduate student, The University of Waterloo.

Smith, Thomasin Ann (Tammy); MSc; Massey University; "Bounds on the Arithmetic Degree"; 1997; Wolfgang Vogel and Dr Kee Teo; By constructing counterexamples, some questions about the arithmetic degree of polynomial ideals are answered. For some cases, a general method for constructing such counterexamples is provided; PhD student and Graduate Assistant, Massey University.

Waterer, Hamish; ME; University of Auckland; "Hydro-electric unit commitment subject to uncertain demand"; 1995; A.B. Philpott; A scenario-based stochastic programming model for daily hydro-electric power generation subject to uncertain load was developed and applied to the Waikato river system; PhD study, Georgia Inst. Tech.

Yamamoto, Shinji; MSc; (Applied mathematics), University of Auckland; "Analysis of age-structure epidemic population models"; 1997; Professor John C. Butcher; Comparison of non-aged-structured models and age-structured-models for modelling epidemics; PhD student, Department of Mathematics, University of Auckland.

PhD Degree

Anderson, Iain A.; PhD; University of Auckland; Mechanical and material properties of the femoral head: from microstructure to continuum modelling; P. J. Hunter and J. B. Carman; 1996; This thesis uses experimental measurements of bone structure and properties to formulate a microstructural model of cancellous bone. It then uses a continuum approximation of the assumed orthotropic material properties, together with a finite element model, to examine the structure-function relationship of the femoral head; Industrial Research Ltd, Auckland.

Balakrishnan, Easwaran; PhD; Massey University; "Numerical study of thermal ignition in different geometries"; 1996; Professor Graeme Wake and Mr Adrian Swift; A study of the numerical methods for calculation of the threshold for spontaneous thermal ignition of exothermic chemical materials, and the conditions for ignition for some difficult but practically important shapes. This led to a generic computational framework for investigation of ignition of stored materials; Member of computer software support staff, University of Auckland.

Barton, Bill; PhD; University of Auckland; "Ethnomathematics: exploring cultural diversity in mathematics"; 1996; Professor J. D. Marshall; A new conceptualisation of ethnomathematics, which avoids some of the difficulties which emerge in this discipline; Senior Lecturer in the Mathematics Education Unit, Department of Mathematics, University of Auckland.

Brown, Jennifer; PhD; University of Otago; "The efficiency of adaptive cluster sampling"; 1996; Professor Bryan Manly; A theoretical investigation of a technique to improve the sampling efficiency of estimating the abundance of rare and patchily distributed ecological populations; the technique is known as adaptive cluster sampling with a number of variants; Lecturer in the Mathematics and Statistics Department, University of Canterbury.

Brunton, Ivan; PhD; University of Auckland; "Solving variable coefficient partial differential equations using the boundary element method"; 1996; A. J. Pullan; Using the boundary element method to solve linear variable coefficient pdes - investigated the dual reciprocity boundary element method in conjunction with separation of variables; Rolls Royce, England

Curran, James Michael; PhD; University of Auckland; "Forensic applications of Bayesian inference to glass evidence"; 1996; Professor Chris Triggs and Dr John Buckleton, statistical problems arising in the interpretation of transfer evidence which may be fragments of glass paint or body fluids; Post-doctoral fellow at the Program in Statistical Genetics at North Carolina State University.

Day, Paul R.; PhD; University of Auckland; "Flight attendant rostering for short-haul airline operations"; D. M. Ryan; 1997; This thesis describes optimization based methods for the solution of highly combinatorially complex set partitioning models which arise in short-haul airline crew rostering problems. A very successful production system based on these methods has been implemented at Air New Zealand; Operations Analyst currently on contract at Air New Zealand.

Henton, Stefan M.; DPhil; The University of Waikato; "Magnetic reconnection in astrophysical plasmas"; 1997; Assoc Professor Ian Craig and Assoc Professor Alfred Sneyd; - ; Research Scientist, HortResearch.

Hunt, Lynette A.; DPhil; The University of Waikato; "Clustering using finite mixture models"; 1996; Dr Murray Jorgenson and Dr Bill Bolstad; - ; Lecturer, The University of Waikato.

Rouse, Paul; PhD; University of Auckland; "A methodological framework of performance measurement with applications using Data Envelopment Analysis"; 1997; M. Putterill and D. M. Ryan; This thesis describes a methodology for the identification of measures which can be used in the measurement of performance. It also describes the analysis of such measures using Data Envelopment Analysis based on linear programming optimization; Senior Lecturer, Accounting and Finance, University of Auckland.

Graduates

Sands, Gregory; PhD; University of Auckland; "Mathematical model of ventricular activation in an anatomically accurate deforming heart"; 1997; P. J. Hunter and B. H. Smaill; This thesis develops a model of the propagating activation wave in the heart which both initiates and is influenced by the mechanical contraction. The model uses a finite element based collocation scheme which incorporates the underlying fibrous-sheet structure of myocardium; Post doc., Physiology Dept, University of Auckland.

Van Dyk Antony Keith (Tony); PhD; Massey University; "Diffusion and uptake of moisture through paint films leading to corrosion of metal substrates: A diffusion-adsorption model with reaction"; 1997; Professor Graeme Wake, Dr Alex McNabb and Mr Colin Gooch (Resene Paints); A new theory of corrosion of metal under polymer paint films is developed, based on competition by oxygen, water, polymer and corrosion product for active sites on the metal surface. The mathematical model is analysed numerically and a number of simplified reduced systems are found. Thresholds for corrosion onset are examined and related to experimental parameters; Technical Section, Resene Paints (NZ) Ltd, Wellington.

Wang, Anping; DPhil; The University of Waikato; "MHD interfacial instability in aluminium reduction cells"; 1996; Assoc Professor Alfred Sneyd and Assoc Professor Ian Craig; -; Software consultant.

Wang, Yuchuan; DPhil; The University of Waikato; "Constructive analysis of partial differential equations"; 1997; Professor Douglas Bridges and Dr Mark Schroder; -; Trainee stockbroker.

Watson, Kelvin Haigh; PhD; Massey University; "Graph theoretic facility layout design and evaluation: theoretical and practical considerations"; 1996; Dr John Giffin and Dr Ingrid Melchert; The Graph Theoretic Facility layout Problem aims to provide effective and efficient layouts from adjacency or transportation cost data. This work concentrates on the translation phase from specification to construction, and develops new techniques, as well as methods for comparing effectiveness of layouts. The framework established enables a practical unification of previous research in the area; Managerial consultant, Ernst and Young, Wellington

Ying Mai; PhD; University of Auckland; "Numerical solution of nonlinear evolutionary problems: generalized finite-difference methods and linear implicit methods"; 1996; Professor John C. Butcher; New numerical methods are developed for two nonlinear wave equations: Burger's equation and the KdV equation; - .

SURVEY ARTICLE

Mathematics Departments in New Zealand Universities

Introduction

The primary purpose of this survey article is to provide information for prospective doctoral students, but it also raises issues of interest to the wider mathematics community. In particular it documents the continuing gender imbalances among the staff and among the doctoral students in university mathematics departments. A similar article was published in the New Zealand Mathematical Society Newsletter in August 1993 [1]. At that time most departments included both mathematics and statistics so the survey included them both. It also attempted to report on the ethnic background of staff and doctoral students. This article updates the numbers of academic staff and doctoral students in mathematics (without including those in statistics), giving the female/male breakdown, but not the ethnic background. It also gives brief comparative information on entry requirements, funding and fees for doctoral degrees. More detailed information may be obtained from the contact people listed at the end of the article.

The information was collected from each mathematics department by sending a questionnaire to the Head of Department. After a draft of the article had been written a copy was sent back to the contact person for them to correct or modify their information as they wished. The numbers of staff and graduate students listed below are those in mathematics departments, or in the case of combined departments those associated with mathematics teaching and research.

Academic Staff

In the 1993 survey the number of academic staff was determined by counting those listed in the 1993 University Calendars. The following tables distinguish between staff for whom promotion depends on their being active in research (Tables 1 and 2) and staff whose primary responsibility is to teach (Table 3). "Permanent" academic staff is intended to mean tenured academic staff or academic staff that are on a limited term contract which under normal conditions will be renewed a number of times. The tables also show the numbers of staff in the broad subject areas of applied and computational mathematics, mathematics education, operations research and pure mathematics, with females and males listed separately. The applied and computational mathematics, mathematics education and operations research lists are incomplete as they include only the people who are housed in mathematics departments.

Table 1: Numbers of "permanent" fulltime research/teaching staff.

	Applied and Computational		Mathematics Education		Operations Research		Pure Mathematics	
	F	M	F	M	F	M	F	M
Auckland	1	7	0	3	0	0	1	22
Canterbury	1	12	0	1	0	1	0	7
Massey	0	6	1	0	0	2	1	7
Otago	0	4	0	1	0	0	0	6
Victoria	0	5	2	1	1	2	1	7
Waikato	0	5	0	0	0	0	1	2
Totals	2	39	3	6	1	5	4	51

Note: The numbers for Massey include 3 staff at the Albany Campus. Auckland numbers include staff at the Tamaki Campus.

Table 2: Numbers of "permanent" part-time research/teaching staff.

	Applied and Computational		Mathematics Education		Operations Research		Pure Mathematics	
	F	M	F	M	F	M	F	M
Auckland	0	1	1	0	0	0	0	0
Otago	0	1	0	0	0	0	0	1
Victoria	0	0	0	0	0	0	0	1
Totals	0	2	1	0	0	0	0	2

Note: Only the universities listed have staff in this category. For part-time staff people have been counted instead of fractions of positions.

Table 3: Numbers of teaching staff whose position does not require a research component

	Fulltime		Part-time	
	F	M	F	M
Auckland	2	3	4	0
Otago	3	0	0	0
Totals	5	3	4	0

Note: Only the universities listed have staff in this category.

It is clear that women form a minority (9%) in Table 1 and a majority (75%) in Table 3. Whilst it is important to aim towards having a balanced ratio of females and males on the staff it is even more crucial in terms of potential PhD supervisors. Overall slightly more than 9% (11 out of 116) of the academic staff in mathematics departments who are active researchers are women. These eleven women are spread unevenly across five of the universities. All of them are in extreme minority situations. With the successive waves of "restructuring" which are upon us, this fragile situation could easily deteriorate.

Notices

Waikato have already had their mathematics staff reduced in a way which halved the number of women in their department .

It is not possible to make meaningful statistical comparisons with the 1993 data [1], but we note that in 1993, 10% of the academic staff in mathematics and statistics were women (17 out of 165) and two of the universities had no women in these areas. It is hard to see much improvement except in the distribution and the teaching-only positions which add a more obvious female presence to the undergraduate and bridging maths scene in some universities.

Doctoral Students

Table 4: Numbers of part-time and fulltime doctoral students.

	Applied and Computational		Mathematics Education		Operations Research		Pure Mathematics	
	F	M	F	M	F	M	F	M
Auckland	6	6	3	0	0	0	1	10
Canterbury	0	4	1	0	0	0	0	0
Massey	3	3	2	0	2	2	1	1
Otago	0	5	1	3	0	0	1	1
Victoria	0	0	1	0	0	0	0	2
Waikato	0	8	0	0	0	0	1	0
Totals	9	26	8	3	2	2	4	14

The proportion of women among the doctoral students is 34% (23 out of 68). This compares with 31% for mathematics and statistics in 1993. The New Zealand Mathematical Society has provided \$500 towards a study whose aim is to investigate factors affecting doctoral study in mathematics in New Zealand Universities. Relevant questionnaires were distributed to all doctoral students in mathematics earlier this year. This research project will provide further information for the mathematical community.

Requirements for Entry and Completion

All the universities have similar requirements for a doctoral degree. These are:

- The usual entry qualification is at least second class honours at either the bachelor or master level. (Canterbury requires first class honours.)
- The average length for fulltime study is three years. For part-time students the situation is more variable, but the maximum is six to eight years.
- The normal requirements for the degree are a thesis containing original work which demonstrates the ability to carry out independent research to an internationally recognised standard. The thesis is examined by a team of examiners including an international expert in the field.

Funding

Funding which is generally available:

- Local university doctoral (or postgraduate) scholarships.
- Temporary tutorships.
- Student allowance (where applicable).

From time to time individual universities have scholarships funded by Public Good Science Fund, Marsden Fund, or industry. (Currently Auckland, Canterbury, Victoria and Waikato have these.) In addition Auckland have departmental scholarships (\$10,000 fulltime and \$8,000 part-time), and Canterbury and Waikato have departmental fees scholarships.

Fees

The following table gives the fees for 1997.

Table 5: Fees per year for New Zealand residents.

	Fulltime	Part-time
Auckland	\$2464	\$1232
Canterbury	\$2400	\$2400
Massey	\$ 605	\$ 605
Otago	\$1660	\$ 830
Victoria	\$2490	pro rata
Waikato	\$2850	\$1425

Note: The Massey part-time fee of \$605 per year is only for the first four years, the fee then becomes nil. Fees for overseas students may be different.

Contact People

More detailed information about doctoral programmes at particular universities may be obtained from the following people.

Table 6: Contact People

	Name	e.mail	Phone/Fax
Auckland	Prof Marston Conder	conder@math.auckland.ac.nz	(09) 373 7599 x 8753 (09) 373 7457 Fax
Canterbury	Dr Alan McInnes	A.McInnes@math.canterbury.ac.nz	(03) 366 7001 x 6664 (03) 364 2587 Fax
Massey	A/P Dean Halford	W.D.Halford@massey.ac.nz	(06) 350 5081 (06) 350 5611 Fax
Otago	Dr Peter Fenton	pfenton@maths.otago.ac	(03) 479 7769 (03) 479 8427 Fax
Victoria	Prof John Harper	john.harper@vuw.ac.nz	(04) 471 5341 (04) 495 5045 Fax
Waikato	A/P Alfred Sneyd	sneyd@waikato.ac.nz	(07) 856 2889 x 8324 (07) 838 4666 Fax

Reference

- [1] Morton M, Doctoral Studies in Mathematics and Statistics, NZMS Newsletter No. 58, August 1993.

