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Editorial

Sid and I welcome you to the first issue of the *Gazette* for 2014.

One of our main articles looks at the legacy of Kurt Mahler, the pioneering number theorist who passed away 26 years ago. He is important in the history of Australian mathematics not only for the research he did, with numerous publications in six languages between 1927 and 1991, but also for the students he taught or supervised and the influence they had. That includes such illustrious names as John Coates and Alf van der Poorten. The article by Jonathan M. Borwein, Yann Bugeaud and Michael Coons reports on some selected highlights of his work, and on the Kurt Mahler Archive, an electronic repository devoted to Mahler's life and work, which is now hosted by CARMA at the University of Newcastle and is freely available to anyone interested. We encourage you to browse the archive.

In another look back, Mike Newman gives a thoughtful obituary of Laci Kovács, who passed away unexpectedly last July.

Looking forwards, Nalini Joshi further examines the role of journal rankings in the evaluation of our research, while Geoff Prince considers the value and structure of our PhD programs. Likewise, Peter Forrester considers a number of topical issues in the President's Column.

Public recognition of the achievements of our members is reported here in two articles: John Croucher received the Prime Minister's Award for University Teacher of the Year, and a number of other awards were presented at the annual ANZIAM conference in January. Our congratulations to all of these recipients.

One of the *Gazette*'s regular features is book reviews, of which we publish four in this issue. Generous publishers continuously send us books for review, and I now have approximately three dozen available in my office. These are advertised on the *Gazette*'s webpage, more precisely at http://www.austms.org.au/Gazette+-+books+available+for+review together with the conditions for reviewers. Any AustMS member interested in writing a review need only write to us to request a copy.

Other regular features in this issue are reports on two conferences partially supported by AustMS or AMSI, a Lift-off Fellowship report, news updates from local correspondents and the society's secretary, and of course the Puzzle Corner.

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David Yost is a graduate of the University of Melbourne, the Australian National University and the University of Edinburgh. He has lived in eight countries and ten cities, returning to Australia in 2003, where he has recently completed ten years at Federation University Australia and its predecessor institution, the University of Ballarat, including a three-year period as Deputy Head of School. While most of his research is in functional analysis, he has lately been interested in convex geometry.

President's Column

Peter Forrester*

The last time I penned this column I was sitting in the Fisher library at Sydney University in between sessions at the AustMS annual meeting in early October. From there I headed to the IAS at Princeton, as a short-term visitor in the random matrix theory program being hosted there. One evening, I was invited to a discussion forum entitled 'Mathematical Conversations'. The aim of this forum was to bring to the fore, in an informal environment, topical research problems and new developments in mathematics. Much to my pleasant surprise, the organiser and chair of the forum turned out to be Melbourne graduate from the mid-2000s, Nick Sheridan. After finishing his Honours degree at Melbourne under the supervision of Craig Hodgson and Hyam Rubinstein, Nick went to complete his PhD at MIT before taking up his postdoctoral appointment at the IAS in 2012. I made a trip to MIT myself to present a seminar. There I met another expat Australian, Shevarl MacNamara, who obtained his Honours degree at ANU, and PhD at the University of Queensland, and was being supported by a Fulbright fellowship. At MIT, he was working with Gilbert Strang, the well-known author of *Introduction to Linear Algebra* and associated videos. AustMS is keen to enhance community among expat Australian mathematicians, and to have their successes provide inspiration for our student and ECR members. With this in mind, moves have begun to gather data for the creation of a directory of expat Australian mathematicians on the AustMS website.

At the end of November I participated in the 2nd annual ANZAMP meeting, something that has grown out of the annual Australian Statistical Mechanics meeting, initiated by Colin Thompson back in 1973. Sponsored by AustMS, the meeting was held in Mooloolaba, thanks to the efforts of the local organisers at the University of Queensland. This year the ANZAMP meeting is to be embedded in the 58th AustMS meeting to be held in Melbourne this December. In January, I attended an AustMS-sponsored conference on random matrices, organised by Sheehan Olver at the University of Sydney. Sheehan did a remarkable job in attracting participants from all over the globe at all stages of their careers. An immediate 'multiplier effect' for me personally was the continuation down to Melbourne of one of the early career participants from China. In general conversation he has confirmed to me the trend I'd earlier heard from expat Australian statistician Iain Johnstone: in China the most popular area of study among the best graduate students in the best universities is probability and statistics. With the recent announcement of the funding of the ARC Centre of Excellence for Mathematical and Statistical frontiers (ACEMS), headed by Peter Hall (director), Jan de Gier, Kerrie Mengersen and Louise Ryan, new research

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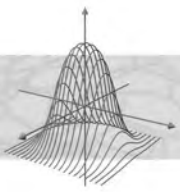
partnerships with our Asian neighbours may well emerge, as well as closer ties between AustMS and SSAI.

My trip to Sydney was squeezed in amongst my summer linear algebra lecturing duties. Telling conference participant Ioana Dumitriu (University of Washington) that I have 270+ students in the one lecture group, her immediate reaction was 'Do they actually learn anything?'. I went on to explain that the large lecture group breaks into small-sized tutorial groups and Matlab classes. Ioanna told me that her most recent teaching assignment was a course 'Introduction to mathematical reasoning', for which she lectures two sessions each with under 40 students.

Another talking point in lecturing circles is the recording of lectures, and in particular its seemingly inevitable consequence of the disengagement of the student body via the phenomenon of students 'studying in the jarmies' (as phrased by my Melbourne colleague Deb King). As a provocative thought, to what critical number will attendance have to drop before real-person lectures are replaced by pre-recorded video, and all teaching is done in tutorials?

