THE NEW ZEALAND MATHEMATICAL SOCIETY

NEWSLETTER

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THE NEW ZEALAND MATHEMATICAL SOCIETY

The New Zealand Mathematical Society was established in 1974 to promote the development, application and dissemination of mathematical knowledge within New Zealand and to assist mathematicians in New Zealand to maintain effective co-operation with one another and with colleagues and mathematical societies in other countries.

Publications

The *Newsletter* comes out three times a year. It publicizes the business of the society and gives details of activities we sponsor. It reports conferences, notices, news of mathematical organisations and visiting mathematicians and focusses on matters affecting mathematicians in New Zealand. *Supplements* to the Newsletter include texts of conference addresses, reports of special conferences, and collections of papers on a theme. Special publications appear from time to time. The Society has produced a brochure *Employment Opportunities in Mathematics* which is intended to be repeated at intervals. It is a detailed survey of jobs in mathematics within New Zealand, with advice about seeking jobs, an outline of job prospects, present commentaries of people using mathematics in their job and other career suggestions. Our yearly compilation *Post-graduate Topics in Mathematics* is a list of research topics and supervisors available in New Zealand universities. It is for the information and guidance of students of mathematical subjects considered for post-graduate work.

Other Activities

The Society sponsors a special lecture at each Mathematics Colloquium. We also have a visiting lecturer scheme and we promote regional meetings on specialized mathematical subjects. Competitions for advanced students are held.

Membership

Members are able to receive the New Zealand Mathematical Chronicle at a reduced rate and to become reciprocal members of a number of overseas societies including the American, Australian, South East Asian, London and Edinburgh Mathematical Societies and the Canadian Mathematical Congress. Membership fees are due on the first of January each year. The full subscription is $12.00 and the student rate is $1.00. Applications for membership should be made to the Treasurer (Mr H.S. Roberts, Applied Mathematics Division, DSIR, Wellington).

EDITORIAL

The Book Reviews section of this issue is especially significant for the Society as it features reviews of books written by two of its members, Rob Goldblatt of Victoria University of Wellington and George Andrews of Pennsylvania State University.

In the last issue our Editorial mentioned that the Mathematics Subject Conference to be held in Auckland in May would be sponsored by the University Grants Committee. This is not correct. The Subject Conference will be held under the auspices of the Vice-Chancellors' Committee. The conference follows on immediately from the Mathematics Colloquium at the same venue. A Supplement to this issue of the *Newsletter* contains information and viewpoints on issues likely to be under scrutiny at the Subject Conference.

Donald Joyce has taken up a senior position in the School of Education, University of the South Pacific, and is now our Honorary Correspondent there. We would like to mention the dedicated service which Donald has rendered to the Society as Vice-President, member of Council, and Editor of the *Newsletter*. Thanks, Don.

There are no Letters to the Editor in this issue. Perhaps somebody will write to the Editor as the coolness of 1980 continues to chill the body of New Zealand education, economically speaking. Or perhaps the continued violation of Human Rights will stir the deeper feelings of our membership into further action on behalf of our scientific colleagues who suffer because of such violation. We report further significant correspondence in the *Notices* of the American Mathematical Society; see pages 68-72, 181-182 and 279-283 in No's 1-3, 1980.

The New Zealand Mathematical Society has continued to expand during its sixth year. The membership now stands at 202, including 3 Honorary members, 28 Student members, 12 Reciprocal members and 5 Institutional members. (In April last year the membership totalled 174). Currently we also send the *Newsletter* to 15 libraries and professional associations in New Zealand and 36 overseas. We can look forward confidently to continued development of the Society's activities, which no doubt will imply further developments for the *Newsletter*. We hope that members will avail themselves of the opportunity to correspond with the Editor on matters relating to the Society, in particular relating to the character of the *Newsletter*.

SUBJECT CONFERENCE IN MATHEMATICS

The following is an extract from an information sheet distributed in February by the Conference organiser, Professor David Vere-Jones.

Time and Place

The subject Conference will be held immediately following the Mathematics Colloquium at Auckland and in the same venue. The programme will cover the afternoon of Wednesday, 21 May, the whole of Thursday, 22 May and may conceivably extend to the Friday morning.

Participation

The Vice-Chancellor's Committee operates a cost sharing scheme which supports up to three teaching staff from each University (although their secretary has asked me to stress that no additional funds are provided for this scheme). Additional staff are free to participate but their expenses will not be covered by this arrangement. Non-university staff (including school teachers, staff at Polytechnics and other tertiary institutions, or representatives of universities outside New Zealand) may be invited to participate if the Mathematics Departments agree.

Travel and Accommodation Allowances

The nominated representatives from each University are entitled to return travel and up to $18 per d.m. allowance for three days (two nights). Application for assistance should be made within individual universities and arrangements may differ from University to University. In the final instance, costs are shared out between universities.

Programme

The intention at present is to devote the Wednesday afternoon to general discussions of problems relating to the University programme, schools, the Polytechnics and other tertiary institutions, and will be open to representatives of these other institutions. The Thursday will be devoted specifically to University problems, and I have in mind that during part of the day at least it may be desirable to split the Conference into working groups looking at particular questions and reporting back to the full Conference either at the end of the day or in a special session on Friday morning.

Role of Subject Conference

I would like to emphasize that there is no relation between the Subject Conference and the Steering Committee. The Steering Committee is appointed by the Universities Entrance Board and has the responsibility for the syllabuses for University Entrance and Bursary examinations. The Subject Conference is sponsored by the Vice-Chancellor's Committee and is concerned with domestic matters relating to University Mathematics Departments. They are quite separately funded and organised and although there may be some overlap in their interests, this is contingent rather than necessary. It has been my fortune (misfortune?) to run into a

situation where the two have been somewhat identified, but for the future I think it might be wise to emphasize the distinction so that there is a greater chance of developing complementary rather than overlapping approaches.

D. Vere-Jones, Course Organiser

The NZ Mathematical Society Supplement to this issue of the Newsletter contains several specific points of view which have been offered to help focus attention on key issues to be raised at the Subject Conference.

NZMS VISITING LECTURER 1980

The New Zealand Mathematical Society Visiting Lecturer for 1980 is Dr Joe Gani, Chief of the CSIRO Division of Mathematics and Statistics and President of the Australian Mathematical Society.

Dr Gani's main fields of interest are stochastic processes and their applications, in particular to biology. He has held professorial positions in the U.K. and U.S.A. as well as visiting appointments in Canada, The Netherlands, Switzerland, the U.S.A., and Australia. He has served as Editor of many journals (including four as "founder") and has published many papers, both technical and general, and seven books. He is an excellent speaker and is offering the following lectures while on tour:

General: "The problem of Buffon's needle", "The role of DMS in CSIRO", and "The early history of gambling and probability".

Technical: "Mathematical models in biology", "The spread of epidemics", and "Yeast cells and random graphs".

Dr Gani's itinerary is

June 1 - 3	Wellington
4 - 5	Palmerston North
5 - 6	Hamilton
7 - 8	Free
9 - 10	Auckland
11 - 12	Christchurch
12 - 13	Dunedin

Details of his lecture programme may be obtained from local university Mathematics departments.

* * * * *

THE NEW ZEALAND MATHEMATICAL SOCIETY

MOVEMENT OF FUNDS FOR THE YEAR ENDING 31 DECEMBER 1979

At 1.1.79 we had a balance in the Bank of					1127.79
Income:					
During the year we received the following amounts:					
Subscriptions:	full members	Current	903.00		
		Arrears	96.00		
		Advance	79.00		
				1078.00	
	students			22.03	
	reciprocal			67.93	
	institutional			80.00	
					1247.96
Interest:	from the Bank of NZ				97.48
Donations:	(Including $150 IBM Prize Money)				160.00
Grant:	from the First Australasian Mathematical Convention				1800.00
					3305.44
Giving us total funds for the year of:					4433.23
Expenditure:					
During the year we spent the following amounts:					
NZMS Newsletter				493.28	
NZMS Visiting Lecturer				202.00	
NZMS Lecturer at Colloquium				100.00	
Royal Society of NZ (Subscription)				57.00	
Regional Meetings - Travel Expenses				283.40	
Auckland Topology Workshop				26.00	
Copies of "A Spectrum of Mathematics"				50.00	
Auditing (4 years)				34.80	
Stamps, Stationery & Miscellaneous				86.05	
Making Total Expenditure for the Year					1332.53
Leaving us with a Balance of					3100.70
This amount is held as follows:					
Cash in hand:	Wellington		12.00		
	Palmerston North		14.56		
				26.56	
Bank of NZ	General Account			1038.19	
Bank of NZ	11% Term Deposit			2035.95	
				3100.70	

Treasurer's Comments:

Although our Income was $3305.44, $1800 is to be put aside for the next Australasian Convention in 1981, and $150 is prize money for the IBM competition. This gave us a working income of $1355.44, and our expenditure came to $1332.19, giving us a profit for the year of $23.25. But note that this includes advance subscriptions of $79.00, and that without this item we would have been down by about $50 for the year.