Margaret Morton
Gillian Thornley

MoRST Review of Mathematical Sciences

The Ministry of Research, Science and Technology (MoRST) have contracted Professor Jeffrey Hunter, through his role as Chairman of the Royal Society of New Zealand Standing Committee on Mathematical and Information Sciences, to organise a Review of Mathematical Sciences in New Zealand.

The first phase was to prepare a report on the underpinning requirements of mathematics and its associated disciplines in relation to the socio-economic framework used by Government Science in the PGSF and the associated disciplines and technology requirements. This was subcontracted to Malcolm Menzies of Victoria Link Limited.

The second phase consisted of identifying a timeline and action plan for the exercise; the development of survey instruments for assessing research and user requirements to meet gaps and opportunities for the sectors identified and to develop a discussion paper to consider issues identified in the Terms of Reference. This paper was presented at a session during the Australasian Mathematics Convention and New Zealand Statistical Association Annual Conference held recently in Auckland. (Copies of the paper are available from Jeff Hunter.) The results of this exercise will feed into the final report. The final phase centres around the following Terms of Reference.

General Task

Through a foresight exercise, prepare a report on future likely developments in mathematical sciences in New Zealand and internationally, and assess their impacts on:

- 1 other science disciplines;
- 2 socio-economically driven science (i.e. PGSF outputs), and;
- 3 the socio-economic sectors of the New Zealand economy and society, including supporting mathematical services for these sectors over the next 25 years.

The report should use the Knowledge Base and other reports on mathematical sciences and be able to contribute to any future priority-setting for science, particularly for the PGSF.

Knowledge Foresight

For the field of mathematics identify: knowledge trends, and likely developments (where is the strength, where is it developing internationally and in New Zealand); performance outside and inside New Zealand in identified "gaps";

"breakthrough" areas of mathematics and its applications;

the implications of new technologies in computing, information and communications in the use of mathematics;

the opportunities for socio-economic sectors within New Zealand in mathematical developments and the supporting needs for mathematical services;

implications for PGSF priorities including any shift(s) in socio-economic science priorities; the enabling science capability required to meet identified opportunities including infrastructure, human and other resources.)

Issues such as links with interdisciplinary science and international linkages should be considered. Development of the report should involve consultation with key providers, users and funders.

The study should also fully assess currently available information and analysis relating to mathematics foresight in order to avoid duplicating effort. Bibliometric and other quantitative analysis should be used where appropriate.

The review will be modelled along the lines of the very extensive review carried out in Australia which culminated in the widely publicised document "Mathematical Sciences: Adding to Australia". A small Secretariat has been established to coordinate the review and subject area coordinators are being appointed to facilitate input into the review. Towards the end of the year, survey results will be presented in a series of regional meetings (Auckland, Hamilton, Palmerston North, Wellington, Christchurch and Dunedin). From these meetings a set of findings and a series of recommendations will be compiled and presented to a Workshop, to be held in Wellington late in the year. This will then be followed by the writing of the final report which is due for submission to MoRST in April 1998.

Although the review has been commissioned by MoRST, the mathematical community needs to take full advantage of this window of opportunity to inform government of the problems being faced not only by researchers but also the difficulties being experienced across all sectors of the mathematical and statistical disciplines.

Your interest and involvement in this exercise will be welcome. Submissions on any items of the Terms of Reference can be made at any time to Professor Jeffrey Hunter, by mail (Massey University, Private Bag 11-222, Palmerston North), by email (j.hunter@massey.ac.nz), or by fax (06 350 2258).

*Professor Jeffrey J. Hunter
Dean, Faculty of Information and Mathematical Sciences
Massey University, Palmerston North, New Zealand*

BOOK REVIEWS

Integration and Probability, by Paul Malliavin

Graduate Texts in Mathematics, 157 Springer-Verlag, Berlin-New York-London, 1995, 322pp, DM 74.00.
ISBN 0-387-94409-5.

(Translation of "Intégration, analyse de Fourier, probabilités, analyse gaussienne",
2nd edition, Masson, Paris, 1993.)

It was Sir Thomas Browne's pretended opinion that one thousand and forty Authors are more than are necessary in a whole World, and the reader of publishers' lists may often be tempted to agree. There are one hundred and fifty-nine Springer Graduate Texts in Mathematics enumerated in this volume - which itself, curiously enough, is only the antepenultimate entry - and something like eight titles suggest to the superficial eye a substantial overlap of content with it. (There are in reality many more duplications, for reasons I shall shortly explain). Nor is that all: this book is one of four on related topics published in close succession by Springer. The second is a modest volume of solutions by Gérard Letac to the exercises which he himself compiled and which occupy 51 pages at the end of this book. Third, there is a sequel, written by Malliavin himself: Stochastic Analysis, Grundlehren der Mathematischen Wissenschaften 313, Springer 1997; I have not seen it. Fourthly, there is an exposition of the Malliavin calculus by Nualart, The Malliavin calculus and related topics, Probability and its Applications, Springer 1995.

Now, these authors are certainly not fools; and, since Malliavin and his co-authors will scarcely grow rich from their efforts in a market so saturated, one must reject Johnson's dictum that no-one but a fool ever wrote anything except for money, and ask what other motive they have.

Malliavin's reason for producing this book, since one must suppose he is indeed the dominant author, was probably that he believed, with justification, that it fills a need. From internal evidence, the book appears to be based on his lectures, though H el ene Airault, who has herself done well-known work on the Malliavin calculus, has doubtless modified and amplified the text. There has been occasional editorial intervention by the translator Leslie Kay; not only is he listed as co-author, but here and there supplementary references are given that seem more appropriate to the American market. (I have not seen the French original). Letac's exercises are in many cases very substantial gollups of additional material; they are not at

all trivial, and Letac's solutions are themselves very instructive.

The presence of these exercises must classify the book as a textbook, if the series in which it appears does not already do so. It is not ostensibly aimed at the moderately expert; it begins at a sort of beginning, assuming only the more basic doctrines of real analysis and topology. Even Urysohn's Lemma is given a proof (in the metrizable case of Tietze). But what a textbook! Pinsky, in his foreword, and Norris, the LMS reviewer, both claim to have observed a tendency of late years, which Norris even calls a dogma, to teach their subject by examples. They comment that such is not Malliavin's way. Not being a probabilist, I cannot confirm their observations, but their comment is indisputable. Indeed, there is, I feel, always a French tendency to prefer an elegant abstract exposition to the horrors of the concrete example, and to relegate the real world, if one may so describe it, to exercises. This is not unrelievedly true here, partly because there is not space for complete generality; but, by the standards of American textbooks for instance, the book is rather tough going, and I should not use it myself as a principal reference in a fourth-year course. To be a little more specific: again and again Malliavin prefers, in the course of deriving some elementary fact, to invoke some abstract concept which is relevant, and may be illuminating, but contributes little to the essence of the argument. A typical example is the proposition III-2.2.2 that the Poisson kernel on T constitutes an approximate identity, which is stated in terms of narrow convergence of measures. This has no mathematical significance; the proof is an old friend; but it has become more remote in this new dress.

For the mature reader, who already has some acquaintance with the subjects treated, this sort of thing is more likely to be informative than discouraging, and the book is indeed full of information. Its frequent juxtaposition of facts usually kept apart is enlightening and inspiring. And this is because of its two great virtues: within its limits, it treats analysis as a single

subject, not as an array of loosely related topics; and it has a definite aim which saves it from formlessness.

I do not suggest that it is the only book with these virtues. Maurin's two fat volumes, very different in their choice of matter, come to my mind as similarly broad in scope but clear in overall intention. But most books, whether textbooks or research monographs, restrict themselves to a single 'topic', and, seeking to minimize their prerequisites, ignore other approaches to their material. Here, after introductory chapters on integration (the Lebesgue integral in \mathbb{R}^n is introduced as the Radon measure associated with the Riemann integral - as in Bourbaki or Maurin), one has the standard facts on the Fourier transform on \mathbb{R}^n and T^n , leading quickly to Sobolev spaces, distributions, and pseudo-differential operators. The basics of probability theory are introduced by way of Hilbert spaces (thus conditional expectations are available before the Radon-Nikodym theorem has been mentioned). Martingales are discussed, with some convergence theorems, and are applied to differentiation theory and Radon-Nikodym; and - the book's real *raison d'être* - a final chapter on "Gaussian Sobolev spaces and stochastic calculus of variations", which is an introduction to the Malliavin calculus. You will see that a great many topics are touched on, and this is why I said that there is more overlap with other books than might be guessed at first glance.

Of course, this abundance of topics means that none is prosecuted for very long, or in the maximal conceivable generality. The Radon-Riesz theorem is proved only for metrizable σ -compact locally compact spaces; Haar's theorem is stated for LCA groups, but only proved for \mathbb{R}^n and T^n ; although martingales are introduced, and Gaussian Sobolev spaces, there is no mention of the Markov property, or of stochastic integrals, or even of Brownian motion as such.

Within the bounds they have set themselves, the authors have obviously designed their exposition with an eye on the interconnections I mentioned above. Thus, we all know that the Martingale Theorem is in some ideal sense the most efficient approach to differentiation theory. However, few of us would have the hardihood to construct such an exposition *ab initio*, balancing the need to discuss martingales at all against the intuitive appeal of Vitali's theorem and the uses that results similar to Vitali's have elsewhere. Malliavin does just that, presumably because Vitali's theorem will be useless to him and martingales are not. In this

and many other respects one feels grateful that at last someone has given a coherent treatment along these lines. It is invigorating, it is exciting, it is informative, it is fun, it reminds one of things half-forgotten and teaches one things never learnt, and one says to oneself "If only my teachers had taught with this width of vision, this brio ..." But one's teachers did not usually have Malliavin's breadth of knowledge and experience - or his singlemindedness, or his disregard for human inertia.

For there is a price to pay for panache and *élan*. I am a grey man, who finds buccaneering, as lately recommended by Atiyah, rather too colourful; and you, dear reader, will say my greyness is the cause of my reservations. The fact is that, partly for reasons which inhere in the book's plan, it gives the reader a rather distorted picture even of the domains it covers. Two trifling instances will suffice. Spectral synthesis on \mathbb{R}^n and T^n ; is approached, very elegantly, via the Poisson and Gaussian kernels; so it is necessary to find the Fourier transform of $\exp(-x^2)$. For this, the authors refer the reader 77 pages *forward*, where they offer the elegant but rather over-subtle proof using the heat kernel. I take it that this is because they are avoiding complex analysis, but the effect is decidedly curious. In the same way, the characterization of different kinds of convergence in spaces of measures (Theorem II6.8) is proved in only one direction, with rather odd consequences for the statement of later theorems. The reason is presumably brevity; I had thought the authors might be avoiding the Hahn-Banach theorem, but they have already appealed to it as known in II6.6. (It is never stated explicitly, however).

Of genuine and misleading misprints there are surprisingly few, if one notes that the typesetting was by the translator, but there is a substantial list of minor errors and obscurities. Perhaps the most startling, because visible to the most casual glance, is on the top line of page *xx* of the Prologue, where the formula quoted for π_k'' appears to be nonsensical. Here and there it seems to me that the overall effect of a passage is rather unclear; for instance, the discussion of infinities for signed Radon measures is confusing. These are minor blemishes in comparison with the interest of the exposition.

A more serious fault is the lack of a bibliography. Doubtless the idea was that a textbook does not need one (except for a few places, where some other textbook is called on for a result our authors do not wish to expound). But at the least a modest indication of further

reading, of other treatments of the same material, and of the historical frame of the results discussed, would have been welcome.

I suggested that this book is addressed to a perceived need. From my description, it should be clear that it attempts to approach stochastic analysis from the viewpoint of abstract and more particularly harmonic analysis. The treatment of probability theory in the last two chapters of the book under consideration is very much that of a mathematician; Malliavin even thinks some introductory remarks on the significance of probability are advisable. Brief though they are, they seem to me a rather helpful indication

of the real meaning of the subject. (I am perhaps not the only person who spent many years wondering what probability theory was really about. Presumably Malliavin's other volume continues in the same spirit, and, if so, they will together constitute a very sympathetic introduction to a domain that is often presented, for an analyst, in a rather refractory style - Nualart's book, which is unapologetically directed to probabilists, and highly recommended by Norris, may serve as an example. This book of Malliavin's, by contrast, one may warmly recommend to a master's student (or above) who wishes for a broader perspective on analysis with some bias towards probability, or for a mathematical introduction to stochastic analysis.

Chris Atkin

An Introduction to Infinite-Dimensional Linear Systems

by Ruth F. Curtain and Hans J. Zwart, Texts in Applied Mathematics, 21.
Springer-Verlag, Berlin-New York-London, 1995, 689p, DM 88.00. ISBN0-387-94475-3.

1. Introduction
2. Semigroup Theory
3. The Cauchy Problem
4. Inputs and Outputs
5. Stability, Stabilizability, and Detectability
6. Linear Quadratic Optimal Control
7. Frequency-Domain Description
8. Hankel Operators and the Nehari Problem
9. Robust Finite-Dimensional Controller Synthesis
- A. Mathematical Background

As can be seen by glancing through the contents, this book deals with control theory for linear systems that are defined by an infinite number of parameters, such as those described by a partial differential equation or a delay-differential equation where state space can be formulated as infinite dimensional. The main development through the text deals with generalizing the system concepts of stabilizability, detectability, controllability, and observability, that dominate finite-dimensional control, to infinite dimensional systems (the first two generalize well while the latter two do not). The authors take the contemporary route and focus on state-space analysis in which the semigroup of evolution operators is central. The ensuing technical difficulties in treating unbounded input and output operators (which are common in practice) are side-stepped by providing formal derivations only for bounded operators, but in a

way that allows the reader to generalize to the more difficult case. The mathematical theory of these infinite-dimensional evolution systems is sufficiently thoroughly developed to warrant the title only mentioning the linear systems aspect even though the direction of the text is towards the problems of control.