Peter Forrester received his Doctorate from the Australian National University in 1985, and held a postdoctoral position at Stony Brook before joining La Trobe University as a lecturer in 1987. In 1994 he was awarded a senior research fellowship by the ARC, which he took up at The University of Melbourne. Peter's research interests are broadly in the area of mathematical physics, and more particularly in random matrix theory and related topics in statistical mechanics. This research and its applications motivated the writing of a large monograph 'log-gases and random matrices' (PUP, Princeton) which took place over a fifteen-year period. His research has been recognised by the award of the Medal of the Australian Mathematical Society in 1993, and election to the Australian Academy of Science in 2004, in addition to several ARC personal fellowships.



Puzzle Corner

Ivan Guo*

Welcome to the Australian Mathematical Society *Gazette*'s Puzzle Corner number 36. Each puzzle corner includes a handful of fun, yet intriguing, puzzles for adventurous readers to try. They cover a range of difficulties, come from a variety of topics, and require a minimum of mathematical prerequisites for their solution. Should you happen to be ingenious enough to solve one of them, then you should send your solution to us.

For each puzzle corner, the reader with the best submission will receive a book voucher to the value of $50, not to mention fame, glory and unlimited bragging rights! Entries are judged on the following criteria, in decreasing order of importance: accuracy, elegance, difficulty, and the number of correct solutions submitted. Please note that the judge's decision — that is, my decision — is absolutely final. Please email solutions to ivanguo1986@gmail.com or send paper entries to: Gazette of the Australian Mathematical Society, School of Science, Information Technology & Engineering, Federation University Australia, PO Box 663, Ballarat, Vic. 3353, Australia.

The deadline for submission of solutions for Puzzle Corner 36 is 1 May 2014. The solutions to Puzzle Corner 36 will appear in Puzzle Corner 38 in the July 2014 issue of the *Gazette*.

Notice: If you have heard of, read, or created any interesting mathematical puzzles that you feel are worthy of being included in the Puzzle Corner, I would love to hear from you! They don't have to be difficult or sophisticated. Your submissions may very well be featured in a future Puzzle Corner, testing the wits of other avid readers.

World cup

In the soccer world cup, each group has four teams. Each team plays one game with every other team in its group. A win gives 3 points, a draw 1 point and a loss 0 points. From each group, two teams advance so that each advancing team gets at least as many points as each non-advancing team.

(i) What is the smallest possible score of an advancing team?

(ii) What is the largest possible score of a non-advancing team?

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Polynomial product

Let n be a positive integer. Consider the polynomial:

$$P(x) = (1 + x)(2 + x^2)(3 + x^4)(4 + x^8) \cdots (n + x^{2^{n-1}}).$$

Express the product of the non-zero coefficients of $P(x)$ in terms of n.

Coin coverage

One hundred identical coins lie on a rectangular table, in such a way that no more can be added without overlapping. We allow a coin to extend over the edge of the table, as long as its centre is still on the table.

Prove that if overlapping is allowed, it is possible to start again and completely cover the table with four hundred of these coins.

Matching remainders

Submitted by Norman Do

The numbers $1, 2, \ldots, 2n$ are divided into two groups of n numbers. We form a list of the remainders formed by dividing the sums $a + b$ by $2n$, where a, b are in the same group (and may be equal).

Prove that the n^2 remainders from one group are equal, in some order, to the n^2 remainders of the other group.

Tessellation test 2

Tess is tessellating polygons with parallelograms again. This time she has successfully divided a regular $4n$-gon into various parallelograms.

(i) Prove that at least n of the parallelograms are rectangles.

(ii) If the original regular $4n$-gon has unit side lengths, prove that the sum of the areas of all rectangles equals to n.

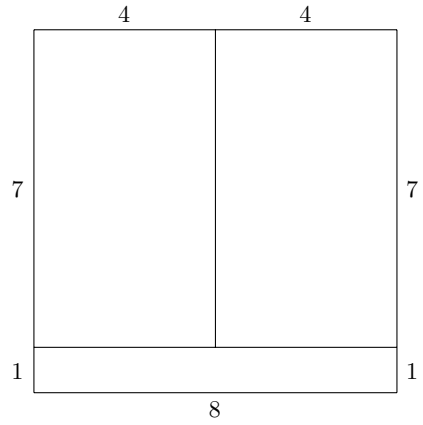
Solutions to Puzzle Corner 34

Many thanks to everyone who submitted. The $50 book voucher for the best submission to Puzzle Corner 34 is awarded to Joe Kupka. Congratulations!

Crowded square

There are four points inside an 8 metres by 8 metres square. Prove that two of those points are at most $\sqrt{65}$ metres apart.

Solution by Peter McNamara: Divide the square up into three rectangles as shown in the following diagram.



Since $7^2 + 4^2 = 8^2 + 1^2 = 65$, each rectangle has a diagonal length of $\sqrt{65}$ metres. By the pigeon-hole principle, two of the points must lie in the same rectangle. Hence the distance between those two points cannot be more than $\sqrt{65}$ metres.

Note: The best bound possible is actually 8 metres, but the choice of $\sqrt{65}$ allows for the nice solution as presented above.

Fraction practice 2

Franny is practising her fractions again. She begins with the numbers

$$\frac{1}{1}, \frac{1}{2}, \cdots, \frac{1}{100}$$

written on the board. At each turn, Franny may erase two numbers a, b and replace them with a single number $f(a, b)$. This is repeated until only one number remains.