Estimates for 1980

Income: Our income comes almost wholly from subscriptions, plus a little bit of interest from the Bank. In 1979 these came to about $1350. As the subscription has risen from $7 to $12, we multiply the amount by 12/7 and get a figure of about $2300. (± ???)

Expenditure: In 1978 the Newsletter cost $300, and in 1979 it cost $500. In 1978 there were no expenses for a Visiting Lecturer, but we paid $225 for the Lecturer at the Colloquium; and in 1979 the two items came to $302. Regional and Council meetings in 1978 cost $105, but in 1979 cost $283. One Workshop cost $26 in 1979, but it is hoped to encourage more of these. Publication of Andrews Book is costing $600, and we do not have a good idea as to how many of these will sell. STATUS is expected to cost about $1500. Assuming that the two books break even, the Treasurer, using his fortune telling methods (better known as accurate statistical forecasts) estimates the 1980 expenditure to be:

Newsletter	$700.00
Lecturers	400.00
Regional Meetings	400.00
Workshops	100.00
Royal Society, stamps, and Stationery, Miscellaneous etc	400.00
Giving a nice round sum of	$2000.00

(Note that "etc" usually costs quite a lot).

H.S. Roberts,
Treasurer

AUSTRALIAN MATHEMATICS COMPETITION

FOR THE WALES AWARDS

Report on the State Directors Meeting held in Canberra on 25th August 1979 attended by N. J. Gale, President of NZAMT as an observer.

Background: The Australian Mathematics Competition (AMC) began about three years ago as a competition for students in schools in the Capital Territory. The next year it was opened to schools in NSW on a pilot scheme basis and in 1978 it was opened to all States. In 1978, Mr Peter O'Halloran addressed interested NZ teachers at the First Australasian Mathematics Convention held in Christchurch in May 1978. As a result of this several NZ schools entered pupils in the 1978 competition and again in 1979. The growth of the competition is illustrated from the figures for 1977 (1300 entries from 33 schools), 1978 (60,000 entries from 700 schools), 1979 (102,000 entries including approximately 900 from 15 NZ schools.) Schools from the Pacific Islands are also showing interest in entering and the 1980 estimate is 120,000. In 1979, 1280 Australian schools entered out of 2300.

Format of Competition: Candidates sit a 1¼ hour paper in June in one of three divisions - Junior (School years 7 and 8 or Forms 3 and 4 NZ); Intermediate (School years 9 and 10 or Form 5 NZ); Senior (School years 11 and 12 or Forms 6 and 7 NZ). These are as I see it with NZ form divisions although there were some problems brought out at the Conference by some State Directors caused by variations of year division between different Australian States. Each paper consists of thirty multichoice questions and are computer marked at Sydney University.

It is estimated that 1 in 300 receive an award of some kind. Prize money of over $13,000 is distributed. Distinction Certificates are awarded to the top 15% of entrants in each State/Year (NZ is treated as a separate State). Credit Certificates are awarded to the next 30%. Medals are awarded in each division of the competition. They are awarded for performances which are outstanding both within the State and in the National context. This year (1979) some eighteen medals will be presented on September 21st by McFarlane Burnett, one of Australia's Nobel Prize winners (last year it was the Governor-General).

Value of Prizes:

	Senior	Intermediate	Junior
Medalists	$100	$75	$50
Other prize winners	40	30	20

Organisation: The organisation of the competition is very thorough and efficient. Mr O'Halloran is the Executive Director and his drive and enthusiasm has involved many people in the Competition's organisation - especially members of the Canberra College of Advanced Education which has supported the competition in quite a large way. Mr O'Halloran heads a Management Committee which organises three sub-committees. They are:

Problems Committee - which met for two days over the weekend of 25th August discussing the questions for the 1980 paper.

Organisation Committee - which has the terrific task of distributing the 102,000 papers, the detailed planning and coordination of the printing, typing, results etc

Computing Committee - responsible for the system design and computing. This is also carried out by the C. of A.E. The analysis and result sheets produced by this committee and sent to schools is quite outstanding.

A book of solutions is also produced.

Finance: With 102,000 entries at 50 cents each where does the $51,000 go to? The Bank of New South Wales provides the $13,000 for prizes plus about $2,000 for administration not provided for by the College. The College of Advanced Education provides all the stationery, postage and printing of exam papers - for all this it is estimated that 40 cents of every 50 cents entry fee is needed to support the competition. $32,000 is spent in labour costs ($10,000 for a permanent secretary and the remainder for student labour at $5 per hour for packing and posting the papers). The Bank also provides the Medals and flies in the medal winners for the presentation. While the computer time at the College of Advanced Education is very cheap, it costs the Competition $10,000 for the actual marking of the answer sheets which is done by a much larger computer at Sydney University. The Competition has also paid for the expenses of the Executive Director's visits to the States to discuss the American National Competition and also the costs of the first State Directors Conference in August this year. The Competition has an estimated $15,000 in reserves for the day when the College stops its support and/or the Bank pulls out.

General Observations: Perhaps one of the reasons for the terrific success of this National Competition in Australia is the fact that external examinations are virtually non-existent in all Australian secondary schools. Generally the only external examination occurs in the student's final year - year 12 or our Form 7. This absence of examinations may be why the N.S.W. Education Department actually refuses to acknowledge the existence of the Competition. Ironically, there is evidently a strong move (in N.S.W. especially) to re-introduce external examinations through pressure from employers. Many States have an I.B.M. competition and in many cases the reception of this National Competition was very cool because of the fear that it would demise the I.B.M. Competition. This was also the feeling of N.Z.A.M.T. Council Members at our meeting in April this year. However it is now seen that the National Competition is catering for a wider spectrum of pupils and not necessarily for the mathematically able. It is evident that they would welcome more NZ schools to participate and since this competition is held in June and open to a wider range of students than our Senior Mathematics Competition held in October there should not be any conflict. I am having sent to me information concerning the 1980 competition later this year including the problem book. I will forward these to Council members as they become available and would be pleased if you and your committees would consider this report and forward to me any decision or query not fully explained by this report.

Footnotes:

1. Roger Gadd of Linwood High School (Christchurch) will be travelling to Canberra (at the Bank's expense) to receive a medal for year 10 at the 1979 Prize-Giving Ceremony.

   In the 1979 Competition, NZ students scored two $20 prizes, two $30 prizes and two $40 prizes.

There were 78 NZ entries in Year 7 (1 Prize, 9 Distinctions, 21 Credits)

There were 213 NZ entries in Year 8 (1 Prize, 39 Distinctions, 11 Credits)

There were 170 NZ entries in Year 9 (1 Prize, 30 Distinctions, 20 Credits)

There were 132 NZ entries in Year 10 (1 Prize, 23 Distinctions, 27 Credits)

There were 121 NZ entries in Year 11 (1 Prize, 20 Distinctions, 30 Credits)

There were 71 NZ entries in Year 12 (1 Prize, 12 Distinctions, 27 Credits)

Overall there were 785 entries from fifteen NZ schools in 1979. They received six cash prizes (including one medallist), 133 Distinction Awards and 136 Credit Awards.

2. The A.M.C. management committee is very keen to enter Australia in the International Olympiad and an observer was sent to England for this year's Olympiad to investigate the feasibility. They are keen to enter the 1980 Olympiad even if it is only a team of one! It is in Outer Mongolia.

3. The A.A.M.T. Conference in Canberra in January 1980 will have a session where Professor Walter Mientka (USA Mathematics Competition), Dr Ken Fryer (Canadian National Mathematics Competition) and Mr Peter O'Halloran (A.M.C.) will hold a joint session on "Developments of Mathematics Competitions on Multichoice Type Questions in USA, Canada Australia".

4. If New Zealand schools participate in this competition on a larger scale than at present, are "we" happy for it to remain called the Australian Mathematics Competition? Should it be Australasian or South Pacific or should we organise our own or should we not participate????

These and other questions should be discussed with your Regional Mathematical Association Committees. I would appreciate hearing of any opinions expressed.

N. J. Gale,
President, NZAMT

RECIPROCITY AGREEMENTS

American Mathematical Society

Members of the NZMS may join the AMS at a much reduced subscription rate (currently $US18 a year) which entitles you to all rights of ordinary members including the right to vote for officers of the AMS. A reciprocal member receives free copies of the *Notices* of the AMS, the *Combined Membership List* and the *Bulletin*, and is entitled to substantial price reductions on other publications of the AMS. Application forms for reciprocal membership can be obtained from our Treasurer who will endorse your application provided you are currently a financial member of the NZMS.

Australian Mathematical Society

The terms of the agreement provide for individuals who are members of one Society to join the other for half the usual fee and thereby enjoy all the privileges of that Society, other than the right to vote. This applies, of course, provided you are not resident in the country of the second Society. Current subscriptions and prices are as follows:

(1) Membership subscription (including the *Gazette*): $25 (with a remission of $5 for early payment)

(2) *Journal* - Series A: $12

(3) *Journal* - Series B: $3

(4) *Bulletin:* $12

Thus members of the NZMS may join the Australian Mathematical Society for $10 a year. They should obtain a note of authentication and an application form from our Treasurer and send both to the Australian Mathematical Society (D.G. Hurley, Department of Mathematics, University of Western Australia, Nedlands, Western Australia 6009, Australia).