The text heavily emphasizes the theoretical aspects of control with few references to implementational or computational issues. My first reaction - as an Applied Mathematician who is sceptical of flights of theoretical fancy that claim to be useful - was to be suspicious of the value of the book's content. But on more detailed reading I was very pleasantly surprised to find that the authors, while not mentioning actual implementations, obviously understand the issues in realising a control system and have focused precisely on the theoretical issues of significant practical value. And the value of the various theoretical results is nicely clarified by many lucid worked examples within the text and a good number of well chosen exercises that appear at the conclusion of each chapter. All in all, the material presented and the pleasant writing style made the theoretical development a joy to digest.

CENTREFOLD



Marston Conder

Marston Conder gave his first seminar at the University of Auckland in 1982. One colleague recalls, "It was immediately apparent to me that he was engaged in a worthwhile and deep part of group theory and was making substantial progress in it. He seemed to be a very good lecturer and have a pleasant manner. I was delighted to support his appointment as a Lecturer here." Since his initial appointment as a Lecturer in 1983 Marston rose rapidly through the ranks to become a Professor in 1993 at the age of 37. He is currently Head of the Mathematics Department.

Born in Hamilton in September 1955 Marston was educated at Matamata College (1968-72), the University of Waikato (1973-77), and University of Oxford, where he obtained his doctorate in 1980 with a thesis on "minimal generating pairs for permutation groups" that won him the Senior Mathematical Prize and the Johnson Prize.

This was followed by two years of postdoctoral research, one at the University of Otago and the second at the Universität Tübingen (Germany)

with a Research Fellowship from the Royal Society of London.

Jenny and Marston were married in Palmerston North in 1984, and they have two children, Jonathan (born in 1990) and Matthew (1993). His hobbies are gardening, music, crosswords, wine tasting and jogging. (It is often remarked that he looks very un-Head-of-Department-like, after returning from his mid-day run and becoming too involved with work to change out of his jogging gear until much later in the day.)

Marston specialises in combinatorial group theory, which is the study of groups given by generators and relations, an area which has diverse and significant applications in other parts of mathematics, especially combinatorics, geometry and topology; and also in theoretical physics and crystallography, and more recently, in the construction and analysis of efficient communication networks. In particular he is acknowledged as the world's leading authority on Hurwitz groups, which are maximal symmetry groups of Riemann surfaces, and on the use of Schreier coset diagrams for constructing permutation representations of finitely-presented groups.

He came to the Mathematics Department in Auckland at a time when computational methods were beginning to greatly influence the study of discrete objects, such as groups. His colleagues were introduced to John Cannon's Group Theory package Cayley (now known as Magma), which has played a major part in departmental research ever since.

Marston won the New Zealand Mathematical Society's Research Award in 1993, with a citation reading "for research exhibiting insight and originality in solving problems in algebra and combinatorics, in which, by his outstanding skills in machine computation, he has demonstrated the effectiveness of the computer when guided by real intelligence".

Marston has over sixty publications in refereed international journals, he has completed more than sixty invited reviews for *Mathematical Reviews* and *Zentralblatt für Mathematik*, and he is on the Editorial Board of several journals. In addition, he is a Fellow of the Alexander von Humboldt Foundation (Germany), has held Visiting Professorships at the Universities of Waterloo (Canada), St. Andrews (UK) and

UNED (Madrid), and has been a Visiting Fellow at the University of Oxford.

He has given numerous invited lectures, the most recent being at conferences in Singapore, Canberra, Oberwolfach and Melbourne.

This year he has been admitted as one of the first Fellows of the New Zealand Mathematical Society.

Research grants, including an inaugural one from the Marsden Fund, have often been used generously to help support students and colleagues. Certainly Marston is an impressive and prolific researcher, but perhaps an even more important contribution has been his willingness to share ideas and expertise with others.

At the national level Marston was President of the New Zealand Mathematical Society (1993-95), and jointly with Derek Holton he founded the Mathematical and Information Sciences Council of New Zealand in 1993, and was its inaugural convenor before helping to establish it as the Royal Society of New Zealand's Standing Committee for Mathematical and Information Sciences in 1995.

He was appointed as a member of the Marsden Fund Committee (and convenor of its Mathematical and Information Sciences advisory panel), and as a member of the New Zealand Science and Technology Postdoctoral Fellowship Advisory Committee in 1996.

In the same year he was appointed by the Ministry of Research, Science and Technology to its "lead expert" group for its review of the New Zealand scientific knowledge base, and he coordinated the area profile report for the mathematical sciences.

Over the years it has been a great pleasure to be associated with Marston as a colleague and friend.

Peter Lorimer
Margaret Morton

Book Reviews cont'd from p27

A single appendix of 100 pages, entitled "Mathematical Background", contains a delightful helter-skelter tour through the mathematical results, from the Open Mapping theorem to the Bezout identity, that are taken as prerequisites in the main text. The material is what I can best describe as all the results from complex functions, normed spaces and associated operators, integration, differentiation, transforms, and abstract algebra that an honours

mathematics student would see - and all in 100 readable pages with examples. I enjoyed reading this appendix, independently of the text, and can see it being a useful future reference for key results and examples.

I recommend this book for any researcher interested in learning about infinite dimensional linear systems theory and/or the control of such systems.

Colin Fox

Solving Problems in Scientific Computing Using Maple and MATLAB

2nd ed., by Walter Gander and Jiří Hřebíček
Springer-Verlag, Berlin-New York-London, 1995,
311 pp, DM 68.00. ISBN3-540-58746-2.

This book collects together 21 worked examples, by a total of 11 authors, of using Maple (a computing tool for symbolic manipulation) and/or MATLAB (for numeric computation) to solve problems coming from mechanics or numerical analysis. All but three articles use Maple for some part of the solution while just seven articles use MatLab, one mainly using MEX files written in C. I am not a Maple guru, but the Maple code looked to be well written to me while the MATLAB could have been more elegant.

The length of the examples varies from 7 pages, for an article on using Maple to compute conformal mappings of the circle to achieve solution in fluid flow problems, to 28 pages, for an article on Gauss Quadrature. To give a flavour of the other articles, there is also: an example of computing the trajectory of a topspin lob, a demonstration of the calibration of a piezoelectric transducer, and an article on predicting the deformed shape of a metal disk undergoing compression. The style and degree of detail varies considerably from article to article; for example, in the article entitled "The Radar Problem" the process of converting degrees, seconds, minutes into radians is discussed at great length, while another article assumes fluency with the QR factorization. I found many of the articles too terse in their development of the physical problem under consideration to be easily understood; The article on conformal mapping was actively annoying by its absence of development and I can only presume that following up the key references would alleviate this problem.

A number of the articles are misleading to the point of being dangerous. One such is the article on "Symbolic Computation of Explicit Runge-Kutta Formulas" for numerical integration of systems of initial-value equations, in which Maple is used to derive and then attempt solution of the order conditions obtained by matching Taylor-series expansions. In many ways this is a very laudable goal. Those of us familiar with the order conditions would not be surprised to see that Maple solves the equations easily up to order 3, needs user intervention at order 4 and is useless for higher orders. The authors mention this difficulty but not the more important fact that even if Maple could solve the more complicated system of equations, the order conditions given are not sufficient to guarantee producing higher order methods. Similarly, the article on "Gauss Quadrature" in which Maple is used to compute the abscissas and weights for the quadrature rules does seem to be using Maple in a pretty way - especially since those quantities are needed to great precision for high order rules and Maple is able to compute with arbitrary precision. But on parallel reading, I found the section on Gauss quadrature in Numerical Recipes (2nd edition) to be far more readable, comprehensive, and useful. I should admit to having found the occasional interesting snippet, such as the observation that the problem of line-fitting by minimising the sum of squared distances to a set of points (which is not linear regression where the sum squared distance in the y-direction, only, is minimised) may be solved by finding the minimum singular value of a certain matrix, along with the associated singular vector (in the article on "Some Least Squares Problems").

I came away from the book unsure who is the intended readership. A person who knows the mathematics and computing that is used in the book is unlikely to learn something new, while a person who is not familiar with the techniques used is unlikely to learn from this book. It is certainly clear that this book would be unsuitable as a teaching text.

Perhaps a constructive way to view this book is to re-title it "Diversions in Scientific Computing" and to think of it as a hodgepodge of potential ideas for class examples, with the understanding that each example would need considerable work to make it presentable. And as for a recommendation; I can only suggest that you skim through this book before, perhaps, buying to ensure that you would find something useful in it.

Colin Fox

GRANTEE REPORTS

Sharleen Forbes : Statistics New Zealand

One of the reasons I was keen to attend the International Conference on Mathematics, Science and Technology education held in Hanoi from 6-9 January this year was that it was jointly organised by Curtin University (Perth) and the Hanoi Pedagogical University. As a current extramural PhD student from Curtin I thought this would be a strategic gathering in terms of getting to thinking more about my own PhD as meeting other PhD students. This did indeed prove to be the case.

I have an idea, which at times seems rather draft, of constructing an indicator of mathematics education outcomes (to compare 'well-being', across subgroups in a cohort) by using a weighted (by participation) linear combination of successive achievement levels. Of course, everything is correlated with everything else making for the usual statistical nightmare. I was hoping to get real feedback on the paper I presented but halfway through realised I was talking to the wrong audience (mainly educationalists rather than statisticians). At first I thought this aspect was therefore somewhat a waste of time but later realised that it was invaluable for making me justify to a non-statistical audience why I wanted to do this at all.

My initial view of the conference was that it was a little Curtin dominated (and the large majority of participants were 'western', - from Australia, New Zealand, USA or the UK). I had been hoping to hear more about South East Asia which I finally managed to do by careful choice of papers including

- Trang Le Truong (Curtin Vietnamese PhD student) discussing factors affecting research in Vietnamese education. Her view was that mathematics in Vietnam is still subject-

centred and dominated by rote-learning. The teacher is still viewed as a respected elder - 'it is hard to change centuries of Confucist beliefs in a few decades'.

- Tan Toon Bee (Brunei) discussing 'Assessment grades can be meaningless',
and
- Hajah Zaitun bte Haji Taha (Brunei) discussing, with some pessimism, the transfer of knowledge from teacher education to the classroom.

Other memorable papers were:

- two by Reuven Lazarowitz (Israel Institute of Technology) involving testing of various pedagogues in controlled settings. One presentation compared various forms of co-operative learning and the other compared an inquiry instructional approach with traditional teaching on risk factors associated with cardiovascular disease. This indicated that more girls than boys in both groups increased their awareness of smoking as a risk factor but this was more marked in the experimental group who also expressed more favourable attitudes and enjoyment than the control group. A hand-on activity used by the experimental group was to blow cigarette smoke on goldfish in small containers which apparently has a visible impact in a very short time period.
- Nerida Ellerton's (ex-New Zealand, now Edith Cowan University, Australia) key note address "The future of mathematics education, mathematics education for the future. Dilemmas and directions", suggested that we look at ways to bridge some of the current educational dilemmas. Among those presented were:

Grantee Reports

- teacher-centred vs student-centred mathematics
 - silent classrooms vs. peer-discussion
 - group vs individual work
 - problem-solving vs problem-posing
 - closed vs open questions
 - value-laden vs value-free mathematics
 - abstract exercises vs real-world examples
 - international vs local curricula
 - pen-and-paper tests vs performance assessment
 - national testing vs school-based assessment
 - single-language policies vs use of 'mother tongue'
 - teacher accountability vs teacher empowerment
 - traditional vs. action research.
- David Squire's (Kings College, UK) key note address is "learning the rose between information and technology thorns?" suggested that there are three traps in the design of educational technology systems: superficial complexity, passivity (use just icon-clicks) and fantasy. He stated that information handling needs to involve the user as 'composer' and have a defined role for teachers, that multi-media cannot replace real-life experiences and that information should not be confused with knowledge.

A number of times a debate arose about the value (or otherwise) of statistical techniques in education. Apparently this is currently a big

issue in Australia (Rama Nemon's article 'Statistical significance testing should be discontinued in mathematics education research' in *Mathematics Education Research Journal*, Vol. 5, No.1, September 1993 and Nerida Ellerton's editorial in the same journal, Vol. 8, No.2, November 1996). While I also have some concerns about the mindless application of statistical techniques (and indeed whether we have adequate measures for concepts such as the reliability and validity of tests) I think that statistics does have a major role to play in all the social sciences, whether the data to be analysed comes from surveys or 'experiments'. As a New Zealander (Brian Haig from Canterbury) has recently pointed out statistics is more than just significance testing (although I maintain this still does have a place in directing our search for knowledge) and includes a range of techniques from exploratory data analysis to sophisticated modelling.

By the end of the conference I had enjoyed it immensely. Staying in Hanoi was great and Thora Blithe (from Victoria University) and I had a very rushed but interesting 6 days in Laos on the way home which made up for the fact that I'd given up most of my annual leave, and put the credit card in the red to attend this conference. Many thanks to the New Zealand Mathematical Society which is one of the few organisations willing to give small grants to assist its members to attend meetings such as this.

Martin Glanvill : University of Waikato

The High Performance Computing Asia '97 conference and exhibition were held in the Seoul Hilton and attended by leading firms, academic institutions and graduate students from Korea, Europe and the Asia-Pacific bowl. In April, Seoul was in springtime and there were many (expensive) tours on offer for the days that were not allocated for presentations. However, I decided to spend my time preparing for my presentation - my fears of whether my presentation would run over the allotted 15 minutes + 5 minutes QandA time were put at ease when everybody ran overtime on the first day. As part of the conference, presenters were allocated a lounge with free coffee/snacks (one small coffee in the cafe cost NZ\$3.50) and computers to send e-mail to colleagues.