(i) *If $f(a, b) = ab/(a + b)$, what are the possible values of the final number?*

(ii) *If $f(a, b) = ab + a + b$, what are the possible values of the final number?*

Solution by Martin Bunder: (i) Whenever the fractions $\frac{1}{m}$ and $\frac{1}{n}$ are erased, they are replaced by

$$f\left(\frac{1}{m}, \frac{1}{n}\right) = \frac{\frac{1}{mn}}{\frac{1}{m} + \frac{1}{n}} = \frac{1}{m+n}.$$

So the sum of the reciprocals of the fractions on the board is constant. Thus the final fraction must be

$$\frac{1}{1 + 2 + \cdots + 100} = \frac{1}{5050}.$$

(ii) First note that

$$f(a, b) + 1 = ab + a + b + 1 = (a + 1)(b + 1).$$

So if we add 1 to each of the numbers on the board and then multiply everything together, the product is a constant. Thus the final number must be

$$\left(\frac{1}{1}+1\right)\left(\frac{1}{2}+1\right)\cdots\left(\frac{1}{100}+1\right)-1=\frac{2}{1}\times\frac{3}{2}\times\cdots\times\frac{101}{100}-1=100.$$

Prickly pair

I am thinking of a pair of positive integers. To help you work out what they are, I will give you some clues. Their difference is a prime, their product is a perfect square, and the last digit of their sum is 3. What can they possibly be?

Solution by Dave Johnson: Let the pair of numbers be x and y with $x < y$, and denote their difference $y - x$ by the prime number p. Since $\gcd(x, y) \mid p$, there are two possible cases.

If $\gcd(x, y) = p = y - x$, then write $x = pa$ and $y = p(a + 1)$. Since the product $xy = p^2a(a + 1)$ is a square, the number $a(a + 1)$ must be a square. But this is impossible since $a^2 < a(a + 1) < (a + 1)^2$.

If $\gcd(x, y) = 1$, then x and y are coprime. The product xy being a square implies that both x and y are squares. Writing $x = a^2$ and $y = b^2$, we have

$$p = b^2 - a^2 = (b - a)(b + a),$$

which implies $b = a + 1$ and $p = a + b = 2a + 1$. Now using the fact that the last digit of the sum is 3, we must have

$$x + y = a^2 + b^2 = 2a^2 + 2a + 1 = 10k + 3$$

for some integer k. This simplifies to $a^2 + a = 5k + 1$. It is easy to check that in modulo 5, the only possible solution is $a \equiv 2$, which implies that $p = 2a + 1 \equiv 0$. Thus $p = 5$, and the only two square numbers which differ by 5 are 4 and 9.

Therefore the required pair of integers is $(4, 9)$.

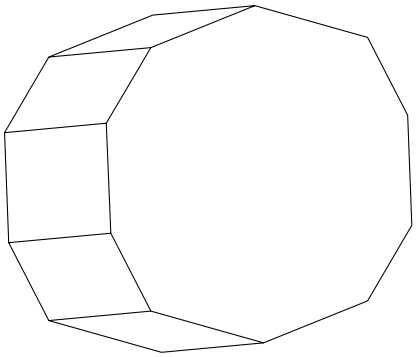
Tessellation test

Tess is trying to draw an n-sided convex polygon which can be tessellated by a finite number of parallelograms. For which n will Tess be able to succeed?

Solution by Jensen Lai: We claim that it is possible to tessellate an n-gon by parallelograms if and only if n is even.

Consider a side S of the n-gon and suppose it is on the bottom. Any parallelogram touching S must have a top edge E_1 which is parallel to S. Then we may find a parallelogram that has E_1 as the bottom edge. Its top edge E_2 is still parallel to S. This process can be repeated until we reach an edge E_k that is on the boundary of the original n-gon, belonging to some side S'. Hence for any side S of the n-gon, there exists another side S' that is parallel to S. Since in a convex polygon, any side can be parallel to at most one other side, we can hence group the sides of our n-gon into parallel pairs. This automatically implies that n is even.

Now we shall show that such an n-gon exists for even n by induction. For the base case of $n = 4$, we can simply take any parallelogram. Now suppose the tessellation is possible for a $2k$-sided polygon P_{2k}. We can construct a $(2k + 2)$-sided polygon P_{2k+2} by translating k sides of P_{2k} while creating k additional parallelograms. The following diagram demonstrates the construction that turns a 10-gon into a 12-gon, but the same idea works for any even number.



Diminishing differences

Begin with n integers $x_1, \ldots, x_n$ around a circle. At each turn, simultaneously replace all of them by the absolute differences

$$|x_1 - x_2|,\ |x_2 - x_3|,\ \ldots,\ |x_{n-1} - x_n|,\ |x_n - x_1|.$$

Repeat this process until every number is 0, then stop. Prove that this process always terminates if and only if n is a power of 2.

Solution by Joe Kupka: We shall denote the initial sequence by

$$s = (x_1, x_2, \ldots, x_n)$$

and the operation by the function f, or

$$f((x_1, x_2, \ldots, x_n)) = (|x_1 - x_2|, |x_2 - x_3|, \ldots, |x_{n-1} - x_n|, |x_n - x_1|).$$

The sequence reached after k operations is denoted by $f^k(s)$. Throughout the solution, the indices will be taken in modulo n. Since the terms will be non-negative after the first step, we shall assume that only non-negative integers are involved. Furthermore, it is clear that the numbers appearing in these sequences are bounded.