Canadian Mathematical Congress

The same terms apply as for the Australian Mathematical Society. Current subscriptions and prices are as follows:

(1) Membership subscription (including newsletter) varies with annual income (I) according to the scale (Canadian dollars):
$0 \leq I < \$10{,}000$ ($5 subscription), $\$10{,}000 \leq I < \$20{,}000$ ($20)
$\$20{,}000 \leq I < \$30{,}000$ ($25), $\$30{,}000 \leq I$ ($30).

(2) *Canadian Journal of Mathematics:* $20.00

(3) *Canadian Mathematical Bulletin:* $12.50

(4) *Applied Mathematical Notes:* $6.00

Members of the NZMS may join for half the appropriate subscription fee. Applications should be addressed to the Secretary, Canadian Mathematical Society, 577 King Edward, Ottawa, Ontario KIN 6N5, Canada.

Edinburgh Mathematical Society

Members of the New Zealand Mathematical Society may join the Edinburgh Mathematical Society on payment of the reciprocity member's subscription. This is £5.00 for the current session (against £7.50 for a full member). A reciprocity member receives the *Proceedings of the Edinburgh Mathematical Society*, but does not have voting rights. Anyone wishing to become a reciprocity member should write to the Secretary, Edinburgh Mathematical Society, James Clerk Maxwell Building, Mayfield Road, Edinburgh EH9 3JZ, Scotland.

Southeast Asian Mathematical Society

The same terms apply as for the Australian Mathematical Society. The current subscription is US$5.00 and privileges of membership include a quarterly newsletter and members' rates for conferences, meetings and occasional publications. Thus NZMS members may join the SEAMS for US$2.50. Application forms may be obtained from our Secretary.

London Mathematical Society

The same terms apply as for the Australian Mathematical Society except that reciprocal members do have the right to an LMS vote. Current subscriptions and prices are as follows:

(1)	Membership subscription:	£3.00
(2)	*Journal:*	£6.00
(3)	*Proceedings:*	£6.00
(4)	*Bulletin:*	£3.00

Reciprocal members are also entitled to a discount on the *Journal of Applied Probability*, LMS Monographs and LMS Lecture Notes. Members of the NZMS may join the LMS for £1.50 a year. Application forms may be obtained from our secretary.

OTHER NEW ZEALAND MATHEMATICAL PUBLICATIONS

Mathematical Chronicle

is published by the Mathematical Chronicle Committee, Department of Mathematics, University of Auckland, Private Bag, Auckland. The editors are Professor J.A. Kalman, Dr D.B. Gauld, Dr G.D. Dixit and Dr D.M. Ryan. The subscription is $10.00 per volume of three issues, with a reduced rate of $5.00 for individual subscribers and a further reduction to $4.00 for members of the New Zealand Mathematical Society. The Chronicle welcomes contributions of short research articles and mathematical notes by New Zealand mathematicians.

Mathematics Magazine

is published by the Auckland Mathematical Association, P.O. Box 6855, Auckland 1. The annual subscription for individuals is $10.00 and four issues are published each year. A reduced rate is available for students.

Network

is published by the Mathematics Education Department of Christchurch Teachers' College (Secondary Division), Dovedale Avenue, Ilam, Christchurch 4. It exists to help provide an exchange of ideas among all those concerned with Mathematics Education in secondary schools.

New Zealand Operational Research

is published by the Operational Research Society of New Zealand, P.O. Box 904, Wellington. The editor is Dr H.G. Daellenbach. The annual subscription for individuals is $6.00 and two issues are published each year.

New Zealand Statistician

is published by the New Zealand Statistical Association, P.O. Box 1731, Wellington. The editor is Dr D. Rhoades. The annual subscription for individuals is $6.00 and two or three issues are published each year. A reduced rate is available for students.

* * * * * * * * * * * * * *

Give these to Applied Mathematics I

1. "Pretty girl with tremulous eyes, if thou knowest the correct method of inversion, tell me the number which, multiplied by 3, and added to three-quarters of the product and divided by 7, and reduced by the subtraction of a third part of the quotient, and then multiplied into itself, and having 52 subtracted from the product and the square root of the remainder extracted, and 8 added, and the sum divided by 10, yields 2."

This was a question set by the Hindu mathematician Bhaskara, to his classes in the twelfth century. (By reversing all the operations he found the answer to be 28)

If your students cry "Relevance please", give them two more from Bhaskara:

2. A snake's hole is at the foot of a pillar and a peacock is perched upon its summit. Seeing a snake at a distance thrice the pillar's height gliding to his hole, he pounced obliquely upon him. Say quickly at how many cubits from the snake's hole they do meet, both proceeding an equal distance.

3. In a certain lake, swarming with geese and crane, the tip of a bud of lotus was seen a span (= half a cubit) above the surface of the water. Forced by the wind it gradually advanced and was submerged at a distance of two cubits. Compute, quickly, mathematician, the depth of the water.

(Quotations from 'A History of Mathematics; by J.F. Scott, Taylor & Francis Ltd.)

Local News

Applied Mathematics Division, DSIR

Robert Davies will be spending seven months this year at Berkeley working with Jerzy Neyman on various problems raised by research applications in statistics.

Jocelyn Dale (Hopkins) of our Auckland station was recently married, and has received an NRAC Fellowship for overseas study.

Peter la Roche has joined us from the Fisheries Research Division to work in problems of operations research.

Lindsay Packer of the Operations Research Section has resigned in order to explore the wider fields of private enterprise.

John Tukey of Princeton University was temporarily on our staff for a month widening our horizons in the areas of applied statistics and presentation of data.

Bob Fletcher has rejoined our Palmerston North station after completing his M.Sc. at Massey.

Peter McGavin has joined the Computing Section after completing a B.Sc. (Hons) at Victoria University.

R.D./J.M.

University of Auckland: Department of Computer Science

This new Department came into existence on 1st February 1980, and its members celebrated with a toast (in sparkling grape juice).

The full-time academic staff consists of *Professor John Butcher* as Head of Department, with *Dr Phil Cox, Alan Grace, Dr Bruce Hutton, Dr Richard Lobb, Garry Tee & John Whale* (on leave). *Dr Alison Heard, Ross Finlayson, Paul Lyons and John Pemberton* are lecturing part-time. The Department is being assisted by *Dr Nevil Brownlee, Dr Peter Fenwick* and *Dr John White* (of the Computer Centre), by *Dr Garry Bold, Dr John Harvey* and *Dr Murray Johns* (of the Department of Physics), by *Dr Bob Crawford* (visiting from Queen's University, Ontario), by *Professor G. Arndt* and *Mr G. W. Blanchard* (of the School of Engineering), and by *Mr D. H. Peters* (of Management Studies), each of whom is teaching part of a course for our Department.

Enrolment

Since the Department is commencing with limited staff and without any departmental computing equipment, restrictions have had to be imposed on enrolment for stage 1 courses. By the end of enrolment week, about 430 students had enrolled for one or more courses in Computer Science. Approximately 240 had enrolled for paper 190 (Introduction to Algorithmic Processes) and 310 for paper 191 (Introduction to Computing).

For the stage 2 courses, 91 had enrolled for paper 210 (Computer Organization), 85 each for paper 220 (Information Structures) and for paper 230 (Programming Languages), with 45 for paper 290 (Numerical Computation). For the stage 3 courses, 32 have enrolled for paper 304 (Special Topics in Computer Science), 29 for paper 310 (Advanced Computer Organization), 34 for paper 320 (Advanced Information Structures), 33 for paper 340 (Operating Systems), and 6 for paper 390 (Numerical Analysis); with one student enrolled for the Diploma in Computational Mathematics.

The question of departmental computing equipment is under active consideration.

G.J.T.

University of Auckland: Department of Mathematics

Staff

The Junior Lecturers for 1980 are *Mr R.P.K. Chan*, *Mr M.P. Hayson*, *Mr G.R. Ihaka* and *Mr D. G. Lane*. *Roy Felton* and *David Thomson* are lecturing part-time.

Departures

Mr John Sealy is now teaching at A.T.I.

Dr John Jarratt has resigned, to become a Tutor in the Department of Mathematics at the University of Sydney.

Leave

Dr J. J. Hunter is on leave for the first two terms at Virginia Polytechnic Institute and State University.

Dr C. P. Chang is on leave for the year, at the University of Calgary.

Dr I. L. Reilly is on leave for the first two terms, as an Honorary Research Fellow at University College in London.

Dr W. J. Walker has returned from the University of Southampton.

Seminars

The following seminars have been presented in the Department:

Mr G. J. Tee (Auckland), on "Khachian's efficient algorithm for linear inequalities, linear programming and the Travelling Salesman problem",

Dr G. Suzuki (Institute of Mathematical Statistics, Tokyo), on "Modified binomial and Poisson distributions".