The exhibition at the conference was attended by most of the major super-computing companies in the Asia-Pacific region. Some of the

presentations included the latest super-computers from SGI/Cray Research (Onyx, Indigo, Cray etc), IBM (RS-6000), Digital (Alpha etc) NEC and Fujitsu. Amongst this amazing array of hardware were the software included the latest in high performance parallel C/C++ and Fortran numerical libraries, in addition to the new HPF (High Performance Fortran) distributed parallel compiler and CFD applications. One of the standing questions at the conference, concerning one of SGI's "Virtual Reality" presentations, was: "Do they accept Virtual Money?"

Anyway, it was interesting to hear from the CEOs of SGI/Cray Research and IBM that the trend of moving away from centralized computing (viz VAX'es) will be reversed by and beyond the year 2000 through the use of massively parallel computers.

The conference itself had a theme of High Performance (Parallel) Computing which encompassed areas such as hardware and compiler design, multimedia (Java) to Finite Element Analysis, Fluid Dynamics and scientific visualisation. For those who attended last year's NZMS conference at Massey University, you will find the topic of my presentation vaguely familiar. For those who unfortunately couldn't attend last year's conference, or who missed my presentation, the paper was based on a portion of my thesis to reconstruct objects in two and three dimensions provided with data which bounds these objects. An application of this technology is in surface reconstruction from two dimensional cross-sections (ie. CT scans) for Finite Element Analysis.

As with most conferences of this nature there were various Welcoming speeches, Keynote Address, Plenary Speeches, Panels and Roundtables. There were also four social events scheduled: The Mixer, Opening Ceremony, Welcome Reception and Korean Night Banquet. The former three events were mostly eating and exchanging business cards, but the Banquet was a night to remember. After all the speeches from

the CEO's and ministers of the South Korean government, they put on the Korean Drum Dance troupe. The performers had everyone shouting "Encore" after 20 minutes of excellent room reverberating drumming!

From the material presented at the conference/exhibition, I would conclude that for New Zealand to be internationally competitive in areas of Applied/Pure Mathematics (CFD and Numerical computation) beyond the year 2000, there needs to be a major shift in the current standard of education and computing resources offered to undergraduates, graduates, post-graduates and academic staff. If we are not successful in this endeavour, New Zealand mathematics graduates will not be able to compete for jobs overseas in these high profile fields.

I would like to thank the NZMS and the Department of Mathematics at the University of Waikato who jointly (generously) funded my trip to the HPC Asia '97 conference in Seoul.

Kim Hee Kyung : Massey University

During February 2-6 1997, I attended the 33rd ANZIAM Applied Maths conference, which was held in Erskin House at Lorne in Australia.

The conference covers a variety of topics in applied mathematics being studied by New Zealand and Australian Mathematicians.

The atmosphere of the conference was very enthusiastic and pleasant. I enjoyed listening to talks on lots of different and interesting topics and learned a lot. Also it was very good to meet

people interests and worries. It gave me a chance to refresh my attitude on my study. I gave a presentation about the second order functional differential equation which arises in the cell growth modelling with dispersion.

Moreover, it was very nice to walk along beside the sea around Erskin house after dinner. We could relax after the day's tight schedule and could prepare for the next day.

I would like to thank the NZMS for supporting my trip to the conference.

S Anton Raviraj : Massey University

I was privileged to attend the 33rd Australian Applied Mathematics Conference (ANZIAM 97) held in Lorne, Melbourne, Australia, during 2-6 February 1997.

The atmosphere of the conference was warm, welcoming and very sociable, and the location

was excellent - with a beautiful beach.

What I found most helpful was that, I was able to have very fruitful discussions with a few among the other participants, who have been principal contributors to the same field of my research area, which I am pursuing towards my

Grantee Reports

PhD degree. Also, when I made my presentation titled "Gauss Equation and Backlund Transformation", there were a few valuable questions raised which have actually helped me to plan a part of my future work.

Considering all these, I am very grateful to the NZMS and to the Department of Mathematics, Massey University, for their retrospective financial assistance enabling me to attend ANZIAM 97, which was very fruitful.

CONFERENCES

**** 1997 ****

October 5-8 (Palmerston North) **NZAMT biennial conference: Get in the Know**

Contact Dr Glenda Anthony, Department of Mathematics, Massey University, Palmerston North, New Zealand.

email: G.J.Anthony@massey.ac.nz

November 24-26 (Brisbane) **Δ '97: Symposium on Modern Undergraduate Mathematics**

Contact Symposium Δ '97, Department of Mathematics and Computing, University of Southern Queensland, Toowoomba, Queensland 4350, Australia.

email: cretchle@usq.edu.au

November 30 - December 4 (Melbourne, Victoria) **4th Conference of the Association of Asian-Pacific Operational Research Societies (APORS'97)**

Contact APORS'97, PR Conference Consultants Pty Ltd, P O Box 326, Balwyn, Victoria 3103, Australia.

email: APORS97@sci.monash.edu.au

1-2 December (Sydney) **Conference to Commemorate G H Hardy**

Contact John Mack, School of Mathematics and Statistics, University of Sydney, NSW 2006, Australia.

email: J.Mack@mail.usyd.edu.au

December 8-9 (Adelaide, South Australia) **Workshop on Quantum Coherence and Information Processing**

Contact Murray Hamilton, Department of Physics and Mathematical Physics, University of Adelaide, Adelaide, SA 5005, Australia.

email: mwh@physics.adelaide.edu.au

December 13-17 (Macquarie University, New South Wales) **Algebraic Methodology and Software Technology - AMAST 6, 1997**

Contact Dr Michael Johnson, School of Mathematics and Computing, Macquarie University, Sydney, New South Wales 2109, Australia.

email: amast97@mpce.mq.edu.au

**** 1998 ****

January 5-11 (Auckland) **First International Conference on Unconventional Methods of Computation CDMTCS**

Contact M Dinneen (secretary)

email: mjd@cs.auckland.ac.nz

home page: <http://www.cs.auckland.ac.nz/CDMTCS/docs/news.html>

February 9-13 1998 (ETH Zurich, Switzerland) **HYP-98 Seventh International Conference on Hyperbolic Problems, Theory, Numerics, Applications**

Contact HYP-98, c/- Seminar for Applied Mathematics, ETH Zentrum, CH-8092, Zurich, Switzerland.

email: hyp98@sam.math.ethz.ch WWW: <http://www.sam.math.ethz.ch/~hyp98/index.html>

June 21-26 (Singapore) 5th International Conference on Teaching Statistics (ICOTS-5)

Contact Brian Phillips, School of Mathematical Sciences, Swinburne University of Technology,
P O Box 218, Hawthorn, Victoria 3122, Australia.
email: bphillips@swin.edu.au

July 6-10 (Brisbane, Queensland) 23rd Australasian Conference on Combinatorial Mathematics and Combinatorial Computing

Contact Elizabeth Billington, Department of Mathematics, University of Queensland, Brisbane,
Queensland 4072, Australia.
email: ejb@maths.uq.oz.au

July 13-16 (Adelaide) 3rd (Biennial International) Engineering Mathematics and Applications Conference (EMAC '98)

Contact Conference Chair EMAC 98, A/Professor Jagannath Mazundor, Department of Applied Mathematics, The University of Adelaide, Adelaide, SA 50501, Australia
email: jmazunda@maths.adelaide.edu.au
website: <http://www.maths.adelaide.edu.au/Applied/EMAC98>

A Message from the Australian Mathematics Society

You are invited to attend a research symposium on spectral and scattering theory, to be held at ANU from Monday December 8 until Thursday December 11. A proposal for financial support for the symposium is under review; if successful, local accommodations costs for a maximum of 25 participants from outside Canberra will be funded. Travel costs are not normally funded, but requests for such support will be considered in certain cases. The organizers are Andrew Hassell (ANU) and Nalini Joshi (Adelaide).

The symposium will overlap with Richard Melrose's visit to ANU. Melrose (MIT) is a leading expert in spectral and scattering theory. The meeting is timed to start directly after the Lie Groups meeting at ANU.

Researchers in any area of analysis that overlaps with spectral and scattering theory, for

example PDE, geometric analysis, or operator theory, are invited to participate. It is not necessary to be active in spectral and scattering theory. Part of our aim is to bring together people in disparate fields in order to learn new techniques and problems for each other. The symposium will run more as a workshop than a conference, with only 3 talks per day pre-scheduled so that there is plenty of time to interact in small groups, or form small discussion groups on particular topics of interest to the participants. Intending participants should send an expression of interest, via email, to hassell@maths.anu.edu.au, indicating the days they wish to attend, whether they wish to give a talk and requesting funding if needed. (Funding is of course contingent on the success of the proposal.) PhD students are welcome to apply. There will be no registration fee. We look forward to hearing from you.

The organizers

MERGA 20 People in Mathematics Education

Mathematics Education Research Group of Australasia Conference, Rotorua, July 7-11, 1997

This year was the first time that this conference has been held in New Zealand, and it provided an opportunity for many New Zealanders to attend for the first time. Its clash with the NZMS/AMS conference in Auckland meant that many tertiary mathematics educators could not be present, but good representation from Colleges of Education and schools made it a very useful occasion. Many Australians crossed the ditch to enjoy New Zealand tourism for the first time, and the success of the conference was due in part

to the restful mode of a venue away from a university, and to the friendships inspired by common accommodation in a well-catered and pleasant hotel. There were over 160 participants, including 90 Australians and 60 New Zealanders.

The convenor, Dr Andy Begg of Waikato University's CSMTER, ensured that the conference theme of "People, People, People" was reflected in both the Maori welcome and

Conferences

marae night, and in the arrangements which maximised informal talk. Plenary speakers included two Australians: Assoc-Prof Lynn English, (Queensland University of Technology) on a primary school research project which won the award for Research with Practical Implications, and Dr Robyn Zevenbergen (Griffith University) on the extent to which disadvantaged students are our responsibility. Statistics education was represented by Prof Mike Shaunessey (Portland State University - Oregon), and NZ was represented by Assoc-Prof Gordon Knight, (Massey University - Albany), who reminded us about the role of memory in mathematics education.

Before 1989 there was little research in New Zealand in mathematics education, and there were no graduate courses in the subject. There are now a wide range of research topics, and a large graduate community. This conference, being our first large-scale international gathering, marked a significant coming-of-age. It was fitting, therefore, that Gordon Knight should represent New Zealand: it was he who initiated the links between mathematics and education in this country, and who has represented us on the international body for many years.

Proceedings are available from Fred Biddulph (fredb@waikato.ac.nz).

Education in Mathematics for Undergraduates

The University of Auckland, 12 July, 1997

Taking advantage of the separate gatherings of mathematicians and mathematics educators from New Zealand and Australia, a one-day workshop specifically focussed on undergraduate mathematics education was held after NZMS/AMS and MERGA.

About twenty people had round-table discussions on four themes: organisation and assessment of

undergraduate mathematics; content and teaching issues; social and cultural issues; and the International Study Group which has just been initiated.

A fuller account of the meeting is being prepared, and it will be available from Bill Barton (b.barton@auckland.ac.nz).

Bill Barton

New Zealand Statistical Association Annual Conference

The 48th Annual Conference of the New Zealand Statistical Association was held at the University of Auckland from July 9 to 11, and it attracted over 160 participants. There were two major conference themes: Statistical Ecology, and Bayesian Statistics. There were invited speakers both from within New Zealand and overseas on both of these themes.

Statistical ecology deals generally with statistical problems in monitoring pollution, managing wildlife populations and other environmental questions. For this conference the major emphasis was on problems of animal abundance and change in animal populations. Professor Steve Buckland from the Research Unit for Wildlife Population Assessment (St Andrews University) was the principal invited speaker. He gave two talks and a Workshop on Line Transect and Distance Sampling for Estimation of Wildlife Populations. He has great experience in applying statistics to these problems, and is the major author of an

important recent book on Distance Sampling: Estimating Abundance of Biological Populations. Methods such as those which Professor Buckland has been developing are used for estimating the abundance of species such as whales and other sea mammals, fish, and land animals such as wild deer or even Kaimanawa horses. Dr Richard Huggins (La Trobe University) spoke about capture-recapture methods, which are also important in estimating species abundance. In the simplest classical case you wish to estimate the population of fish in a closed body of water, such as a lake. If a number of fish are caught (captured) and tagged on one occasion, and the same body of water is fished again at a later time, then the proportion of tagged fish (recaptures) in the second sample and the number of fish tagged originally can be used to estimate the total number of fish in an obvious way (assuming that all fish are equally likely to be caught on each occasion). Dr Huggins spoke about generalizations of this simplified problem.

Bayesian statistics has become a hot topic in recent years, because new computational methods have made it possible actually to analyse data using the Bayesian paradigm. This approach has been important, particularly in image analysis and biostatistics. The principal advance is the method of sampling a probability distribution, using Markov chain Monte-Carlo methods. These methods have long been known in physics, but have only fairly recently been applied in statistics. Professor Luke Tierney (University of Minnesota) spoke on his work in this area, and Dr Geoff Nicholls (University of

Auckland) described an application of the method to image analysis, of Maori pa sites. Two talks by invited speakers were sponsored jointly with the 5th Australasian Mathematical Convention. Professor Peter Hall (ANU), the world's most prolific statistical researcher, spoke about estimating a boundary in an image. Professor Keith Worsley (McGill) dazzled the audience with his lecture about the geometry of random images, which included dozens of colour images of regions of human brains.