First suppose that $n > 1$ is odd. Consider the starting sequence $s = (1, 0, \ldots, 0)$. It is clear that we will only ever have 1s and 0s. If we eventually have all 0s, let the first occurrence of this be $f^k(s) = (0, 0, \ldots, 0)$. Then in the step before, we must have $f^{k-1}(s) = (1, 1, \ldots, 1)$. Going back further, the numbers in $f^{k-2}(s)$ must alternate between 1s and 0s. But this is not possible since n is odd.

Now suppose that n has an odd factor $m > 1$. Consider the starting sequence

$$s = (\underbrace{1, 0, \ldots, 0}_{m}, \underbrace{1, 0, \ldots, 0}_{m}, \ldots, \underbrace{1, 0, \ldots, 0}_{m}).$$

Due to the cyclic nature of the process, the sequence $f^i(s)$ will always have period m. Furthermore, each chunk of length m has the same behaviour as an evolving length m sequence starting with $(1, 0, \ldots, 0)$. Thus by previous arguments, it is not possible to reach all 0s if n has an odd factor.

Finally, we show that it is always possible to reach all 0s if $n = 2^a$ where a is a positive integer. Consider everything in modulo 2. Since $x - y \equiv x + y$, we may replace the differences by sums. It is possible to explicitly compute $f^n(s)$ in modulo 2. Begin by computing $f^2(s)$:

$$\begin{aligned} s &= (x_1, x_2, \ldots, x_n), \\ f(s) &\equiv (x_1 + x_2, x_2 + x_3, \ldots, x_n + x_1), \\ f^2(s) &\equiv (x_1 + 2x_2 + x_3, x_2 + 2x_3 + x_4, \ldots, x_n + 2x_1 + x_2) \\ &\equiv (x_1 + x_3, x_2 + x_4, \ldots, x_n + x_2). \end{aligned}$$

Then $f^4(s)$ can be computed by applying $f^2(s)$ twice:

$$\begin{aligned} f^4(s) &\equiv f^2(f^2(s)) \\ &\equiv (x_1 + 2x_3 + x_5, x_2 + 2x_4 + x_6, \ldots, x_n + 2x_2 + x_4) \\ &\equiv (x_1 + x_5, x_2 + x_6, \ldots, x_n + x_4). \end{aligned}$$

Continuing this pattern, we can compute $f^{2^i}(s)$ for any i. In particular, for $f^n(s)$,

$$\begin{aligned} f^n(s) &= f^{2^a}(s) \\ &\equiv (x_1 + x_{2^a+1}, x_2 + x_{2^a+2}, \ldots, x_n + x_{2^a}) \\ &\equiv (0, 0, \ldots, 0). \end{aligned}$$

Since this is in modulo 2, we have shown that, after $n = 2^a$ iterations, all numbers must be even. By dividing everything by 2 and applying the same process, we see that after a further n iterations, all numbers must be multiples of 4. Repeating this argument, we see that after kn iterations, all numbers must be multiples of 2^k, for all k. But since the numbers are bounded, we must eventually have all 0s. This completes the solution.

Ivan is a PhD student in the School of Mathematics and Statistics at The University of Sydney. His current research involves a mixture of multi-person game theory and option pricing. Ivan spends much of his spare time playing with puzzles of all flavours, as well as Olympiad Mathematics.

Communications

The legacy of Kurt Mahler

Jonathan M. Borwein,* Yann Bugeaud† and Michael Coons*

Kurt Mahler (1903–1988)

I hope that you can continue with your preparing of my collected works. When my old papers first appeared, they produced little interest in the mathematical world, and it was only in recent times that they have been rediscovered and found useful. So a collection of all my papers may repair this position!

[Kurt Mahler, in his last letter to Alf van der Poorten]

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The quote at the beginning of this article was taken from a letter written by Kurt Mahler to Alf van der Poorten the day before Mahler died on 25 February 1988; it was received after van der Poorten had heard about Mahler's death.

At that time van der Poorten had already begun to collect Mahler's works. Twenty-five years have now passed since Mahler's death, and three years since van der Poorten's. Recently, in memory of van der Poorten, we[1] have finished van der Poorten's project and established the *Kurt Mahler Archive*. The Archive is hosted by the Centre for Computer-Assisted Research Mathematics and its Applications (CARMA), which is located[2] at the University of Newcastle, Australia. It can be found at http://carma.newcastle.edu.au/mahler/index.html.

The story of how the Archive came into (digital) existence may be of interest to our Australian audience; it involves each of the present authors. In the late 1990s, Alf van der Poorten mentioned to Jon Borwein that he had had a student scan a rather large subset of Mahler's papers. Jon and Alf were both on the International Mathematical Union's then new Committee on Electronic Information and Communication (CEIC). Being aware of the significance of such a collection, Jon suggested that they store it at his Centre for Experimental and Constructive Mathematics (CECM) at Simon Fraser University in Burnaby (Vancouver), Canada.

More than ten years later, in March 2012, at the dinner for the Alf van der Poorten Memorial Conference in Newcastle, Australia, Jon mentioned that Alf had made such a collection, but that he could not recall what had happened to it. Yann Bugeaud offered to try and find it. A few days later he excitedly emailed that Mahler's work was housed online in Vancouver. Jon was pleased, if chagrined, to realise it was at CECM. A month later, Michael Coons successfully interviewed for a Lecturer position at the University of Newcastle. Michael talked on Mahler's method and some related results, highlighting the work of Mahler, van der Poorten, and Bugeaud. So, inspired during Michael's talk, and thanks to iPad connectivity, Jon had the works moved to the CARMA servers. By the end of the talk, the project, which became The Mahler Archive, was in full swing.