Professor Frank Smithies (Cambridge), on "History of the concept of a function" and on "Cauchy and the beginnings of complex analysis".

Professor D. R. Brillinger (Statistics Department, Berkeley), on "Empirical examination of the threshold model of neuron firing".

G.J.T.

University of Canterbury

Bob Long and *Neil Watson* have both gone on leave to Australia - Bob at the University of Newcastle and Neil at Queensland University.

Alan McInnes has returned from leave spent in Maryland.

Brian Woods attended the Australian Summer Research Institute held in Canberra in January - February.

Seminars

Visiting speakers have included:

Professor G. Suzuki (Japan) who spoke on "A stochastic game with one-chance recovery".

Dr Low Thain Sim who spoke on "The Low-Johnson algorithm for the Transporation problem".

Dr D. C. Joyce (U.S.P.) who spoke on "Experiment and theory in numerical analysis".

P.F.R.

Canterbury Mathematical Association

The first meeting of 1980 was held in March when 200 senior pupils and teachers from Christchurch Secondary Schools met to hear *Dr L. R. Foulds*, Operations Research, University of Canterbury give the M.A. Bull Memorial address; his interesting topic was "Caliban Puzzles".

H.W.

Christchurch Teachers College (Secondary Division)

1980 has brought a reorganisation of programmes in the Secondary Division, one of the main changes being the presentation of Professional and Teaching Studies as two separate Courses.

The following are some details of the numbers of teacher trainees taking courses being offered by the Mathematics Education Department, which is staffed by 2 senior lecturers:

36 students are taking a 96 hour course, Mathematics Education Forms 1-7;

41 students are taking a 48 hour course, Mathematics Education Forms 1-5, with 9 continuing with a further 24 hour course, Forms 5-6.

52 students have elected to take a 24 hour course "Laboratory Methods in Mathematics Education".

H.W.

Massey University

Staff

Gillian Thornley has joined us from Wellington Polytechnic, filling the vacancy left by *Donald Joyce's* departure for Fiji. We have also acquired a computing technician - *Giovanni Moretti,* who previously performed the same function for the Department of Physics at Auckland University. A newly created three-year post is currently under offer, and yet another vacancy, on the statistics side, will shortly be left by *Rob Pringle's* departure. Rob will be leaving Massey but not Palmerston North - he is taking up a post as consultant biometrician at the Research division of the Ministry of Agriculture and Fisheries. Add to all this the departure of *Les Foulds* for Canterbury, to be replaced later in the year by *Susan Byrne,* and it can be seen that Massey is going through the biggest series of staff changes in ten years.

Peter Thomson spent the summer in Australia, chiefly working on delay estimation at the Institute of Advanced Studies, A.N.U. He also attended the Summer Research Institute of the Australian Mathematical Society in Canberra, where he had the pleasure of hearing (among others) Peter Whittle, Professor of Operations Research at Cambridge.

Courses

Indications are that enrolments will be up this year in the majority of our papers. The two papers being offered extramurally for the first time (212 Statistical Methods and 304 Modern Geometry) have each attracted more than 30 students.

Seminars

Dr G. Suzuki of the Institute of Statistical Mathematics, Tokyo, visited us early in February and gave seminars on "Modified binomial and Poisson distributions" and "Detecting optimum time of control action for a manufacturing system".

M.R.C.

University of Otago

Dr R. L. Enlow has returned from his sabbatical leave at the Aerospace Department of the University of Michigan.

Dr Christopher Meaney who received his Ph.D. in Mathematics (Fourier Analysis) from the University of Washington in 1979, will be a Post-Doctoral Fellow in the Department this year (he is from South Australia).

Mr B. F. J. Manly is a council member of the International Biometrics Society (1980-83).

This year, the "Study Group Seminar" will be investigating Simple Groups (using Gorenstein's "Simple Groups") and Graph Theory.

G.O.

University of the South Pacific

This is a relatively young institution (the first students were admitted in 1968) set up to serve eleven territories: the Cook Islands, Fiji, Kiribati, Nauru, New Hebrides, Niue, the Solomon Islands, Tokelau, Tonga, Tuvalu, and Western Samoa. Courses are offered, internally and by extension, at several levels: Preliminary (~ Form VI), Foundation (~ Form VII), Diploma and Degree. 1979 internal enrolments were 25 Preliminary, 274 Foundation, 624 Diploma and 860 Degree. Extension enrolments totalled 1030 for credit courses and 3171 for non-credit ("continuing education") courses, and 818 were involved in courses offered by the Institutes of Education, Pacific Studies, and Social and Administrative Studies.

Three are three Schools; Education, Natural Resourses, and Social and Economic Development. Mathematics is located in the School of Education (along with Education, English, Home Economics and Industrial Arts) and has 14 staff (from Australia, Fiji, India, New Zealand, the Solomon Islands, the UK and the USA), of whom ten are primarily involved with preliminary/foundation/diploma courses. Ten degree-level mathematics courses are offered, with enrolments ranging from 120 at first year to 20 at third year. There is a bias towards calculus, linear algebra, numerical analysis and statistics, in keeping with the needs of the region. On-campus computing facilities are limited at present (the most powerful is a TRS-80!) but considerable use is made, for administrative, research and teaching purposes, of an ICL 2904 at the government EDP centre. Research interests of staff include mathematics education, numerical analysis, seismology and statistics.

D.C.J.

Victoria University of Wellington

Rob Goldblatt and *Graeme Wake* have been promoted to Readerships. Our congratulations to them both. Rob has also written a book on topoi (or, as the Americans say, toposes) which is reviewed on page 27.

John Collins is our new Teaching Assistant, replacing some fraction of *Mick Roberts* who is now with the Head Office Systems Lab., Ministry of Works and Development.

Jock Hoe has returned from his two years in China and *Thora Blithe* and *Doug Harvie* from their sabbatical leaves in England and Scotland respectively.

Jim Ansell is to be the convenor and *John Harper* the treasurer of the 1st Geophysics Colloquium to be held at V.U.W. in early September (see advertisement on page 26).

After his retirement announced in the last issue, *Jack Hutchings* is to return this year part-time to teach his Honours Meteorology course.

Five of us visited Australia during the long vacation. *David Vere-Jones* was a Visiting Fellow at the Statistics Department, A.N.U. for two months during which he was an invited speaker, on statistical methods of assessing earthquake risks, at the 17th General Assembly

of the International Union of Geodesy and Geophysics. *Jim Ansell* and *John Harper* also attended that Assembly, giving papers on seismology and plate tectonics. The latter also spoke at the 3rd S.W. Pacific Workshop Symposium in Sydney.

Graeme Wake spent a week at Macquarie University with a group working on thermal ignition, and *Lindsay Johnston* attended the Australian Association of Mathematics Teachers conference at ANU.

J.F.H.

University of Waikato

Our total enrolment, about 1580 student courses, exceeds last year's by more than a hundred. The increase appears at all levels, in all fields. (The university's growth was smaller, about 4% but computer science really jumped).

The Mathematics department moved to its new temporary but permanent home (TB3) by the carpark last November. We are all together for the first time since 1967, except for *Dr Broughan* (on leave at Cambridge for the whole year), *Dr Braun* (on leave mainly at Macquarie until August), *Mr Bolstad* (on leave at Missouri till May) and *Prof Hosking* (seconded to Bangkok for two years).

A couple of weeks ago, *Prof Dr Hab. Bogdan Weglorz* arrived for a two month visit ending in April. A graduate of the University of Wroclaw (M.A. in 1964 under Prof E. Marczewski and Ph.D in 1968 under Prof J. Mycielski), be habilitated in 1973 and now occupies a chair in the Institute of Mathematics (Division of Logic and Foundations of Mathematics) at that University. His main fields of interest include universal algebra, set theory, model theory, and the applications of infinitary combinatorics to measure theory and topology, and while here, he intends to continue his research in the last of these. (In addition, he has enthusiastically begun to "convert the natives").

About the same time, *Mr Raoul Cornwell* began a year with us as Teaching Fellow, coming from the Secondary Inspectorate in Auckland. Before that, he had been head of mathematics at Tokoroa High School and then Glenfield College. In addition, he is co-author of the series "Mathematics, a Study in Pattern".

His main task here is to investigate problems arising at the secondary-tertiary interface, and to suggest some remedies. He will study current research, and will welcome information about this, and indeed any suggestions anyone wishes to make in connection with this project.

Visitors include

Dr Mike Hendy (Massey), November 14, who spoke on "Kummer's ideal numbers in the field $Q(N\sqrt{-5})$" on his way to North America.

One of our former students now well on his way to a D.Phil., *Mr Marston Conder* (Brasenose College, Oxford), December 20, who gave us "some thoughts on coset diagrams" for our Christmas stocking, and

Dr Giitiro Suzuki (Institute of Statistical Mathematics, Tokyo), February 1, who discussed "modified binomial and Poisson distributions".

Finally, *Mr French, Ms Gardiner and Dr Sneyd* are all back from leave (the last with a brand-new son, Oliver), the department has acquired a Compu-Colour graphics outfit (whose routines have been set up by one of our seniors under the student work scheme) and two black and white graphics repeaters on permanent loan from Education (who now have colour instead), and the Library is completing its holding of the Cumulative Index of Mathematical Reviews.