David Scott

The Fourth International Congress on Industrial Applied Mathematics ICIAM 99

This congress is scheduled 5th-9th July 1999 in Edinburgh jointly organised by the Institute of Mathematics and its Applications (UK) and the International Centre for Mathematical Sciences, with the involvement of the Mathematics Departments at Edinburgh University and Heriot-Watt University. It is the premier meeting in Applied Mathematics and is held every four years. Previous Congresses met in Paris in 1987, Washington DC in 1991, and Hamburg in 1995. Following ICIAM 99, the local (Australia and New Zealand Industrial Applied Mathematics group ANZIAM) will be hosting the Congress ICIAM 03 in July 2003 at Sydney with Dr Noel Barton, CSIRO, Sydney as Director. Broad developments and the latest advances in industrial and applied mathematics will be presented. Cross disciplinary themes within mathematics and

other disciplines, and between mathematics and particular industries will be covered. The scientific programme of ICIAM 99 consists of Invited Lectures, Minisymposia, Contributed Presentations in Lecture form and Contributed Presentations in Poster form. Proposals for Minisymposia can be submitted via the web (see below) and are due by 30th September 1998 and the deadline for submission of a contributed paper is 31st October 1998. registration details, accommodation arrangements and other information will be available on the web site from April 1998. The web site is:

<http://www.maths.ed.ac.uk/conferences/iciam99/>

Professor Graeme Wake (University of Auckland) has copies of the first circular which can be forwarded on request.

Graeme Wake

International Congress of Mathematicians Berlin, Germany August 18-27, 1998



First Announcement

The Organizing Committee is pleased to announce that the next International Congress of Mathematicians will take place in Berlin, Germany, from Tuesday, August 18, through Thursday, August 27, 1998. It will be held under the auspices of the International Mathematical Union (IMU) and sponsored by many other institutions.

Mathematical Program

Responsibility for the scientific program lies with the Program Committee appointed by IMU. There will be about twenty one-hour Plenary Lectures covering recent developments in the major areas of mathematics and about 170 forty-five-minute Invited Lectures in nineteen sections. The sections are as follows:

- | | |
|--|---|
| 1. Logic | 11. Mathematical Physics |
| 2. Algebra | 12. Probability and Statistics |
| 3. Number Theory and Arithmetic Algebraic Geometry | 13. Combinatorics |
| 4. Algebraic Geometry | 14. Mathematical Aspects of Computer Science |
| 5. Differential Geometry and Global Analysis | 15. Numerical Analysis and Scientific Computing |
| 6. Topology | 16. Applications |
| 7. Lie Groups and Lie Algebras | 17. Control Theory and Optimization |
| 8. Analysis | 18. Teaching and Popularization of Mathematics |
| 9. Ordinary Differential Equations and Dynamical Systems | 19. History of Mathematics |
| 10. Partial Differential Equations | |

Every registered participant (traditionally called Ordinary Member) of the Congress will have the opportunity to give a short presentation, either during a poster session or in the form of a fifteen-minute lecture. A formal call for such presentations will be issued in the Second Announcement. Informal mathematical seminars may be organized at the initiative of groups of participants. English, French, German, and Russian are the official languages of the Congress.

All Plenary and Invited Lectures will be published in the Proceedings of ICM'98; after the Congress, a complimentary copy of these Proceedings will be sent to each Ordinary Member. Abstracts of all lectures and of all short presentations will be distributed free of charge to Ordinary Members at Congress check-in.

The Fields Medals and the Nevanlinna Prize will be awarded during the Opening Ceremony on the first day of the Congress. This will take place in the International Congress Center Berlin (ICC); all other scientific events will be held at Technische Universität Berlin. No scientific activities are scheduled for Sunday, August 23.

In an effort to reach out to a wider audience, the ICM'98 organizers have initiated several cultural activities related to mathematics that are attractive to the general public. In particular, there will be a VideoMath Festival, software demonstrations, talks about mathematics and its relations to other subjects, several exhibitions (*Mathematics in the Arts*, etc.), and other events (*Mathematics and Music*, etc.).

Special consideration will be given to the impact of the Nazi regime on mathematics in Berlin and Germany.

Social Events

On August 18, a buffet-banquet for all registered participants will be held at noon directly after the Opening Ceremony in the ICC. During the Congress, a number of guided tours of Berlin, visits to museums, and walking tours will be offered. On Sunday, August 23, it will be possible to choose from several excursions. For that evening, tickets have been reserved for the opera *The Magic Flute* at the Deutsche Oper. Registered participants may purchase tickets in advance for these events as well as for many day trips and pre- or post-congress tours to places of interest in the vicinity of Berlin.

Organization

Up-to-date information about all aspects of ICM'98 is available on the following website:

<http://elib.zib.de/ICM98>

This includes information about registration, abstract submission, etc. Correspondence should be directed to
 icm98@zib.de

It will be forwarded to an appropriate member of the Organizing Committee. If electronic communication is not available you may also write to

ICM'98
 c/o Prof. Dr. J. Winkler
 TU Berlin, MA 8-2
 Straße des 17. Juni 135
 D-10623 Berlin, Germany
 FAX: +49/30/314-21604

Registration and Accommodation

DER-CONGRESS, a professional congress and tour organizer, has been appointed by the Organizing Committee to handle all non-scientific matters for individual participants: registration to the Congress and the social events, hotel reservation, tourist program, collection of registration fees, etc. The formal registration procedure for the Congress will be described in the Second Announcement (see below).

Participants will be housed in a variety of hotels in Berlin; the necessary reservations have already been made by DER-CONGRESS. In addition, DER-CONGRESS will make student residences available and will provide a certain amount of private accommodation at a cheap rate for participants willing to accept less comfort. Detailed information on locations and rates will be provided in the Second Announcement.

Forms for registration and accomodation requests will be made available on the ICM'98 server in January 1998.

Second Announcement

The Second Announcement of ICM'98 will describe the activities of the Congress in more detail and give instructions on how to complete the registration process and obtain accommodation. It will provide more, although not complete, information on the scientific program, contain a call for contributed short presentations, and give instructions regarding the submission of abstracts.

The Second Announcement will also include advice on how to proceed upon arrival at airports and train stations, and it will be accompanied by a brochure describing the day trips and tours organized by DER-CONGRESS.

Several conferences of a more specialized nature are scheduled immediately before or after ICM'98. The Second Announcement will also contain a list of such "satellite conferences".

To receive the Second Announcement, fill out the form on the ICM'98 server (<http://elib.zib.de/ICM98>). Alternatively, send an empty e-mail to icm98@zib.de with Second Announcement in the SUBJECT line to receive an e-mail form. If this is not possible for you, please fill out the form below and send it to the ICM'98 Secretary Prof. Winkler (see address above).

The Second Announcement will be mailed from Berlin at the beginning of 1998.

I would like to receive the Second Announcement of ICM'98.

Please print

Name:

last/family/surname

first/given name

middle name/initial

Address:

institution

street and number

postal code

city

country

E-mail:

VISITORS

The main purpose 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.

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.

An up-to-date version of this list is maintained available on the Worldwide Web, at the URL

<http://www.math.auckland.ac.nz/~mcintyre/Visitors> This site also contains a form for convenient submission of information about forthcoming visitors.

Mary Barnes; University of Melbourne; - ; Mathematics Education, teaching of calculus, graphic calculators; October 1997; New Zealand Mathematics Teachers Association; Dr Glenda Anthony.

Professor Kevin Burrage; University of Queensland; Wife and 2 children; High performance computing, environmental management systems, scientific parallel algorithms and software (differential equations, linear systems), stochastic methods; 29 December 1997 to 16 February 1998; University of Auckland; Robert Chan.

Professor V. E. Cazanescu; Bucharest University; - ; category theory, universal algebra and semantics; October-November 1997; CDMTCS, University of Auckland; Professor C.S. Calude.

Professor Peter Cholak; Notre Dame University; - ; Mathematical logic and computability; early 1998; Computer Science Department, University of Auckland; Dr B Khoussainov.

Assoc-Professor David Clarke; University of Melbourne; - ; Mathematics Education, assessment, teacher education; October 1997; New Zealand Mathematics Teachers Association; Dr Glenda Anthony.

Professor K. Culik II; University of South Carolina; - ; cellular automata and compression theory; 9-15 or 2-8 November 1997; CDMTCS and HMU, University of Auckland; Professor C S Calude and Dr J Lennon.

Professor James Daly; University of Colorado; - ; Harmonic Analysis; 1 Feb 1998 to 1 June 1998; University of Canterbury; Qui Bui.

Professor Satya Deo; University of Jabalpur, India; - ; topology; February-June 1998; University of Auckland; David Gauld.

Dr Max Ganster; Technische Universitat Graz, Austria; unaccompanied; topology; Nov-Dec 1997; University of Auckland; Ivan Reilly.

Assoc-Professor Ron Gribben; Universities of Brunei and Strathclyde; accompanied by wife Margaret; thin films modelling in fluid mechanics, plankton dynamics; 29 June-26 September 1997; University of Auckland; Professor Graeme Wake.

Professor Dr Reinhard Laue; University of Bayreuth; - ; t-designs; 6-27 October 1997; Centre for Discrete Mathematics and Theoretical Computer Science, University of Auckland; Peter Gibbons.

Professor Will Light; Leicester University; accompanied by wife Anita; Approximation theory; 20 July 1998 to 16 October 1998; University of Canterbury; Rick Beatson.

Assoc Professor A Nies; University of Chicago; - ; recursion theory; 1-7 August 1997; CDMTCS, University of Auckland; Professor C S Calude.

Professor M J D Powell; Cambridge University; Accompanied by wife Caroline; Optimisation and Approximation; mid October to mid December 1997; University of Canterbury; Rick Beatson.

Professor David Ragozin; University of Washington; - ; Harmonic Analysis; September 1997; University of Canterbury; Rick Beatson.

Professor Jeff Rosoff; Gustavus Adolphus College, Minnesota; - ; commutative algebra and algebraic geometry; 11 July 1997 to July 1998; University of Canterbury; Peter Renaud.

Professor Aner Shalev; Hebrew University; Accompanied by wife and daughter; Groups and Lie Algebras; 25 September-4 October 1997; University of Auckland; Dr Eamonn O'Brien.

Professor Rosamund Sutherland; Bristol University; - ; Mathematics Education, Teaching algebra; October 1998; University of Auckland; Bill Barton.

Anne Watson; University of Oxford; - ; Mathematics Education, assessment, mathematical thinking; October 1997; New Zealand Association of Mathematics Teachers; Dr Glenda Anthony; British Council Link funded visit.

Assoc Professor Sue Willis; Murdoch University; - ; Mathematics Education, numeracy, gender issues; October 1997; New Zealand Mathematics Teachers Association; Dr Glenda Anthony.

Please note: Production of these lists is dependent on me 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.

*David McIntyre. N.Z. Mathematical Society Visitors' Co-ordinator
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NEW ZEALAND MATHEMATICAL SOCIETY NOTICES

President's Report 1996/97

This report covers the period from the last New Zealand Mathematical Society Annual General Meeting, in July 1996, to the end of June 1997.

MATHEMATICAL AND INFORMATION SCIENCES COUNCIL (MISC)

Although MISC, comprising representatives of the New Zealand Mathematical Society, the New Zealand Statistical Association, the Operational Research Society of New Zealand, the New Zealand Association of Mathematics Teachers (NZAMT), the Informatics Group of the New Zealand Computer Society, and Fellows of the Royal Society of New Zealand, has only met once since the last Annual General Meeting of the NZMS, its members, and in particular Professors Wake, Conder, and Hunter, have continued to work behind the scenes for a better future for the Mathematical Sciences in this country. In particular, MISC has persuaded the Ministry of Research, Science and Technology (MoRST) to conduct a review into the current state and future needs of the Mathematical Sciences in New Zealand, along the lines of the Australian enquiry, whose report *Mathematical Sciences: Adding to Australia*

was published in 1996. Preliminary meetings, creating the Working Party and Advisory Council for the enquiry, and setting down the timetable for meetings, writing, etc, were held in Auckland and Wellington in June. All attending the New Zealand-Australian Joint Meeting are strongly encouraged to take part in the forum on Wednesday afternoon, where they will have an opportunity of sharing their views and hopes of the review.

The timing of this review could hardly be more appropriate. The past year has seen my own department under attack from within the university for the disparity between its EFTS income and its salary bill, and intimations of similar assaults on at least two other New Zealand Mathematics departments. The EFTS funding regime, coupled with the extreme form of financial devolution that is currently in fashion with university administrators (including many Deans), has placed great strains on Mathematics departments, which typically have seen their student numbers decline as their staff get older and more expensive. It seems that there is little recognition, by administrators, of the inevitable

connection between the appointment of first-rate young mathematicians twenty-five years ago and the current salary cost of those same, by now internationally recognised, researchers. The rise of Computer Science, the desire of subjects to grab EFTS at the expense of each other, and the apparent lack of jobs for mathematicians per se have combined, doubtless with other factors such as the lack of quality Mathematics teaching in our schools, to make our subject less and less attractive to school leavers. It is imperative for the future of Mathematics, and therefore of all mathematically-based subjects, in New Zealand that the forthcoming review succeeds in persuading the Ministry, and through it the public, that top-rate research and teaching in Mathematics is a vital part of the ongoing development of our nation.

ACCREDITATION

Perhaps the most important initiative of the New Zealand Mathematical Society that has taken place in the past year has been the introduction of various grades of accredited membership of the Society. The initial Accreditation Committee - Professor Derek Holton (Chair), Professor Rob Goldblatt, and Dr Alex McNabb - has made its first recommendations for individuals to be accredited. I and the Council are most grateful to the Accreditation Committee for the time, thought, and effort they have put into their deliberations. The Council has already agreed that the members of the initial Accreditation Committee be awarded the first Fellowships of the New Zealand Mathematical Society.

VISITING LECTURERS

The Forder Lecturer this year was Professor Ian Stewart (University of Warwick), mathematician-writer-polymath, who gave very successful lectures in each university centre. I am most grateful to Associate Professor Rick Beatson for managing Professor Stewart's visit so smoothly.