Mahler, the man

Mahler was born in Krefeld, Germany, on 20 July 1903. He did not come out of an academic family, but nonetheless, from one which loved the printed word; his father ran a printing firm. While first entering academia in a non-traditional way, Mahler should most appropriately be considered a student of Siegel, and this

[1] Joy van der Poorten helped immensely with collecting Mahler's harder-to-get papers, as well as with the correspondence between Alf van der Poorten and Mahler. We thank her greatly for her contribution to the Archive.

[2] We would have liked to have compiled a more standard printed archive, or even published a print selecta, of Mahler's work. Unfortunately, in the current digital age, such a work is no longer appealing to publishers.

is how the *Mathematics Genealogy Project* has recorded it. With the change of power in 1933, Mahler realised that he would need to leave Germany. After six weeks in Amsterdam, Mahler spent the academic year 1933–1934 in Manchester under a fellowship secured by Mordell. He spent most of the next few years in the Netherlands until returning to the University of Manchester in 1937, where he remained for twenty-five years. After that, with the exception of a few years hiatus in the United States of America, he was an Australian mathematician.[3]

Mahler and number theory in Australia

Under the invitation of B.H. Neumann, in 1962, Mahler visited Australia, and in particular, the then quite new Australian National University (ANU). He was impressed enough to quickly join the ANU as a Professor in its Institute of Advanced Studies. As Mahler recollects,

> There was at this time no teaching of number theory in the undergraduate school (School of General Studies) at the ANU. I therefore gave a course on this subject to second and third year students at the SGS, probably the first one ever in Canberra. One of my undergraduates, Coates, asked me to introduce him to research. I provided him with problems to work on, and by the time he obtained his BSc, he had already several papers published or in print.
>
> [Kurt Mahler, as quoted from [20]]

One gains much more appreciation for Mahler reading his student's view of the same time.

> Mahler was also very concerned with sowing the seeds of his own mathematical knowledge in his new country. As in his own mathematical research, he instinctively felt that the best way to do this was to go back to first principles, and to begin by teaching beginners in the subject. The ANU had begun to award undergraduate degrees only a few years before Mahler arrived, and Hanna Neumann was appointed to head the new Department of Mathematics in the teaching side of the University (the School of General Studies) at about the same time that Mahler took up his chair. Between them, they arranged for Mahler to give two courses to the small number of undergraduates reading mathematics, one in 1963 on elementary number theory, and the second in 1964 on the elliptic modular function $j(z)$. One of us had the good fortune to attend these courses. Mahler started and finished each lecture with extraordinary punctuality; in between, the audience was given a rare insight into his understanding of and enthusiasm for the material of the lecture. As he spoke, he would produce a beautiful written exposition on the blackboard of the key points, which were neatly placed in order in his characteristic rectangular boxes. Although he seemed at

[3]There are numerous biographies of Kurt Mahler, which are extremely well written. Thus we will not dwell too much on this here. See [2], [3], [6], [8], [19], [20], [23].

> first so different and forbidding, we soon discovered that he was very willing to talk about his knowledge of mathematics in general, and to lend us his own mathematical books when we could not find them in the library. Mahler gave lectures at various summer schools in Canberra and elsewhere around Australia, as well as a number of advanced courses on transcendental number theory in the Institute of Advanced Studies. In the end the fascination of what he was doing beguiled us both into research in number theory, and we made our first steps in mathematical research on problems suggested by him.
>
> [John Coates and Alf van der Poorten, as quoted from [5]]

These two students are well known to those of us in number theory, and many of us beyond. John Coates went on to become a Fellow of the Royal Society and was Sadleirian Professor of Pure Mathematics at Cambridge from 1986 to 2012. Soon after Mahler moved to Australia, at the encouragement of George Szekeres, Alf van der Poorten visited Mahler regularly in Canberra. A friendship based at first on a common interest in science fiction[4] turned quickly into a mathematical relationship. Van der Poorten became Mahler's doctoral student, graduating[5] in 1968. Alf van der Poorten went on to positions at the University of New South Wales and then Macquarie University, both in Sydney.

Van der Poorten[6] continued Mahler's legacy of number theory in Australia, both mathematically in a very interesting and important collaboration with John Loxton, and as a mentor and supporter of young Australian mathematicians.[7] One such instance remembered by a former young Australian mathematician goes as follows.

> I first encountered Alf's unique style when I was a member of the Australian International Olympiad (IMO) team and we came across his wonderfully entertaining paper on Apéry's proof of the irrationality of $\zeta(3)$. I assumed from his name that he was Dutch, and was then pleasantly surprised when I met Alf at the IMO team send-off reception and to find that he lived and worked in Sydney! He then and there told me what the p-adic numbers were and immediately offered me a job at any time in the future! I took him up on his offer at the end of my first year at Melbourne University, and spent six weeks in his office annex learning about elliptic curves, the Riemann–Roch theorem, the Weil conjectures,

[4]This is entirely evident from the correspondence between Mahler and van der Poorten. The amount of space devoted to science fiction is roughly asymptotic to that devoted to mathematics.
[5]Alf van der Poorten was enrolled as a student at the University of New South Wales, not at the ANU.
[6]There is a comprehensive biography on van der Poorten's life and work written by David Hunt [7] in the *Number Theory and Related Fields, In memory of Alf van der Poorten, Based on the proceedings of the international number theory conference, Newcastle, Australia, March 12–16, 2012* [1].
[7]In keeping with van der Poorten's avid support of young Australian mathematicians, in his memory, his family funds the *Alf van der Poorten Travelling Fellowships*, which aim to assist young pure mathematicians (who have earned a PhD in Australia) in travelling in Australia and overseas so that they can enrich their mathematical research through contact with other mathematicians.