M.S.

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VACANCY

UNIVERSITY OF AUCKLAND: POSTDOCTORAL FELLOWSHIP IN MATHEMATICS

Applications are invited for a Fellowship to begin during the period 1 February 1980 to 28 January 1981. The Fellowship is tenable in the Department of Mathematics for up to 12 months. It is for the purpose of carrying out advanced research in the field of Topology but the successful applicant may be expected to participate in limited teaching activities. The Fellowship is primarily open to those who have completed the requirements for the PhD degree at any university other than the University of Auckland, not more than four years before the time of application. Remuneration will be $800 per month (taxable). Where applicable a return fare will be paid for the Fellow only. Prospective candidates seeking further information should write directly to Dr D. B. Gauld, Department of Mathematics. Conditions of Appointment and application forms are also available from the Assistant Registrar (Academic Appointments), University of Auckland, Private Bag, Auckland, New Zealand. *Applications will be accepted at any time up to 25 May 1980.*

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Major Eichler says that 50% of the mothers who pass through Bethany decide to keep their babies. "Once it was opposite."

(Auckland Star)

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CONFERENCES 1980-81

****1980****

April 10-11
(New Brunswick, N.J.)

Conference on Linear Partial Differential Equations

Details from W. J. Sweeney, Department of Mathematics, Rutgers University, New Brunswick, New Jersey 08903, U.S.A.

April 13-19
(Exeter)

Journées Arithmétiques

Details from R. Odoni, Department of Mathematics, University of Exeter, North Park Road, Exeter EX4 4QE, England.

April 18-19
(Carbondale, Illinois)

Algebra Conference (Group Theory, Lie Algebras, Partially Ordered Algebraic Structures

Details from Ralph K. Amayo, Department of Mathematics, Southern Illinois University, Carbondale, Illinois 62901, U.S.A.

April 18-19
(Lawton, Oklahoma)

Conference on Convergence Structures

Details from Caroll V. Riecke, Department of Mathematics, Cameron University, Lawton, Oklahoma 73505, U.S.A.

April 25-26
(Cleveland, Ohio)

Conference on New Directions in the Applications of Mathematics

Details from Ms Gwendolyn Pettis, Conference Secretary, Department of Mathematics, Case Western Reserve University, Cleveland, Ohio 44106, U.S.A.

May 1-2
(Washington, D.C.)

Second Symposium on Mathematical Programming with Data Perturbations

Details from Anthony V. Fiacco, Department of Operations Research, School of Engineering and Applied Science, The George Washington University, Washington, D.C. 20052, U.S.A.

May 2
(Storrs, Connecticut)

Fifth Invitational Symposium on the Unification of Finite Elements, Finite Differences and Calculus of Variations

Details from H. Kardestuncer, School of Engineering, University of Connecticut, U-37, Storrs, Connecticut 06268, U.S.A.

May 2-3
(Chicago)

First Midwest Algebraic Geometry Conference

Details from Phil Wagreich, Department of Mathematics, University of Illinois at Chicago Circle, Box 4348, Chicago, Illinois 60680, U.S.A.

May 6 - 9
(Kalamazoo, Michigan)

Fourth International Conference on Graph Theory and its Applications

Details from Directors, 1980 Graph Theory Conference, Department of Mathematics, Western Michigan University, Kalamazoo, Michigan 49008, U.S.A.

May 8
(Dundee)

Symposium on Recent Developments in Applicable Mathematics

Details from The Secretary and Registrar, The Institute of Mathematics and its Applications, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY, England.

May 9-11
(West Lafayette, Indiana)

Conference on Honour of Michael Golomb: Variational Methods in Analysis

Details from W. Goutschi, Department of Mathematics, Purdue University, West Lafayette, Indiana 47907, U.S.A.

May 12-15
(Philadelphia)

Number Theory Conference in Honour of Emil Grosswald

Details from M.I. Knopp, Department of Mathematics, Temple University, Philadelphia, Pennsylvania 19122, U.S.A.

May 12-16
(Adelaide)

50th Jubilee ANZAAS Congress (incorporating the Annual Meeting of the Australian Mathematical Society)

Details from Dr D. L. Clements, Department of Applied Mathematics, University of Adelaide, GPO BOX 498, Adelaide, SA 5001, Australia.

May 18-21
(Auckland)

15th New Zealand Mathematics Colloquium

Details from the Colloquium Secretary, Department of Mathematics, University of Auckland, Private Bag, Auckland, New Zealand.

May 21-22
(Montréal)

Optimization Days, 1980

Details from Alain Haurie, Service de L'Enseignement de Méthodes Quantitatives, Écoles des Hautes Études Commerciales, 5255 avenue Decelles, Montréal, Québec, Canada H3T 1V6.

May 24-31
(Kozubnik, Poland)

Conference on Harmonic Analysis of Function Measures and Convolution Operators on Groups

Details from Andrzej Hulanicki, Institute of Mathematics, Polish Academy of Sciences, ul. Kopernika 18, 51-617 Wroclaw, Poland.

May 27-31
(Freiburg in Breisgau)

International Symposium on Interval Mathematics

Details from Herrn Professor Dr Karl Nickel, Institut für Angewandte Mathematik, Universität Freiburg i. Br., Hermann-Herder-Str. 10, D-7800, Freiburg i.Br., Federal Republic of Germany.

May 28-30
(Madison)

Advanced Seminar on Singular Perturbations and Asymptotics

Details from Gladys Moran, Mathematics Research Center, University of Wisconsin, 610 Walnut Street, Madison, Wisconsin 53706, U.S.A.

May 28-30
(Riverside, California)

Conference on General Topology, Set Theory and Modern Analysis with Applications

Details from Ms Florence Kelly, Department of Mathematics, University of California, Riverside, California 92521, U.S.A.

June 2-12
(Timisoara, Romania)

Fifth Annual International Conference on Operator Theory

Details from Fifth Operator Theory Conference, Department of Mathematics, INCREST, Bdul Păcii 220, 77538 Bucharest, Romania.

June 2-21
(Sherbrooke, Québec)

Canadian Mathematical Society Summer Research Workshop on Fixed Point Theory and its Applications

Details from Gilles Fournier, Département de Mathématiques, Université de Sherbrooke, Sherbrooke, Québec, Canada J1K 2R1.

June 3-6
(Dublin)

International Conference on Boundary and Interior Layers - Computational and Asymptotic Methods

Details from BAIL I Conference, 39 Trinity College, Dublin 2, Ireland.

June 9-12
(Tübingen, Germany)

Symposium on Operator Algebras and Derivations

Details from W. Kaup, Mathematisches Institut, Auf der Morgenstelle 10 7400 Tübingen, Federal Republic of Germany.

June 9 - 13
(Nijmegen)

Analytical and Numerical Approaches to Asymptotic Problems in Analysis

Details from Mrs T. van der Eem-Mijnen, Department of Mathematics, University of Nijmegen, The Netherlands.

June 15-27
(Newark, Delaware)

SIAM Summer Research Conference on Numerical and Statistical Analysis

Details from Hugh B. Blair, Society for Industrial and Applied Mathematics, 33 South 17th Street, Philadelphia, Pennsylvania 19103, U.S.A.

June 16-20
(Montréal)

Second International Symposium on Innovative Numerical Analysis in Applied Engineering Science

Details from R. B. Wilson, EB-353, Pratt and Whitney Aircraft, East Hartford, Connecticut 06108, U.S.A.

June 16-20
(Arlington)

International Conference on Nonlinear Phenomena in Mathematical Sciences

Details from V. Lakshmikantham, Department of Mathematics, The University of Texas at Arlington, Box 19408, Arlington, Texas 76019, U.S.A.

June 16-21
(Hong Kong)

Fifth Biennial Meeting of the Southeast Asian Mathematical Society

Details from the Secretary, Fifth SEAMS Conference, Mathematics Department, The Chinese University, Shatin, N.T., Hong Kong.

June 22- July 5
(Les Arcs, France)

NATO Advanced Summer Institute on Stochastic Systems: The Mathematics of Filtering and Identification and Applications

Details from M. Hazewinkel, Department of Mathematics, Erasmus University of Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands.

June 25-28
(East Lansing, Michigan)

Third Summer Symposium on Real Analysis

Details from Clifford E. Weil, Mathematics Department, Michigan State University, East Lansing, Michigan 48824, U.S.A.

July 7-31
(Trieste)

Summer Seminar on Complex Analysis

Details from International Centre for Theoretical Physics, P.O. Box 586, I-34100 Trieste, Italy.

July 8 - 11
(Les Arcs, France)

Fifth Conference on Automated Deduction

Details from Institut de Recherche d'Informatique et d'Automatique, Service des Relations Exterieures, Domaine de Voluceau, 78150 Le Chesnay, France.

July 9-11
(Reading)

Conference on Sparse Matrices and their Uses

Details from The Secretary and Registrar, The Institute of Mathematics and its Applications, Maitland House, Warrior Square, Southend-on-Sea, Essex SS1 2JY, England.