The Society was disappointed in one respect: when I approached the British Council for funding to support the Forder Lectureship (funding it has always provided in the past), it was unable to do so at that time. When I wrote again several months later, I was disappointed to learn that the British Council was still unable to help the Society, since it had accepted a request from the Victoria University Mathematics Department for funds to support Professor Stewart's visit to Wellington. I would urge all colleagues involved in the local coordination of visiting lecturers to ensure that they do not jeopardise global funding by taking

initiatives without consulting the global coordinator.

The very successful 1996 New Zealand Mathematical Society Visiting Lecturer was Professor Valerie Isham (University College, London). My thanks go to Dr Mick Roberts for his excellent work on coordinating that visit. Our thanks are due to the Lotteries Board for its support for Professor Isham's visit.

Our first choice for NZMS Visiting Lecturer in 1997 unfortunately was unable to accept our invitation. In view of this and the difficulties experienced by a number of Mathematics departments in funding the Forder Lecturer this year, the Council decided to postpone the next Visiting Lectureship until 1998. It may be that in these times of financial hardship for departments, it would be better to have the Forder Lectureship and the New Zealand Mathematical Society Visiting Lectureship in alternate years, thereby ensuring one substantial visitor to our community each year, rather than one each year and a second one every alternate year. (This matter will be raised under the appropriate agenda item later on.)

FINANCIAL GRANTS

Council has made the following grants between 1 July 1996 and 30 June 1997:

(i) NZ Mathematics Colloquium 1997	\$1500
(ii) Travel (students, 1996 NZ Colloquium; other)	\$2750
(iii) Research Fund assistance (grants)	1250
(iv) Donation to NZ Mathematical Olympiad Committee	\$500
(v) NZMS Visiting Lecturer (Isham)	\$19 (profit)
(vi) Forder Lecturer	\$750

Note that items (i), parts of (ii), and (iv) on this list are budgeted, not yet actual, expenditures.

AITKEN PRIZE

The second award of Aitken Prizes, established in 1995 for the best paper or talk presented by a student at the New Zealand Mathematics Colloquium, was made at the 1996 Colloquium, in Palmerston North, to Anton Raviraj (Massey), for his talk Gauss's equation and Backlund transformations, and to Thomasin Smith (Massey), for her talk On arithmetic degree theory.

The 1997 Aitken Prize will be awarded later this week, at the current Australian/New Zealand Mathematics Conference. I am grateful to Professors Wake, Hendy, and Kalnins for acting as judges for the 1997 prize.

NZMS RESEARCH AWARDS

The 1995-96 Awards were presented, at the 1996 Colloquium dinner, to Associate Professor Mavina Vamanamurthy (University of Auckland) and in absentia to Dr Geoff Whittle (Victoria University of Wellington) for their outstanding research achievements in the preceding five years. The results of the 1996-97 Award round will be announced at a special ceremony preceding lunch on Wednesday.

PERSONAL

On behalf of the Society, I congratulate:

- Professor Rod Downey (Victoria University of Wellington) on the award of a Fellowship of the Royal Society of New Zealand, and

- Professor John Butcher (Auckland) on the award of the Hector Medal of the Royal Society of New Zealand, in recognition of his outstanding contributions to mathematical research throughout his career.

It was with great sadness that we learned of the untimely death of Wolfgang Vogel, who had added so much lustre to the Massey department in his short time there, and of Gordon Petersen, who retired some years ago after a long spell as Head of Department at Canterbury. Our condolences go to their families and colleagues.

Finally, I thank all others who have helped me in my time as President. I look forward to continuing to serve you as Immediate Past President in the coming year.

Douglas S. Bridges

NZMS Research Award

This annual award was instituted in 1990 to foster mathematical research in New Zealand and to recognise excellence in research carried out by New Zealand mathematicians.

A New Zealand Mathematical Society Research Award for 1997 was made to Peter Lorimer (University of Auckland) "for a lifetime of achievements in mathematical research, especially for his contributions to the application of group theory in geometry and combinatorics, and to the structure and classification of finite projective planes". The award for 1997 was announced at the 1997 Mathematics Convention in Auckland in early July. Other recipients to date have been John Butcher and Rob Goldblatt (1991), Rod Downey and Vernon Squire (1992), Marston Conder (1993), Gaven Martin (1994), Vladimir Pestov and Neil Watson (1995), and Mavina Vamanamurthy and Geoff Whittle (1996).

Call for nominations: 1997/98 round

Applications and nominations are invited for the NZMS Research Award for 1998. This award will be based on mathematical research published in books or recognised journals within the last five calendar years: 1993-97. Candidates must have been residents of New Zealand for the last three years. Nominations and applications should include the following:

- (1) Name and affiliation of candidate
- (2) Statement of general area of research

- (3) Names of two persons willing to act as referees
- (4) A list of books and/or research articles published within the last five calendar years: 1993-97
- (5) Two copies of each of the five most significant publications selected from the list above
- (6) A clear statement of how much of any joint work is due to the candidate.

A judging panel shall be appointed by the NZMS Council. The judges may call for reports from the nominated referees and/or obtain whatever additional referee reports they feel necessary. The judges may recommend one or more persons for the award, or that no award be made. No person shall receive the award more than once. The award consists of a certificate including an appropriate citation of the awardee's work, and will be presented (if at all possible) around the time of the AGM of the Society in 1998.

All nominations (which should include also the written consent of the candidate) and applications should be sent by 31 October 1997 to the New Zealand Mathematical Society President, Rob Goldblatt, Department of Mathematics, Victoria University, P O Box 600, Wellington. Please consider nominating any of your colleagues whose recent research contributions you feel deserve recognition!

Professor Rob Goldblatt

NZMS Visiting Lectureship
Valerie Isham, University College London

I arrived in New Zealand in Auckland on Sunday October 13 (on a direct flight from London) to be met at the airport, taken straight for a most enjoyable lunch, and then for a quick tour to see Devonport and the (rather wet and windy) view from Mt Eden. Thus my visit was marked from the outset by the elements that were to characterise it throughout: the care with which I was looked after and entertained by all my hosts and the very generous hospitality shown to me everywhere I went by my hosts and many of their families.

A full account of the visit would run to many pages, but suffice to say that before I left New Zealand from Christchurch on November 6th I had visited Mathematics and Statistics departments in Auckland, Waikato, Massey, Wellington, Otago, Lincoln and Canterbury Universities, NIWA, as well as Ruakura, Whatawhata, Wallaceville, Invermay and Lincoln AgResearch stations. I offered a choice of general lectures on "Epidemics: models for the spread of infection and the development of disease" and "Spatial processes: point process models and some applications" and more specialist ones on "Stochastic models for macroparasitic infections" and "Spatial-temporal rainfall processes: stochastic models and data analysis" and in all gave 12 lectures on these topics. In addition, I gave a talk to the Wellington Mathematics Association on "Spatial processes: ants, epidemics and rainfall" and took part in the PhD examination in Wellington of a thesis on multifractals. In each place I visited I also enjoyed the many opportunities to discuss mutual research interests with staff and graduate students, especially where these were very close to my own research areas. At times it became frustrating to be

constrained by the short duration of my stay and I would have loved to have had longer to get down to details, but I really appreciated being able to fit so much into the visit.

The Lectureship also gave me a wonderful chance to see a little of the incredible variety of natural scenery and topography of New Zealand. All my hosts were determined that not a moment of the visit should be wasted and every opportunity was taken to show me parts of the local environment en route from one commitment to another. I also had three weekends (including one with a national holiday) free for more substantial sightseeing. I managed to see many different stretches of coastline, mountains and national parks around New Zealand, but for me the highlights had to be the thermal areas which were quite unlike anything I had experienced before and provided input for all five senses.

I have brought back many happy memories of places and people, of old friendships renewed and new ones made. I should particularly like to thank Mick Roberts who coordinated the whole visit and whose hard work and careful planning made the trip so effortless for me. I am also grateful to the New Zealand Mathematical Society for the invitation to be its Lecturer for 1996, and indebted both to it and to the various university departments for their financial sponsorship. I particularly appreciated the contribution from the New Zealand Lotteries Board, whose support of an applied probabilist seems especially appropriate! Finally, to all my official hosts and to everyone else who took so much trouble to make me feel really welcome, thank you - I really enjoyed the visit.

1996 New Zealand Mathematics Colloquium Financial Statement
Massey University

Income		Expenditure	
From 1995 Colloquium	8052	Accommodation deposits	1583
Registrations	18368	Accommodation & meals	7940
Support		Events/excursions	2299
NZMS General	1500	Conference packs	330
NZMS Student gran	1000	Lecture Theatres	1138
ANZIAM	400	Conference Centre fee	3115
Bank Interest	520	Miscellaneous	505
		Invited speakers	2982
		Students support	1000
		To 1997 Colloquium	8948
Total	29,840	Total	29,840

Peter Kelly, Treasurer

MINUTES OF THE FORTIETH COUNCIL MEETING SUNDAY 6 JULY, 1997.

The meeting was held at the University of Auckland and began at 12.05 p.m.

PRESENT: D. Bridges (Chair), R. Beatson, M. Hendy, S. Joe, V. Kirk, and M. Roberts.

APOLOGIES: R. Goldblatt, D. McCaughan, R. McLachlan.

1. Minutes of 39th Council meeting:

It was moved (Roberts/Hendy) that the minutes be approved. The motion was carried.

2. Matters arising from the minutes:

- (a) Professor Ian Stewart made a successful tour around New Zealand as the 1997 Forder Lecturer. Associate Professor Rick Beatson was thanked for coordinating the visit.

Noted in discussion:

It was unfortunate that a local initiative to obtain funding for the 1997 Forder Lecturer from the British Council cut across the global coordination of the visit. This should not happen again and the Society should be informed of such initiatives so that possible higher levels of funding are not jeopardised.

The London Mathematical Society paid their share of the costs generously.

- (b) Professor Valerie Isham, the 1996 NZMS Visiting Lecturer, made a successful visit in October/November 1996. Dr Mick Roberts was thanked for coordinating her visit and arranging financial assistance through the Lotteries Board.

3. Formal ratification of earlier decisions: The following decisions made by email were ratified:

- (a) The study into New Zealand doctoral studies in mathematics and statistics by Drs M. Morton and G. Thornley was supported. The application for financial assistance of \$500 from Morton and Thornley was granted.
- (b) The applications for financial support from Dr J. Hannah, Mr S.A. Raviraj, and Ms H.K. Kim were granted. Each received an amount of \$500.
- (c) Professor J.H. Rubinstein was chosen to be the 1997 NZMS Visiting Lecturer.
- (d) The membership fee for overseas students was set to be the same as the reciprocal fee, currently \$16.
- (e) The members of the Accreditation Committee were invited to become Fellows of the NZMS.
- (f) Council does NOT grant honorary membership to Mr P.K. Srinivasan.

4. Treasurer's report:

- (a) An oral report was given by the Treasurer. Overall, the Society was in a good financial state with the 1996 financial year showing a satisfactory surplus.
- (b) It was moved (Kirk/Beatson) that the budget and audited accounts be received. The motion was passed.
- (c) Due to an oversight on the part of the Royal Society, the NZMS had accumulated arrears of \$1562.50 (incl. GST). It was agreed that this debt should be paid as soon as possible from the budget.
- (d) The Treasurer would recommend at the AGM that there be no increase in the subscription fees.
- (e) The Treasurer was thanked for acting so capably and willingly as NZMS Treasurer in the past year.
- (f) The budget included amounts for the Mathematics Olympiad and New Zealand Journal of Mathematics. However, no request for this money had been received. The President would attempt to discuss the matter with Professors Ivan Reilly and John Butcher during the Mathematics Convention.

The meeting adjourned for lunch from 1-2.15 p.m.

5. **Membership Secretary's report:**

- (a) A report from Dr John Shanks was received. The Council gave him a vote of appreciation for the fine job that he has done. He was also thanked for being willing to carry on in the position of Membership Secretary.
- (b) The heads of mathematics departments would be emailed to remind them that students were eligible for a year's free membership of the NZMS.

6. **Requests for financial assistance:**

After some discussion, it was moved (Hendy/Roberts) that the following grants be approved. The motion was passed.

Tina Chan	\$500
David Chen	\$500
Martin Glanvill	\$500
Andrew Hill	\$250
Saraswhathi Kota	\$500
Anjana Singh	\$500

Noted in discussion: To help in the decision making process, it would be useful to redesign the application form so that there was budgetary information including a breakdown of costs. Also, a statement from the supervisor or Head of Department for all applicants would be useful.

7. **Nominations to Council for 1997:**

- (a) Though nominations for the two vacancies had been called for in the April 1997 issue of the Newsletter, the Secretary had received no nominations.
- (b) Dr Mick Roberts indicated that he would be willing to be nominated from the floor at the AGM.
- (c) One of the vacancies had to be filled by a NZMS member from the South Island. If no South Islander nominations were received from the floor at the AGM, Dr Dennis McCaughan had indicated that he would be willing to be co-opted onto Council for a year to give time for a new Council member to be found.

8. **Fellows of the NZMS:**

Upon the recommendation of the Accreditation Committee, the Council admitted to the Fellowship of the New Zealand Mathematical Society the following members:

Professor Bruce Christianson, University of Hertfordshire
Professor Marston Conder, University of Auckland
Professor David Gauld, University of Auckland
Associate Professor Dean Halford, Massey University
Dr Charles Little, Massey University
Dr Gillian Thornley, Massey University
Associate Professor Mavina Vamanamurthy, University of Auckland.

[The members of the inaugural Accreditation Committee, Professor Derek Holton (University of Otago), Dr Alex McNabb (University of Auckland) and Professor Rob Goldblatt (Victoria University) who accepted the invitation to the Fellowship - editor.]