> and, of course a lot of great stuff about recurrence relations (Skolem–Mahler–Lech) and continued fractions. I have always appreciated the time he spent talking to me—it was clear he cared a great deal about young Australian mathematicians.
>
> [Frank Calegari, as quoted from [7]]

Mahler's contribution to number theory in Australia continues today, beyond his work and the work of his students and colleagues, in the *Mahler Lectureship* of the Australian Mathematical Society.

Every two years, the Australian Mathematical Society honours Mahler's legacy by awarding a distinguished lectureship in his name.

> The Mahler Lectureship is awarded every two years to a distinguished mathematician who preferably works in an area of mathematics associated with the work of Professor Mahler. It is usually expected that the Lecturer will speak at one of the main Society Conferences and visit as many universities as can be reasonably managed.
>
> [Australian Mathematical Society website: http://www.austms.org.au/]

The phrase *visit as many universities as can be reasonably managed* is not taken lightly. This year's Mahler Lecturer was Akshay Venkatesh of Stanford University. Professor Venkatesh gave 16 talks in 19 days at 10 different universities throughout Australia. Giving so many talks in that amount of time is a difficult task. Include the 10 000+ kilometres of travel within Australia in addition to the 24 000 kilometres just to get to and from Australia from Stanford and the Mahler Lectureship starts to sound like a daunting thing to accept (Akshay, if you are reading this, we all thank you heartily). Of course, Venkatesh grew up in Perth, so presumably he knew what he was getting into.

Former Mahler Lecturers comprise a marvellous group: John Coates (1991), Don Zagier (1993), Michel Mendes France (1995), Peter Hilton (1997), John H. Conway (1999), Robin Thomas (2001), Hendrik Lenstra (2003), Bruce Berndt (2005), Mark Kisin (2007), Terence Tao (2009[8]), and Peter Sarnak (2011).

The Mahler Archive

The way most of us interact with Mahler's legacy is now through his work. With the advent of the digital age, looking up papers is a much easier task than in previous times. With this in mind, we have made the Kurt Mahler Archive freely available online (see the first part of this article for the details and URL). It contains (in PDF format) every mathematical article published by Mahler, as well as a host of links to biographies and other information. His books are listed, but are not available through the Archive.

[8] In 2009, the lectureship was organised in partnership with the Clay Mathematics Institute, so the lecture tour that year was known as the Clay–Mahler lectures.

Mathematically, it is quite easy to point out various highlights from Mahler's work. We do so here, hitting only a few of which we think are exceptional. Of course, this view is biased by our interests. For a more thorough list of topics see Mahler's 'Fifty years as a Mathematician' [18] or the obituaries by Cassels [3] or van der Poorten [23].

1. In [10], Mahler introduced a measure of the quality of approximation of a complex transcendental number ξ by algebraic numbers. For any integer $n \geq 1$, we denote by $w_n(\xi)$ the supremum of the real numbers w for which
$$0 < |P(\xi)| < H(P)^{-w}$$
has infinitely many solutions in integer polynomials $P(x)$ of degree at most n. Here, $H(P)$ stands for the naïve height of the polynomial $P(x)$, that is, the maximum of the absolute values of its coefficients. Further, we set
$$w(\xi) = \limsup_{n\to\infty} \frac{w_n(\xi)}{n}.$$
According to Mahler, we say that ξ is an
   - S-number, if $w(\xi) < \infty$;
   - T-number, if $w(\xi) = \infty$ and $w_n(\xi) < \infty$ for any integer $n \geq 1$;
   - U-number, if $w(\xi) = \infty$ and $w_n(\xi) = \infty$ for some integer $n \geq 1$.

   The terminology S-number may have been chosen to honour Siegel. Almost all numbers, in the sense of Lebesgue measure, are S-numbers, and Liouville numbers are examples of U-numbers. The existence of T-numbers remained an open problem for nearly forty years, until it was confirmed by Schmidt [21, 22]. An important point in Mahler's classification is that two algebraically dependent transcendental numbers always fall in the same class.
2. One of the first significant contributions of Mahler is an approach, now called 'Mahler's method', yielding transcendence and algebraic independence results for the values at algebraic points of a large family of power series satisfying functional equations of a certain type. In the seminal paper [9] Mahler established that the Fredholm series $f(z) = \sum_{k\geq 0} z^{2^k}$, which satisfies $f(z^2) = f(z) - z$, takes transcendental values at any nonzero algebraic point in the open unit disc.
3. Concerning specific *transcendence results*, in [12] Mahler proved that *Champernowne's number*
$$0.12345678910111213141516\cdots$$
is transcendental and is not a Liouville number. Champernowne had proven it normal to base ten a few years earlier.
4. Mahler [15] was also the first person to give an *explicit irrationality measure* for π. He showed that if p and $q \geq 2$ are positive integers, then
$$\left|\pi - \frac{p}{q}\right| > \frac{1}{q^{42}}.$$

This bound built off of work from his previous paper [14], where he showed that $\|e^n\| > n^{-33n}$, where $\|x\|$ is the distance from x to the nearest integer. It is still a very interesting and open question as to whether or not there is a $c > 0$ such that $\|e^n\| > c^{-n}$.