July 9-19
(St Andrews)

St Andrews Colloquium 1980

Details from C.M. Campbell, Mathematical Institute, University of St Andrews, North Haugh, St Andrews, KY16 9SS, Fife, Scotland.

July 14-16
(Madison, Wisconsin)

Nonlinear Programming Symposium IV

Details from Nonlinear Programming Symposium IV, Computer Sciences Department, University of Wisconsin, 1210 West Dayton Street, Madison, Wisconsin 53706, U.S.A.

July 14-19
(Jena)

Ninth International Conference on General Relativity and Gravitation

Details from E. Schmutzer, GR9, Sektion Physik, Friedrich-Schiller-Universität, DDR-69 Jena, Max-Wien Platz 1, German Democratic Republic.

July 28 - August 1 (São Paulo)

Second Annual Conference on Topology of Manifolds and Homotopy Theory

Details from Antonio Conde, IMECC - UNICAMP, 13.000 Campinas-SP, Brazil.

July 28 - August 9 (Mar del Plata)

V Escuela Latinoamericana de Matematica

Details from M. Herrera, Instituto Argentino de Matematica, Via monte 1636, 1055 - Buenos Aires, Argentina.

August 4-15 (Vancouver)

NATO Advanced Study Institute on Generalised Concavity in Optimization and Economics

Details from Siegfried Schaible, Faculty of Business Administration, University of Alberta, Edmonton, Alberta, Canada T6G 2G1.

August 4-22 (Montréal)

Seminar on Complex Manifolds: Applications to Algebraic Geometry and Mathematical Physics

Details from Ghislaine David, Département de Mathématiques et de Statistique, Université de Montréal, C.P. 6128, Montréal H3C 3J7, Canada.

August 10-16 (Berkeley)

Fourth International Congress on Mathematics Education

Details from ICME IV, Mathematics Department, University of California, Berkeley, CA 94720, U.S.A.

August 11-15 (Ottawa)

International Conference on Categorical Aspects of Topology and Analysis

Details from Louis D Nel, Department of Mathematics, Carleton University, Ottawa, K1S 5B6, Canada.

August 17-23 (Toronto)

Fifteenth International Congress of Theoretical and Applied Mechanics

Details from Ken Charbonneau, Executive Secretary, ICTAM Toronto, National Research Council, Ottawa, Ontario K1A 0R6, Canada.

August 18-22 (Patras, Greece)

Summer Meeting in Logic

Details from Logic Symposium I, Chair of Logic and Set Theory, University of Patras, Patras, Greece.

August 18-22 (Brisbane)

Seventh Australasian Hydraulics and Fluid Mechanics Conference

Details from Conference Manager, 7th Australasian Hydraulics and Fluid Mechanics Conference, The Institute of Engineers, Australia, 11 National Circuit, Barton ACT 2600, Australia.

August 18-22 (Edinburgh)

COMPSTAT 80: Fourth Symposium on Computational Statistics

Details from COMPSTAT 1980, C/- Director, Program Library Unit, Edinburgh University, 18 Buccleugh Place, Edinburgh EH8 9LN, Scotland.

August 18-23 (Aarhus, Denmark)

18th Scandinavian Congress of Mathematicians

Details from Organizational Committee, 18th Scandinavian Congress of Mathematicians, Mathematisk Institut, Aarhus Universitet, 8000 Aarhus C, Denmark.

August 24-30 (Prague)

Logic Colloquium 80 and European Summer Meeting of the Association for Symbolic Logic

Details from Logic Colloquium 80, Mathematical Institute of the Czechoslovakian Academy of Sciences, 25 Zitna, 115 67 Prague 1, Czechoslovakia.

August 25-29 (Geelong)

Eighth Australasian Conference on Combinatorial Mathematics

Details from K. L. McAvaney, Division of Computing and Mathematics, Deakin University, Victoria 3217, Australia.

August 25-Septemter 7
(Scarborough, Ontario)

18th International Symposium on Functional Equations

Details from J. Aczél, Pure Mathematics Department, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada.

August 27-29
(Utrecht)

Geometry Symposium

Details from D. Siersma, Mathematisch Instituut, Rijksuniversiteit Utrecht, Budapestlaan 6, 3508 TA Utrecht, The Netherlands.

August 27-September 3
(Torun, Poland)

International Conference on Young Tableaux and Schur Functions in Algebra and Geometry

Details from Tadeusz Józefiak, Mathematical Institute, Polish Academy of Sciences, Chopina 12, 87100 Torun, Poland.

September 1-13
(Black Sea Coast, Romania)

International Conference on Operator Algebras and Group Representations

Details from OAGR Conference, Department of Mathematics, INCREST, Bd. Păcii 220, 77538 Bucharest, Romania.

September 9 - 11
(Sheffield)

Third IMA Conference on Control Theory

Details from The Secretary and Registrar, The Institute of Mathematics and its Applications, Maitland House, Warrior Square, Southend-on-Sea, Essex, SS1 2JY, England.

September 15 - October 3
(Nancy, France)

Summer School of the International Centre for Pure and Applied Mathematics: Harmonic Analysis

Details from ICPAM, Villa "La Lézardière", 1 av. Edith Cavell, 06000 Nice, France.

September 22 - October 3
(Maratea, Italy)

NATO Advanced Study Institute on Singularities in Boundary Value Problems

Details from H.G. Garnir, Department of Mathematics, University of Liege, 15 avenue des Tilleuls, B-4000 Liège, Belgium.

September 29-December 20
(Strasbourg, France)

Autumn School of the International Centre for Pure and Applied Mathematics: Ordinary Differential Equations and Control Theory

Details from ICPAM, Villa "La Lézardière", 1 av. Edith Cavell, 06000 Nice, France.

October 1 - 3
(Lake Placid, New York)

21st Annual Symposium on Foundations of Computer Science

Details from Andrew C. Yao, Program Chairman, Computer Science Department, Stanford University, Stanford, California 94305, U.S.A.

October 6-17
(Tokyo & Melbourne)

International Federation for Information Processing Congress

Details from IFIP Congress 80, GPO BOX 880 G, Melbourne, Vic 3001, Australia.

October 13-15
(Madison)

Symposium on Transition and Turbulence

Details from Gladys Moran, Mathematics Research Centre, University of Wisconsin, 610 Walnut Street, Madison, Wisconsin 53706, U.S.A.

**** 1981 ****

January 12 - February 6
(Hobart)

Australian Mathematical Society 21st Summer Research Institute

Details from R. Lidl, Department of Pure Mathematics, University of Tasmania, GPO BOX 252C, Hobart, Tasmania 7001, Australia.

July 20-24
(Swansea)

Eighth British Combinatorial Conference

Details from A.D. Keedwell, Honorary Secretary, British Combinatorial Committee, Department of Mathematics, University of Surrey, Guildford, Surrey GU2 5XH, England.

NOTES AND NOTICES

NZMS-IBM THESIS COMPETITION

Eleven entries were received from NZ Universities for this competition and these are currently being evaluated. Announcements of the winners and presentation to the winners present will be made at the Colloquium, probably after the opening lecture on Sunday 18th May. All things point to this being a very successful venture for the Society.

G. C. Wake

MEMBERSHIP FEES

Members are reminded that membership fees were due on 1 January 1980. *If you have not paid your fee yet please do so now - the Society cannot function without income.* The rates are:

Ordinary member:	$NZ12.00
Student member:	$NZ 1.00
Reciprocal member:	$NZ 6.00

Please forward your remittance to the Treasurer, Mr H. S. Roberts, Applied Mathematics Division, DSIR, P.O. Box 1335, Wellington.

MATHEMATICAL REVIEWS CUMULATIVE INDEX

Last December Dr Wake circulated a letter to NZ university mathematics departments and to the DSIR containing a request for information on which New Zealand libraries intend to purchase this latest section of the Index. It spans 1973-1979 (volumes 45-58), will contain both author and subject listings with about 300 000 entries, and will total 9 200 pages in 12 volumes. So far Massey and Waikato libraries have indicated their intention to buy this section of the Index, and Waikato will then hold the complete Index.

FIFTEENTH NEW ZEALAND MATHEMATICS COLLOQUIUM

This will be held at the University of Auckland from Sunday evening, 18th May, to midday Wednesday 21st May, 1980. The Annual Meeting of the New Zealand Mathematical Society will be held during the Colloquium, on Tuesday afternoon.

Invited speakers The following invited addresses will be given: Dr P. J. Diggle (Newcastle-on-Tyne) *Statistical Analysis of Spatial Point Patterns,* Dr R. I. Goldblatt (VUW)

Categories and Creative Ideas, Professor C. Rees (New Orleans) *Egyptian Fractions*, and Professor I. E. Segal (MIT) *Mathematical Cosmology and the Red Shift*. Dr Diggle will give the NZMS Lecture at the Colloquium.

Contributed papers in any topic in mathematics or with a substantial mathematical content from other disciplines are called for. Intending contributors are required to furnish a Notice of Intent to Present a Paper together with 150 copies of an abstract by 19 April.