9. **Changes to accreditation procedures:**

- (a) The changes to the accreditation procedures suggested by Professor Derek Holton were discussed.
- (b) It was agreed that there should be a certificate for all Fellows. The President and Secretary would look into the matter.
- (c) There was little support for the suggestion that the number of Fellows at any one time be limited to a given percentage of the membership. Rather, it was the quality of the applicant that was important.
- (d) The idea of an "Emeritus Fellow" would be considered further.
- (e) The suggestion of an additional fee for Fellows was discussed. This was not supported as it would be difficult to apply retrospectively and it was not clear that members of the NZMS would have supported the accreditation procedure if such additional fees were required. Having additional fees would also require a change to the NZMS Constitution.
- (f) Though there were no "official duties" for Fellows, their expertise would no doubt be called upon for such activities such as the MoRST review.

10. **NZMS Visiting Lecturer:**
 - (a) Nominations for the 1998 Visiting Lecturer had been called for. Members would be reminded about this at the AGM.
 - (b) The Lottery Board was a possibility for obtaining funding for the Visiting Lecturer. However, there were many visitors and many mathematics departments were not in a healthy financial state. Because of this, it would be recommended to NZMS members at the AGM that "The NZMS Visiting Lecturer would normally be chosen every alternate year, in alternation with the Forder Lecturer". This would allow some flexibility in that it does not preclude a Visiting Lecturer in a year when ideal nominees present themselves, such as when a visitor is based on one institution, but would be willing to give a series of talks around the country. By having the Visiting Lecturer every two years, the extra money available should allow someone from further away.

11. **NZMS Research Award 1997:**

A nomination for a research award recognising lifetime achievement had been received. It was moved from the Chair that this award be granted. The motion was passed.

12. **NZ Journal of Mathematics:**
 - (a) Professor John Butcher would present the report of the NZ Journal of Mathematics at the AGM.
 - (b) The query from Dr Simon Woodward concerning an exemption from the subscription to the Journal was discussed. It was agreed that there be no change in the current policy, that is, ordinary members of the NZMS would continue to pay for the Journal, except for the current exemptions available for NZSA and ORSNZ members.
 - (c) The content of the NZ Journal of Mathematics was determined by the papers submitted. A broader range of topics in the Journal was only possible if papers covering a broader range of topics were submitted.

13. **Honorary life membership:**

This was to be decided on a case by case basis with there being an expectation that such members would have some connection with New Zealand mathematics.

14. **Aitken judging panel:**

The panel would consist of Professors Mike Hendy, Ernie Kalnins, and Graeme Wake.

15. **1997 and 1998 Mathematics Colloquium:**
 - (a) The Council agreed to give the earmarked amount of \$1500 to the Mathematics Convention as well as another \$1000 to support students to attend the Convention. There was usually a speaker, designated as the NZMS Speaker.
 - (b) Professor Gaven Martin would be advised that there was the float available from the last Colloquium which could be used (in moderation) to help with the costs of the Convention. The Australian Mathematical Society might also be approached to make a larger contribution to the costs.
 - (c) Victoria University has agreed, in principle, to host the 1998 Colloquium.

16. **Restructuring of mathematics departments:**
 - (a) It was noted with concern the events that had been taking place at several university mathematics departments.
 - (b) Though mathematicians generally agreed that the subject mathematics should be funded at a higher level than it currently is, previous attempts to achieve this had not been successful. The MoRST review may be an opportunity to make further submissions about the funding issue.
 - (c) At the University of Waikato, the department had had 10.5 staff at the start of this year, but this number would drop to 8 by the beginning of 1998. An applied mathematician who took early retirement about four years ago had not been replaced.
 - (d) At the University of Otago, three staff had taken early retirement. Two vacancies there at the lower end of the lecturer scale had been advertised.
 - (e) Massey University had effectively lost three staff over the past few years and there were indications that the department was still considered as being overstaffed.
 - (f) Staff-wise, the mathematics departments at Auckland and Canterbury were in a stable position.

Minutes

17. **MoRST review:**
- (a) Professor Douglas Bridges gave an oral report on a meeting held in Auckland concerning the MoRST review.
 - (b) Dr Mick Roberts gave an oral report on a similar meeting held in Wellington as well as on another meeting held to discuss the position of mathematics within the PGSF.
18. **General business:**
- (a) A draft president's report and draft AGM agenda were circulated for feedback.
 - (b) The NZMS Newsletter Editor indicated he did not wish to stay in the position indefinitely and would welcome someone volunteering to take on the position.

The meeting closed at 4.40 p.m.

**MINUTES OF THE TWENTY-THIRD ANNUAL GENERAL MEETING
MONDAY 7 JULY, 1997.**

The meeting was held at the University of Auckland and began at 5.37 p.m.

PRESENT:

D. Bridges (Chair), D. Alcorn, R. Beatson, J. Butcher, M. Conder, G. Dixit, P. Donelan, W. Halford, M. Hendy, S. Joe, E. Kalnins, V. Kirk, C. Little, G. Martin, D. McIntyre, P. Renaud, M. Roberts, G. Tee, M. Vamanamurthy, G. Wake.

APOLOGIES: None were received.

1. **MINUTES OF TWENTY-SECOND ANNUAL GENERAL MEETING:**
It was moved (Hendy/Halford) that the minutes of the previous meeting be accepted as a true and accurate record. The motion was carried.
2. **MATTERS ARISING FROM THE MINUTES:**
There were none.
3. **PRESIDENT'S REPORT:**
The President's report was delivered to the meeting and will be published in the NZMS Newsletter. It was moved (Wake/Roberts) that the report be accepted. The motion was carried.
Points to note:
- (i) Members were encouraged to attend the meeting concerning the MoRST review on July 9.
 - (ii) Members were encouraged to attend the research award presentations on July 9 to recognize their colleagues.
 - (iii) The three members of the initial Accreditation Committee have been admitted to Fellowship of the NZMS. Another seven members of the NZMS had been admitted to the Fellowship of the NZMS upon the recommendation of the Accreditation Committee.
4. **TREASURER'S REPORT:**
The Treasurer's report was delivered to the meeting and will be published in the NZMS Newsletter. It was moved (Butcher/Donelan) that the report be accepted. The motion was carried. Points to note:
- (i) The gross profit from the book trading account for linear algebra appears lower than reality because it includes royalties for two years.
 - (ii) Financial assistance for students, travel, etc. came from the investment income of the Society.
 - (iii) Due to an oversight on the part of the RSNZ, the NZMS had accumulated arrears of \$1562.50 (incl. GST). The Council had decided that this debt should be paid as soon as possible.
5. **MEMBERSHIP REPORT:**
A report from the Membership Secretary, Dr John Shanks, was circulated. It was moved (Beatson/Kirk) that the report be accepted. The motion was carried.
Point to note: Head of departments would be reminded about the year's free subscription to the NZMS for new staff and graduate students.

6. MEMBERSHIP FEES:

It was adopted by acclamation that there be no increase in the NZMS membership fees.

7. NEW PRESIDENT AND ELECTION OF TWO COUNCIL MEMBERS:

- (a) As Incoming Vice-President, Professor Rob Goldblatt would automatically assume the position of President for the next two years.
- (b) No nominations for the two positions on Council had been received by the Secretary.
- (c) Dr Mick Roberts had indicated that he would be willing to be nominated from the floor to serve a second term on Council. Accordingly, he was nominated (Butcher/Kirk) for a position on Council.
- (d) Dr Dennis McCaughan had indicated that he would reluctantly agree to be co-opted as a member of Council for another year so that another Council member from the South Island could be found. Procedurally, it was pointed out that he should be renominated for another three year term, with the option of resigning his position when another Council member had been found. Accordingly, he was nominated (Beatson/Conder) for a position on Council.
- (e) As the number of nominations did not exceed the number of positions, the Chair declared these two persons elected to Council.

8. APPOINTMENT OF AUDITORS:

It was moved (Wake/Hendy) that the current auditors, McKenzie McPhail (4th floor, Farmers Mutual House, 68 The Square, Palmerston North), be reappointed for another year. The motion was carried.

9. NZMS Visiting Lecturer:

The possibility of having the NZMS Visiting Lecturer every two years in alternation with the Forder Lecturer was discussed. Points raised in the discussion:

- (i) Though a 1997 Visiting Lecturer had been chosen, he was unable to accept the invitation.
- (ii) The poor financial position of some mathematics departments, in conjunction with the contributions for the Forder Lecturer, resulted in the NZMS Council deciding not to find a replacement 1997 Visiting Lecturer.
- (iii) Having a NZMS Visiting Lecturer normally every two years should allow the possibility of visitors from outside Australasia.
- (iv) A disadvantage of having the Visiting Lecturer every two years would be the possible loss of a visitor.
- (v) The Council was asked to think about the possibility of setting up a scheme in which a newly-appointed member of staff in a New Zealand institution did a tour in the years when there was a Forder Lecturer. This would be cheaper than having someone come from overseas.
- (vi) It would be beneficial to the Society to have the continuity of a lecturer every year.
- (vii) Although no official motion was put, the discussion should give guidelines to the Council.

10. NEW ZEALAND JOURNAL OF MATHEMATICS:

Professor John Butcher presented the report of the NZJM. It was moved from the Chair that the report be accepted. The motion was passed.

Points to note:

- (i) Two issues with a total of about 400 pages had appeared in 1996.
- (ii) The journal was expensive to produce, with about 460 copies being produced each print run at a cost of about \$7000 per run.
- (iii) It would be difficult to implement a suggestion that the Journal be more fussy over papers in order to cut the backlog.
- (iv) Moving to an electronic version would still require printed copies for exchange purposes.
- (v) In response to a question, Mr David Alcorn outlined some possible ways of increasing their income.

11. MATHEMATICAL AND INFORMATION SCIENCES COUNCIL (MISC) MATTERS:

- (a) Professor Graeme Wake gave a verbal report on MISC matters. This included the role of the MISC, its position as a subcommittee and an electoral college of the RSNZ. Professor Jeffrey Hunter is currently the Acting Chairman.
- (b) The importance of the review of the mathematical sciences, similar to the one carried out in Australia, was emphasized.

Minutes

- (c) There had been a workshop to discuss the position of mathematics within the PGSF. A draft report had been released.
- (d) Professor Wake was thanked for the four years in which he had been Chair of the MISC.

12. MATHEMATICS COLLOQUIUM:

- (a) At the request of Professor Gaven Martin, colloquium business was discussed under this agenda item.
- (b) Professor Mike Hendy presented the financial report for the 1996 Colloquium.
- (c) Associate Professor Rick Beatson moved a vote of thanks to Professor Hendy for organizing the 1996 Colloquium. This was adopted by acclamation.
- (d) The 1998 Colloquium would be held at Victoria University with Dr Peter Donelan as Convenor. It would be held during the week of 5-9 July, 1998.
- (e) The 1999 Colloquium would be held at the University of Canterbury.
- (f) There was a suggestion that the 2000 Colloquium be another joint meeting with the Australians, this time to be held in Australia, possibly at Central Queensland University in Rockhampton. The Australian Mathematical Society Annual Meeting in 1998 would be held in September at Sydney University.

13. GENERAL BUSINESS:

- (a) Associate Professor Dean Halford asked for further information about the New Zealand Institute of Mathematics. In reply, Professor Marston Conder gave information about its objectives, structure, long term goals, and financial information. This included the organization of workshops, of which three had already been held. Professor Gaven Martin outlined the instructional nature of the workshops that had previously been held in Huia and Tolaga Bay. The next workshop would be in Napier in the first week of January 1998, with the emphasis on geometrical analysis.
- (b) Professor John Butcher moved a vote of thanks to Professor Douglas Bridges for his role as President of the NZMS over the past two years. This was adopted by acclamation.

The meeting closed at 6.40 p.m.

NEW ZEALAND MATHEMATICAL SOCIETY INC

Income and Expenditure account for the year ended 31 December 1996

	1996	1995
Income		
Interest received	11,762	5,600
Subscriptions	5,024	4,819
Accreditation fees	89	-
Gross profit from books	2,158	2,400
Visiting lecturer	2,933	-
NZAMT share of publication profits	-	394
Other income	-	334
	21,966	13,547
Less Operating Expenses		
Accountancy and audit fees	847	794
Donations (meetings)	1,750	1,500
Travel and research grants	4,700	4,550
NZMS Lecturer	3,526	-
Newsletter	1,531	2,590
NZ Journal of Mathematics Grant	1,250	1,000
Posters and brochures	-	1,250
Postage and stationery	63	339
Travel/Council expenses	894	568
	14,561	12,591
Excess of income over expenditure	7,405	956
Accumulated funds at beginning of year	137,549	136,593
Transfer from NZAMT	3,567	-
Accumulated funds at end of year	148,521	137,549

NEW ZEALAND MATHEMATICAL SOCIETY INC

Statement of Financial Position for the year ended 31 December 1996

	1996	1995
Accumulated funds	148,521	137,549
Represented by:		
Current assets		
Petty cash imprest	-	9
Bank - general account	11,538	-
BNZ autocall account	2,962	1,153
Accounts receivable	1,511	1,318
Book stock on hand	10,432	13,613
GST refund due	-	152
	26,443	16,245
Investments		
BNZ investment	63,000	66,391
BNZ centenary bonds	62,000	62,000
	125,000	128,391
Total assets	151,443	144,636
Current liabilities		
Bank - general account	-	1,224
Accounts payable	1,907	475
Owing to NZAMT	-	5,388
GST payment due	1,015	-
	2,922	7,087
Net assets	148,521	137,549

OPEN UNIVERSITY SELECTS MATHCAD 7 PROFESSIONAL AS TEACHING TOOL FOR ADVANCED MATHEMATICS CLASS

Leading UK University Buys 5,000 Licenses of Product to use as Core of Distance Learning Curriculum MathSoft today announced that the Open University, Britain's largest and most innovative university, purchased 5,000 licenses of Mathcad 7 Professional. The University will use this newest version of the industry's most powerful calculation software extensively in its teaching curriculum. The Open University, which teaches its entire course offering to home-based students through a mix of distance learning techniques and technologies, purchased the on the first day Mathcad 7 Professional became available in the United Kingdom.