5. Concerning Diophantine equations, in [11] Mahler provided finiteness results for the number of solutions of the so-called *Thue–Mahler equations*. In particular, he showed that if $F(X, Y) \in \mathbb{Z}[X, Y]$ is an irreducible homogeneous binary form of degree at least three, b is a nonzero rational integer and $p_1, \ldots, p_s$ $(s \geq 0)$ are distinct rational prime numbers, then the equation

$$F(x, y) = bp_1^{z_1} \cdots p_s^{z_s},$$

in

$$x, y, z_1, \ldots, z_s \in \mathbb{Z} \quad \text{with} \quad \gcd(x, y) = 1 \quad \text{and} \quad z_1, \ldots, z_s \geq 0,$$

has only finitely many solutions. The case $s = 0$ was proved by Thue, corresponding to Thue equations. Mahler was the first to see the importance of extending results in Diophantine approximation to include p-adic valuations as well as the ordinary absolute value.

6. Mahler also made outstanding contributions to the theory of polynomials with integer coefficients. In [16] and [17], he introduced what is now called the *Mahler measure* of a polynomial. A celebrated open question is Lehmer's problem (from an article of 1933) asking, in different words (!), whether there exists $c > 1$ such that the Mahler measure of a non-cyclotomic polynomial is always at least c.

Lehmer's Problem. *Let* $P(X) = a_d X^d + \cdots + a_1 X + a_0 = a_d(X - \alpha_1) \cdots (X - \alpha_d)$ *be a polynomial with integer coefficients. Its Mahler measure* $M(P)$ *is defined by*

$$M(P) = |a_d| \prod_{i=1}^{d} \max\{1, |\alpha_i|\}.$$

Does there exist a positive real number ε *such that if* $M(P) < 1 + \varepsilon$*, then all the nonzero roots of* $P(X)$ *are roots of unity?*

7. One of the most famous contributions of Mahler in geometry of numbers is his compactness theorem, established in 1946 in [13]. This is a criterion for the existence of a convergent subsequence of lattices in a sequence of lattices in the n-dimensional space, *which may be said to have completely transformed the subject.* The last words express Cassels' opinion on page 136 of his monograph [4].

Conclusion

Here we have highlighted only a few of Mahler's many mathematical contributions. We apologise if we have left out your favourite, but in this case, we encourage you to find its original paper in the Archive and enjoy Mahler's own words about it; we hope that you find them in a language with which you are familiar, though this may not be the case. Indeed, like many mathematicians during Mahler's active years (1927–1988), he wrote in several languages. Using the Archive as our data, we found that he published papers in his native German, as well as in English, Italian, Dutch, Russian, and even Chinese!

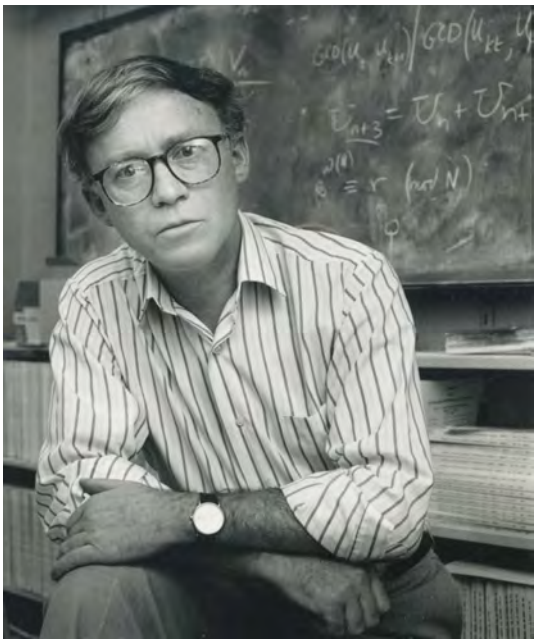
Mahler's interest in Chinese led him to do more than write just one paper in the language. Mahler felt so strongly that students should attempt to learn Chinese and be able to at least read mathematically in the language that while on his hiatus from Australia at Ohio State University, he suggested that Chinese be taught to graduate students in mathematics. As the story goes, he was asked who could they ever find to teach such a course? He then answered that he would do it! And indeed, Mahler gave this course. For those interested, his lecture notes, 'Lectures on the reading of mathematics in Chinese', can be found on the Archive in the Collection under the year 1972.

One can only speculate that Mahler saw the dawn of the Asian century coming. Indeed, there is a *Mahler–Needham collection*[9] at the ANU housing Mahler's Chinese mathematics collection. Joseph Needham (1900–1995) was the leading western sinologist of the past century and there was a considerable correspondence between the two concerning Volume 3 (Chinese mathematics) of Needham's 28-volume opus *Science and Civilisation in China*.

In addition to Mahler's formal mathematical work, we found some very interesting private writings of his. In particular, much of his correspondence with Alf van der Poorten survives. It is evident from what we have been given that Mahler and van der Poorten had a tremendous correspondence relationship, which as described a bit before, centred around mutual interests in science fiction and mathematics. These letters reveal more about the man. In a letter dated 1 March 1985, Mahler mentions his thoughts about the Riemann hypothesis and a purported proof then circulating.

> It will be a pity if the proof of Riemann's conjecture turns out to be incomplete. As you know, I am not convinced that RC is true. The numerical results go only to a limit which is relatively small when we think of numbers like $10^{10^{10}}$.
>
> [Kurt Mahler, to Alf van der Poorten on 1 March 1985]

[9]See http://anulib.anu.edu.au/about/collections/spcoll.html.