Accommodation has been reserved at Grafton Hall, 1.4 km from the University, at $13.50 per day for dinner, bed and breakfast, and at O'Rorke Hall, about 200 metres from the University, at $14.00 per day for dinner, bed and breakfast. Hotel and motel accommodation is available by own arrangement.

Registration will take place in the Chemistry Department foyer from 4.00 - 9.00 pm on Sunday, 18 May, with late registration on Monday morning.

Programme. Formal sessions, including invited addresses and contributed papers, will run from Monday morning until Wednesday noon. Monday evening will be devoted to a special session on Mathematics Education. The Vice- Chancellor's Reception and Colloquium Dinner will be held on Tuesday evening, and the Colloquium Business Meeting is scheduled for Wednesday morning. A number of tours, on a limited basis, will be offered to associates of those participating in the Colloquium.

Address for further information: Colloquium Secretary, Department of Mathematics, University of Auckland, Private Bag, Auckland, New Zealand.

BOOK SALES - PROGRESS REPORT

As of 3rd April,1980, 243 copies of

Andrews, *Partitions: Yesterday and Today*

had been distributed. This includes 150 left with ANU Press which is selling the book for the NZ Mathematical Society in Australia. In addition copies have been sent to review journals, etc. So far sales have been to the following countries: New Zealand, Australia, India, Canada, U.S.A. and West Germany. The book may be purchased for $NZ4.00 (NZMS members) or $NZ5.00 (non-members) including postage and packing. Send your order to *Graeme Wake, Mathematics Department, Victoria University of Wellington, Private Bag, Wellington*.

FIRST NEW ZEALAND GEOPHYSICS COLLOQUIUM

This will be held at Victoria University of Wellington 1st - 3rd September 1980 under the auspices of the VUW Institute of Geophysics. Topics covering all aspects of solid and fluid geophysics are within the scope of the Colloquium: Geodesy, seismology, tectonophysics, applied and exploration geophysics, upper atmosphere studies, gravity, geothermal and heat flow, geomagnetism and paleomagnetism, volcanology, oceanography and meteorology. It is hoped that the papers will be of interest to the wider community of geophysicists.

The programme will consist of two or three days of formal papers and several poster sessions. Time and facilities will be available for workshops and informal meetings organised by separate groups. (An invited workshop on plate tectonic reconstruction has already been proposed).

It is proposed to form a New Zealand Geophysical Society. The inaugural meeting will be held during this Colloquium. Any queries or comments about this, and requests for further information about the Colloquium, should be addressed to *Dr J. H. Ansell, Institute of Geophysics, Victoria University of Wellington, Private Bag, Wellington, New Zealand.*

RSNZ DECLINES APPLICATION FOR GROUP II MEMBERSHIP OF THE IMU

The Royal Society of New Zealand at its March Council meeting declined the application made by the New Zealand Mathematical Society (though the National Committee for Mathematics) to raise the status of New Zealand's membership of the International Mathematical Union from Group I to Group II, on the grounds of limited financial resources. The RSNZ policy is to give priority to assisting scientists to travel overseas, and this meant that the RSNZ felt it necessary to decline both the mathematicians' and the geophysicists' applications (the latter also applied for N.Z. to do similarly in the IUGG).

BOOK REVIEWS

We invite readers to submit reviews of books. Especially welcome will be reviews of books having direct relevance to New Zealand mathematics. In particular we encourage reviews of textbooks in mathematics based on classroom use. Reviews should ordinarily not exceed 300 words per book, typed with double spacing. However, in the case of textbooks or works of special significance, longer reviews may be accepted.

Topoi - The Categorial Analysis of Logic by Robert Goldblatt, North-Holland Publishing Co., Amsterdam, 1979. 486 pp. US$83.00.

It is, perhaps, necessary for this reviewer to declare his hand at the start so that readers are in no doubt concerning the basic perspective from which the review is undertaken. It is one of unqualified admiration for Dr Goldblatt as a person and mathematician, combined with the strong belief that the publication of this book will bring to the awareness of the mathematical community, both here in New Zealand and elsewhere, the recognition that in Dr Goldblatt is found a creative and comprehensive mathematical mind of rare excellence. The publication of the book itself marks, I believe, the reaching of a significant maturity in the development of mathematical logic and foundational studies in New Zealand. Several persons, in recent years and formerly, in different university centres have contributed to this development but Dr Goldblatt, both through this book and otherwise, has advanced it to a level that few would have thought yet attainable. Perhaps I run the risk of being too fulsome in my praise of Dr Goldblatt and in judgement of the quality of his work. If so, it is of small matter. The book itself is available to all as independent evidence and, no doubt, will make its own way in the mathematical world. But I predict for it a long and widely acclaimed journey.

In preparation for the writing of this review I was tempted to develop a little of the technical content of the book as a means of giving readers, not ordinarily concerned with the technicalities of mathematical logic and foundational studies, a flavour of its main concerns. But I was dissuaded from doing this on two counts. The first and obvious one is that such a development too quickly took me beyond the bounds of a review appropriate to the character of the Newsletter. The second, and more important one, is that to do so would preempt the spirit of the book itself. Dr Goldblatt writes with the conviction "that the emergence of topos theory is an event of supreme importance, that has major implications for the advancement of conceptual understanding as well as technical knowledge in mathematics". Its central themes, drawn from "a number of disciplines (logic, set theory, algebraic geometry)", ought to be made as widely available as possible, to people who claim expertise in only some of these disciplines, or in none of them. Hence "everything - set theory, logic, and category theory - begins at square one". The book itself serves as its own introduction, and even readers familiar with much of the technical material, particularly of the early chapters, will be enriched by the freshness and clarity of insight into the larger meaning and purpose of familiar results. Dr Goldblatt records that the writing of the book was a

"reconstruction of the progress of my own understanding. And at the end it seemed to me that much that I had dwelt on had finally fallen into place". It is this ability of Dr Goldblatt to set both familiar and unfamiliar concepts and results "into place" that gives a rich quality to the expositional character of the text.

The subtitle of the book *The Categorial Analysis of Logic* (a deliberate parallel to one of G. Boole's works) gives the key to its central aim. Most readers will be familiar with the manner in which the structure of the propositional logic can be represented by operations of the two-element Boolean algebra. A categorial analysis uses quite a different mathematical structure (a topos!) within which to represent the formal principles of logic. This has quite breath-taking consequences, not only for the study of logic itself, but also for many of the classical concepts of mathematical study, including the real number continuum. This alternative mathematical structure is constructed out of the building blocks of category theory.

One of the many praiseworthy features of the book is the exposition Dr Goldblatt provides of the elementary (and not so elementary) features of category theory. Readers, who may sometime have sought acquaintance with category theory in expositions set within the context of algebraic topology, algebraic geometry or universal algebra, and retired baffled, will be grateful to Dr Goldblatt for the clarity and gentleness of his account. Two principles of exposition have determined Dr Goldblatt's approach. The first, to introduce and develop the universal constructions within a category free, initially, of the over-lay of functorial language and machinery, that in many treatments scares and confuses the novice. The second, reflects a penetrating insight into the pedogogical process. In his own words he has tried "to move always from the particular to the general, following through the steps of the abstraction process until the abstract concept emerges naturally". This latter principle informs and sustains the whole work, and is the source of its expositional strength.

Dr Goldblatt's account of the categorial analysis of logic moves through two chief phases. The first, in the main, occupies the first eleven chapters, the second, the remaining four chapters. The first is concerned with the task of translating the classical set-theoretical accounts of the structures of formal logic into the alternative structures built from the primitives of category theory, and called topoi. Its outcome is the surprising result that the principles of logic characterised by these alternative structures are precisely those of intuitionistic logic. Who would have predicted in the early years of this century that the esoteric but brilliant mathematical programme of L. E. J. Brouwer would have its underlying and intuitive logic captured and represented in such a manner. But it is so and Dr Goldblatt gives a perceptive account as to how it has come to be so.

The second phase is more complex, technically and conceptually, but in the long run more consequential for the wider study of mathematics. It has to do with nothing less than the building of a foundation for all of mathematics alternative to that provided by set theory. Into it flow some mighty mathematical rivers with sources in algebraic geometry,

including the theory of sheaves, and axiomatic set theory, including the array of independence proofs and related results. Dr Goldblatt is meticulous in documentation of the historical development of these ideas and in identification of those who have first established the many and various results. He is explicit in recognition of the epoch-making work of F. W. Lawvere, and others, in identifying the right categorial description for the category of sets, so opening the way for the alternative foundations through the translation of the traditional set-theoretic descriptions of mathematical entities into the language of categories. The isolation of the concept of "subobject classifier" (a categorial representation of the correspondence between subsets and characteristic functions in set theory) will surely be recognised in years to come as a decisive global advance in mathematical ideas. By means of it each topos gains its own logic and some become the vehicle for a representation of the number systems and other mathematical entities, classically described in set-theoretic terms. Many, varied and challenging are the range of consequential results. But more than this, there is in Dr Goldblatt's words, the recognition that "these developments have shown us more clearly than ever just how the properties of the structures we study depend on the principles of logic we employ in studying them".