The Open University has extensive experience using Mathcad in its distance-learning curricula. It teaches an introductory math course based on an earlier version of Mathcad, taking advantage of Mathcad's, unique, easy-to-use interface and reusable worksheet capabilities to teach off-site students. With this new purchase, the Open University will apply these same techniques to much more advanced math subjects and applied math content using the enhanced live symbolics

and programming features of Mathcad 7 to teach students who are training to become professional mathematicians, physicists and engineers. Students will also be encouraged to use the new Internet and collaboration features of Mathcad 7.

Each time the University designs an advanced math curriculum around Mathcad 7 Professional, it distributes copies of the software to all students taking the course as part of their course materials. Mathcad will also be used as the calculating engine for a number of multimedia packages that are being developed in collaboration with the British Broadcasting Corporation (BBC).

"Our experience with Mathcad has shown us that it is an excellent tool for mathematics education," said Mick Bromilow, Course Team Chair of the Open University course on mathematical methods, models and modelling. "It is very easy for the students to use and learn from Mathcad in an introductory setting. We are now turning to Mathcad 7 for our advanced students because it is even more important to

provide them with a widely used professional tool that takes them beyond calculation exercises, helps foster an understanding of advanced concepts and prepares them for their technical careers."

"It is very gratifying that the Open University was so quick to select Mathcad 7 as the tool for teaching and training its technical students," said Charles Digate, president and CEO of MathSoft. "Mathcad 7, with its enhanced

mathematics, full support for OLE 2 and Web-based collaboration and resource-sharing capabilities, is a great tool for supporting such a high-quality, innovative program. The product was designed for a new generation of engineering and educational techniques, and we are committed to giving technical students worldwide access to its power and utility".

(Press release, forwarded by Ray Hoare)

Grant Cooper

A new CD "Aotearoa", of orchestral works by Douglas Lilburn, has been published by Kiwi Pacific Records (CD SLD-99). Two overtures for full orchestra (Aotearoa, and Festival Overture) are transfers of LP recordings by the NZSO, conducted by John Hopkins; but the other eight works for string orchestra are newly performed by the Ithaca College Festival Orchestra conducted by Grant Cooper, recorded at Ithaca College, New York, USA. The ten works by Lilburn are all fine pieces for orchestra, and they are well-performed by both orchestras.

Grant Cooper came from Wellington to study mathematics and trumpet performance at the University of Auckland. He was active in the University Singers, the University Orchestra and in the National Youth Orchestra. He graduated BSc. at the University of Auckland in 1975, majoring in mathematics; and has since made his career in music, based in the USA.

In 1978 Grant Cooper spent a fortnight with Vaughan Jones (MSc 1974) at Geneva, where he (with Mary Martin, from Auckland) was observing the Geneva International Competition for flute. He has now ceased performing on trumpet, and concentrates on conducting and teaching at Ithaca College. He has found that his knowledge of mathematics has helped him greatly, as a conductor of music. Before he was appointed to Ithaca College, at another university he gave an Honours course on "Mathematics and Art", which the students responded to with a great deal of interest and passion.

At Ithaca College he was promoted to full Professor in 1996, and recently he has been appointed as Associate Conductor of the Syracuse Symphony Orchestra, which is a full-time orchestra. He frequently conducts the Buffalo Philharmonic and the Rochester Philharmonic Orchestras, as a guest conductor.

The booklet for the CD "Aotearoa" contains the following article about Grant Cooper.

Garry Tee

"Grant Cooper was born in Wellington, the son of a professional opera singer. He participated in his first opera at age four, and studied piano and music theory prior to college. After completing his university degree in Pure Mathematics at the University of Auckland, he travelled to Great Britain and Asia with the National Youth Orchestra on their historic world tour. Following a performance at the Henry A. Wood Promenade Concerts at the Royal Albert Hall, conductor Claudio Abbado invited Mr Cooper to join the orchestra of La Scala as solo trumpet. A series of awards from the Queen Elizabeth 2nd Arts Council of New Zealand for study with Gerard Schwarz in the United States took precedence which, in turn, led to performances in New York's Carnegie Hall and with the Boston Pops under Arthur Fiedler. Mr Cooper performed as principal trumpet under conductors Leonard Bernstein, Seiji Ozawa and Sir Neville Marriner, among others, before devoting himself to conducting.

Grant Cooper was guest conductor at the 14th Commonwealth Games closing ceremonies, appearing with Dame Kiri te Kanawa as soloist. His engagement as guest conductor for the Mozart Wochen of the Heidelberger Schlossfestspiele in Germany prompted high critical praise. In recent years he has appeared as guest conductor of several distinguished American orchestras, including the Buffalo Philharmonic Orchestra, the Erie Philharmonic Orchestra, the Cayuga Chamber Orchestra, and the Syracuse Symphony Orchestra. He made his debut conducting in New York's Alice Tully Hall in 1995.

A dedicated advocate of New Zealand music, Grant Cooper has conducted and performed the United States and World premieres of many compositions from his homeland, as well as commissioning several new works. The present recordings are taken from the US premiere performances of Douglas Lilburn's music for string orchestra. It has been particularly gratifying for Mr Cooper to share this music with a new generation of young performers and watch them respond with the same enthusiasm which he has always felt for this wonderful music."

THE NEW ZEALAND
MATHEMATICAL SOCIETY (INC.)



APPLICATION FOR FINANCIAL ASSISTANCE

Please fill in where appropriate

Name of applicant:

Address:

.....

.....

e-mail:

Academic affiliation / Official status / Present position:

.....

NZMS status: Ordinary member Student member

Other (give details)

Signature:

Date:

Type of assistance sought	Amount
(a) Student Travel Grant
(b) Research Grant: conference/travel/visitors/other
(c) Grant from South Pacific Fund
(d) Conference/Workshop Organisation
(e) Other (please specify below)

.....

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Estimated total expenditure:

.....

Other sources of assistance sought/approved (please specify below):

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Notices

- Estimated total expenditure (please include a breakdown of this expenditure, e.g. conference fees, travel, accommodation, etc.)

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- List all previous support of this kind you have received from the NZMS in the past five years.

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- Please describe your reasons for making this application and the plans you have for spending the grant if your application is successful:

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- Please list any supporting documents or other evidence (attached to your application):

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- Supporting statement from Supervisor, Head of Department or person of responsibility.

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.....

Please send this application (and any supporting documents or other evidence) to:

Dr Stephen Joe, Secretary, N.Z. Mathematical Society,
Department of Mathematics, The University of Waikato, Private Bag 3105, Hamilton.



The NZMS Council normally considers these applications at its meetings in July and November each year, but applications may be considered at other times in exceptional circumstances.

SITUATION VACANT

A LECTURESHIP IN MATHEMATICS EDUCATION

Department of Mathematics, School of Mathematical & Information Sciences
The University of Auckland, (Vacancy UAC.893NNM)

Applicants must have an honours or a post-graduate degree in mathematics or statistics and a doctorate or equivalent in mathematics education. They should also have a background of successful mathematics or statistics teaching, and a proven record of research in some branch of mathematics education. Applications are particularly welcome from candidates with secondary mathematics teaching experience.

Specific duties will be:

- to contribute to the research profile of the Mathematics Education Unit within the Departments of Mathematics and Statistics;
- to teach appropriate undergraduate mathematics and/or statistics papers;
- to contribute to undergraduate and graduate teaching in mathematics education;
- to supervise theses and projects in mathematics education at postgraduate level;
- to contribute to links between the Departments of Mathematics and Statistics and the wider education community,

particularly senior secondary mathematics teachers;

- to contribute to the development and administration of the Mathematics Education Unit.

Commencing salary will be \$NZ44,250 to \$NZ53,250 per annum. Further information and Conditions of Appointment should be obtained from the Academic Appointments Office, Telephone 09-373 7599, Extn 5097, Fax 09-373 7023, Email: appointments@auckland.ac.nz. Three copies of applications must reach the Registrar by 3 November 1997. Please quote Vacancy Number UAC.893NNM in all correspondence. Further information about the University of Auckland can be found at <http://www.auckland.ac.nz> The University has an EEO policy and welcomes applications from all qualified persons.

*W B Nicoll, REGISTRAR
The University of Auckland
Private Bag 92019, Auckland, NEW ZEALAND*

CALL FOR PAPERS

Journal of Applied Mathematics and Decision Sciences

The primary aim of this new Journal is to rapidly publish carefully refereed papers treating practical problems of Mathematics, Operations Research, and Statistics without compromising mathematical precision. The Journal of Applied Mathematics and Decision Sciences covers a wide range of applied and theoretical subjects, including: Optimization and Heuristic Methods; Stochastic Systems; Mathematical Modelling; and Numerical Methods and Analysis. Emphasis will be given to papers that address both theoretical and application aspects (including computational). In addition, the Journal will also consider papers dealing with applied mathematical sciences that have a practical implication. Topics to be covered in the Journal of Applied Mathematics and Decision Sciences include:

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- Heuristic Methods in Operations Research.
- Mathematical Modelling: Geothermal, Environmental, Socio-Economic, and Biological Systems.
- Reliability and Quality Control, and Stochastic Systems.
- Numerical Methods and Analysis.

For information on submission and/or subscription write to: Dr Mahyar Amouzegar, Managing Editor, JAMDS, Department of Mathematics, Massey University, Private Bag 11-222, Palmerston North

or see our WWW page at <http://fims-www.massey.ac.nz/math/jamds/>

MATHEMATICAL MINIATURES

Partitions, generating functions and the chain rule

Given $f : Y \rightarrow Z$ and $g : X \rightarrow Y$ the chain rule gives the formula for the derivative of $f \circ g$. The exact nature of the vector spaces X , Y and Z and the smoothness and differentiability requirements for the functions f and g are a luxury we cannot afford in this miniature. Suffice it to say that for every $y \in Y$ and $x \in X$ and every positive integer n the n -linear mappings $f^{(n)}(y) : Y^n \rightarrow Z$ and $g^{(n)}(x) : X^n \rightarrow Y$ exist. We will assume that these functions possess the usual meanings of n -fold derivatives with X one-dimensional for simplicity.

Let $\mathcal{P}(n)$ denote the set of all partitions of a non-negative integer n . The generating function for the number of members of $\mathcal{P}(n)$, is given by

$$\phi(t) = 1 + t + 2t^2 + 3t^3 + 5t^4 + \dots$$

and satisfies the wonderful formulae of Euler

$$\phi(t)^{-1} = \prod_{i=1}^{\infty} (1 - t^i) = \sum_{i=-\infty}^{\infty} (-1)^i t^{i(3i+1)}. \quad (1)$$

By contrast the number of partitions of a set with n members has the generating function

$$\psi(t) = 1 + t + 2t^2 + 5t^3 + 15t^4 + \dots,$$

where $\psi(t)$ can be written in the form

$$\psi(t) = 1 + \frac{t}{1-t} + \frac{t^2}{(1-t)(1-2t)} + \frac{t^3}{(1-t)(1-2t)(1-3t)} + \dots \quad (2)$$

The first few derivatives of $f \circ g$ are equal to

$$\begin{aligned} (f \circ g)'(x) &= f'(g(x)) (g'(x)), & (f \circ g)''(x) &= f'(g(x)) (g''(x)) + f''(g(x)) (g'(x), g'(x)), \\ (f \circ g)'''(x) &= f'(g(x)) (g'''(x)) + 3f''(g(x)) (g'(x), g''(x)) + f'''(g(x)) (g'(x), g'(x), g'(x)). \end{aligned}$$

The general case of this "Faa di Bruno formula" is

$$(f \circ g)^{(n)}(x) = \sum_{p \in \mathcal{P}(n)} C(p) f^{(r)}(g(x)) (g^{(n_1)}(x), g^{(n_2)}(x), \dots, g^{(n_r)}(x)),$$

where it is assumed that the partition p of the integer n is given by $n = n_1 + n_2 + \dots + n_r$. The coefficient $C(p)$ is given making use of a multinomial coefficient

$$C(p) = \binom{n}{n_1, n_2, \dots, n_r} \frac{1}{m_1! m_2! \dots}, \quad (3)$$

where m_1 of $\{n_1, n_2, \dots, n_r\}$ are equal of one kind, m_2 are equal of a second kind, and so on.

A neater form of the Faa di Bruno formula, which is easy to prove and has no coefficient in front of each term, can be written in terms of the partitions not of n but of a set with n members. It is then easy to recover the traditional form of the formula by inserting a factor equal to the number of partitions of a set which correspond to a given partition of n .

Let $\mathcal{P}(S)$ denote the set of partitions of a finite set S . For $\pi \in \mathcal{P}(S)$, suppose the components are π_1, π_2, \dots . The number of members of each component will be denoted by $\#\pi_1, \#\pi_2, \dots$ and the number of components will be $\#\pi$. We then have the modified form of the Faa di Bruno formula

$$(f \circ g)^{(\#S)}(x) = \sum_{\pi \in \mathcal{P}(S)} f^{(\#\pi)}(g(x)) (g^{(\#\pi_1)}(x), g^{(\#\pi_2)}(x), \dots). \quad (4)$$

It remains to identify some exercises that you might like to try.

1. Use (1) to obtain a formula for computing the coefficients in $\phi(t)$ recursively.
2. Prove (2).
3. Show that the number of partitions of a set corresponding to a given partition of an integer is given by (3).
4. Prove (4) by using induction on the number of members in S .
5. Remove the restriction that X is one dimensional so that $(f \circ g)^{(n)}(x)$ has to be regarded as an n -linear operator. Does this help to make sense of the modified form of the Faa di Bruno formula?

John Butcher