Certainly the lay reader will find this second phase of the categorial analysis of logic more difficult to cope with. In recognition of this Dr Goldblatt has reduced the amount of technical verification of results (referring the reader to primary sources) and concentrated on setting the various ideas and results into perspective with the over-all development. But the final chapters are worth persevering with for they reveal the more significant aspects of the wider developments in mathematics. "A revolution has occurred in the history of mathematical ideas (albeit a peaceful one) that will undoubtedly influence the direction of the path to the future".

I cannot conclude this review without drawing attention to the explicit philosophical commitments expressed by Dr Goldblatt in his book and to the quality of his philosophical reflections. It gives to the work an intellectual richness not present often enough in mathematical expositions. These philosophical concerns are worked out in a variety of ways. They are made explicit in many sections, including the preface and prospectus. They are reflected in the aptness of the wide range of chapter heading quotations. In discerning, and regretting in part, a trend against generality and abstraction in the name of applicability and problem solving I am particularly glad for the balance of this perspective : "Progress in understanding comes as much from the recognition that a particular new structure is an instance of a more general phenomenon, as from the recognition that several different structures have a common core. Our knowledge of mathematical reality advances through the interplay of these two processes, through the movement from the particular to the general and back again." The book demonstrates the outworking of this commitment at its best.

This philosophical perspective is made explicit in Dr Goldblatt's comments on the nature of mathematical discovery and the role of foundational studies in mathematics. For the

latter his views point us in directions quite other than those which motivated the traditional philosophies associated with the names logicism, intuitionism or platonism.

"A Foundational system serves not so much to prop up the house of mathematics as to clarify the principles and methods by which the house was built in the first place. "Foundations" is a discipline that can be seen as a branch of mathematics standing apart from the rest of the subject in order to describe the world in which the working mathematician lives."

These words, part of the first chapter of Dr Goldblatt's book, were first written by him in a student essay at the beginning of a 4th year course in Foundations. Not only has he adhered to this perspective, and enriched and strengthened it with the fruit of scholarship and research, but also himself, a short ten years later, has made I believe a distinguished contribution to the practice of Foundational studies.

(Wilf Malcolm, Victoria University of Wellington)

Partitions : Yesterday and Today by George E. Andrews, New Zealand Mathematical Society, Wellington, 1979. pp.56 NZ $5.00.

The 1979 New Zealand Mathematical Society Visiting Lecturer was Professor George Andrews of Pennsylvania State University, who during his tour in New Zealand presented a series of three lectures. These lectures have been expanded into the essays which form this first publication of the New Zealand Mathematical Society. I count myself fortunate to have attended each of Professor Andrews' lectures. Each was a balance of anecdotage and mathematics, relating to a specific character who made a major contribution to partition theory, and a sample of old and new related results, interestingly and skillfully presented. I was awed by the power of simple graphical representations using devices such as Durfee squares to derive many massive identities of the Rogers - Ramanujan type. Of course in such a presentation many details must be omitted; however the ideas were convincingly illustrated by examples.

With this background to the subject I found the book a disappointment. There is usually a feeling of loss in viewing the film of a book you know well, but my sense of disappointment was not of this nature. I feel that Professor Andrews has not exploited the advantage of this medium to the full. Being removed from pressures of time and space, these essays could have had a lot more detail included, and more examples illustrating the development would have led to an easier understanding. For example, the final paragraph on page 22 is an explanation of how to interpret the partitions with a $(n \times 2n)$ rectangle; a similar paragraph on page 11 would have eased us past the statement "The answer is, in fact, immediate once we recognize the infinite product as

$\sum_{m,n \geq 0} p(\mathbb{N}, m, n) z^m q^n \ldots$" For those of us for whom this recognition is not immediate, several sentences of explanation would have been a boon.

There are many other places where an unskilled reader may also falter, perhaps at times unwittingly caught by typesetting errors. On page 27, the reader is invited to replace a by q^2 in equation (2.3.3), and multiply throughout by $q \prod_{j \geq 1} (1+q^{2j})$ to obtain (2.3.10). However despite exhausting the skill of the reviewer, such a derivation was not forthcoming. The subsequent derivation of (2.3.3) (Theorem 2.4) however is in error, due to an omitted minus sign, so that the right hand side of (2.3.3) should read

$$2 \prod_{j=1}^{\infty} (1 - q^{4j}) \sum_{n=0}^{\infty} \frac{q^{(2n+1)^2} a^{-2n-1}}{(1-q^4)(1-q^8)\ldots(1-q^{4n})} .$$

From this (2.3.10) is readily derived.

Throughout the book there are far too many obvious errors that ought to have been corrected in proof. A list of errors and their suggested amendments is given as an appendix below in order to assist other readers. I hope that the Society, in future publications, can avoid these unfortunate occurrences.

Despite the negative expressions above, I should add that this is still an enjoyable and worthwhile book. While the reader may be asked to perform some demanding derivations (the successful achievement of which is rewarding), the subject is accessible to anyone with no background in partition theory, or even number theory, but simply an ability to understand some algebraic manipulation and analysis. Professor Andrews in a few giant strides brings us from 19th century results to current research results.

The book is organised into three chapters, and each chapter itself into two sections. The first sections are short biographies while the second sections are related mathematical developments. This is an attractive way of presenting material, and I hope we will see more in the same style. Chapter 1 focusses on the eccentric Sylvester, with the development and application of the Durfee square. Chapter 2 introduces us to the prodigious Ramanujan, and Professor Andrews uncovers more of the hitherto "lost identities" of Ramanujan. In Chapter 3 we meet the misremembered Rogers and then see some applications of his false theta functions. For those not familiar with these functions, the equations (3.1.1) - (3.1.6) here are not well expressed in that the patterns of terms are not apparent. For example, we can deduce from Theorem 3.1, that

$$\frac{1}{1-q} - \frac{q^2}{(1-q^2)(1-q^3)} + \frac{q^7}{(1-q^3)(1-q^4)(1-q^5)} - \ldots\ldots\ldots$$

$$= 1 + q^7 - q^8 - q^{29} + q^{31} + \ldots\ldots + q(1 + q^2 - q^{13} - q^{19} + \ldots\ldots)$$

can be re-expressed as

$$\sum_{n=0}^{\infty} \frac{(-1)^n q^{n(3n+1)/2}}{(1-q^{n+1})(1-q^{n+2})\ldots(1-q^{2n-1})} = \sum_{n=0}^{\infty} (-1)^n [q^{n(15n+1)/2} - q^{n(15n-1)/2} + q^{1+n(15n+11)/2} - q^{1+n(15n-11)/2}];$$

with five quadratic expressions in the exponents, the pattern in (3.1.1) is in fact not determinable.

In summary I would like to emphasize that this book is an enjoyable one, although one has to work to get its benefits. It is available at an attractive price. I hope that any subsequent reprints, and further books produced by the Society will contain far fewer distracting errors.

Appendix: Errata in *Partitions: Yesterday and Today*

Page	Line	Reads	Should Read
p.11	ℓ.7	p(m)	p(n)
	ℓ-12	Theorem 1	Theorem 1.2 and Corollary 1.3
p.13	ℓ.1	$q^{s(3s+1)/2+2s+1}$	$q^{2s+1} + s(3s+1)/2$
p.25	ℓ-2	a^{-2b-1}	a^{-2n-1}
p.26	ℓ.3	a^{2n+1}	a^{-2n-1}
p.29	ℓ-1	12^n	12n
p.30	ℓ.2	$(bq^{2\nu})^n$	$(bq^{4\nu})^{2n}$
p.31	ℓ-3	(2.3.4)	(2.4.3)
p.32	ℓ.4	$b^j a^{4j+4N}$	$b^j q^{4j+4N}$
	ℓ.7	=	+
	ℓ-3	$a^{n^2+(N-n)^2}$	$q^{n^2+(N-n)^2}$
p.33	ℓ.1	$q^{2n^2+2Nn+N^2}$	$q^{2n^2-2Nn+N^2}$
	ℓ.4	a^{2n+1}	a^{-2n-1}
	ℓ.6	2.B.4	2.B.5
p.47	ℓ.2	(Replace N by n, in 4 places)	
	ℓ.5	$q^{n(15n+11)/2+1}$	$q^{n(15n+11)/2} + 1$
	ℓ-3	$n = j(15j-7)/2 + 1$	$n = j(15j-7)/2$
p.49	ℓ-14	$n = j(3j-1)/2$, $j > 0$	$n = j(3j+1)/2$, $j > 0$
p.53	ℓ-1	$\left(\frac{aq}{b_k}\right)$	$\left(\frac{aq}{b_k}\right)_N$
p.55	ℓ.8	$q^{N_1(N_1-1)/2+N_2^2+\ldots+N_{k-1}^2}$	$q^{N_1(N_1-1)/2 + N_2^2+\ldots+N_{k-1}^2}$

(Mike Hendy, Massey University)

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The New Zealand Mathematical Society Newsletter

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