Alfred (Alf) Jacobus van der Poorten (1942–2010)

More so than in Mahler's papers, in his correspondence with van der Poorten, we find that Mahler was deeply interested in computational mathematics, and specifically what is more commonly thought of today as *experimental mathematics*.

> I am interested in the problem of whether there are squares of integers which, to the base $g = 5$, have only digits 0 or 1. I could not find a single example although I went quite far on my calculator. Strangely, to the base $g = 7$ I obtained the one example $20^2 = 1111(7)$, and I am now seeing whether there are others.
>
> [Kurt Mahler, to Alf van der Poorten on 15 February 1988]

Even in his last letter, the day before his death, Mahler was doing mathematics, lamenting that he was too old to learn to program well!

> If I were ten years younger, I should also try to learn [to] handle big computers. But I have used only programmable calculators which I found very convenient. In the calculations for Squares to the base 3 I used mostly a TI 59 with printer and so could get my results. I have now also a H-P 28c calculator which works to 12 places. Unfortunately the manuals that come with this machine are far too short and badly arranged. So far I have not yet been able to construct on it a program which allows [me] to express a given integer or real numbers to the base $g \geq 2$, something I could do on the TI 59.
>
> The problem of the representation of squares to the base $g \geq 5$ seems quite hard, and I hope you have more success with it than I. It would be appropriate to consider the following more general problem.

> 'Let $f(x)$ be a polynomial in x with integral coefficients which is positive for positive x. Study the integers x for which the representation of $f(x)$ to the base $g \geq 3$ has only digits 0 or 1.'
>
> Here it may be sufficient to assume that the highest coefficient of $f(x)$ is a power of g, and that f is of the second degree. For polynomials of the first degree we settled this problem in our joint paper.
>
> [Kurt Mahler, to Alf van der Poorten on 24 February 1988]

Kurt Mahler remained a mathematician's mathematician until the very end.

> May his theorems live forever!
>
> [Paul Erdős, remembering Mahler in [6]]

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Yann Bugeaud is Professor of mathematics at the IRMA (Institut de recherche mathématique avancée) at the University of Strasbourg. His current interests include Diophantine approximation, transcendence and distribution modulo one. He has written two research monographs.

Michael Coons is Lecturer of mathematics and an ARC Research Fellow at the University of Newcastle, Australia. He can usually be found working in arithmetic functions, transcendental number theory, or Diophantine approximation, specifically in the context of Mahler's method.

ANZIAM awards

Winner of the 2014 ANZIAM Medal

The ANZIAM Medal is the premier award offered by ANZIAM. It is presented biennially.

The ANZIAM medal is awarded on the basis of a combination of research achievements, activities enhancing applied or industrial mathematics or both, and contributions to ANZIAM. This year, it was bestowed upon Professor Kerry Landman, Department of Mathematics and Statistics at the University of Melbourne.

Citation for the 2014 ANZIAM Medal

Left to right: Larry Forbes, Bob Anderssen and Kerry Landman

Professor Kerry Landman is an Applied Mathematician committed to cross-disciplinary research. She graduated with a PhD from the University of Melbourne in 1979, and subsequently has acquired a distinguished publication record with a total of 116 peer-reviewed papers in highly regarded international journals. Her research reflects a life-time career devoted to the development of Applied Mathematics in Australia, and in particular to the application of mathematical modelling to industrial, environmental, biological and medical areas. The excellence of her research career and her long-standing support for ANZIAM and its aspirations form the basis for the award of the ANZIAM Medal.

Research excellence

Professor Landman has made fundamental and significant contributions to the understanding of physical and biological processes across a remarkably broad spectrum of applications. She has successfully exploited a wide variety of mathematical techniques, and has pioneered their use in numerous disparate applications. Her work encompasses:

- *Modelling biological cell invasion* which has provided a fundamental understanding of the embryonic development of the nervous system in the intestine. She and her collaborators have made major advances to the understanding of Hirschsprung's Disease. Her work in the mathematical

modelling has provided much insight and has greatly clarified how the disease is caused.

- *Mathematical study of patterns on growing domains* is a current research topic of considerable moment. While previous studies had been limited to slow growth, Kerry has pioneered the study of cell migration patterns on rapidly growing domains. These results have crucial implications to understanding and mitigating embryonic developmental defects.
- *Discrete cellular automata models* has been one of her research topics since 2007. Kerry together with Professor Barry Hughes and their group have made significant advances in understanding the average properties of agent-based models through the approximating partial differential equations.
- *Industrial applications* have continued to motivate her principal research activities in Applied Mathematics. Her work, jointly with Professor White, has made fundamental contributions to predicting the performance of solid–liquid separation processes (gravity thickeners and pressure filters) and to characterising fundamental material properties of solid–liquid systems. This particular work has made a significant contribution to environmental waste management, water treatment and minerals processing. Her research has developed a generalised approach to the understanding and prediction of solid–liquid separation procedures, and she has developed new numerical techniques to handle the difficult moving interfaces that evolve in flocculated suspensions.

Exemplary leadership in science

In summary, Professor Kerry Landman has established and led research collaborations across engineering, industry and biological fields for over 30 years. She has a proven record of achievement in the advocacy and public promotion of mathematics through partnership building and collaboration. As a role model, she has demonstrated influence across the scientific community.

While an ARC Australian Professorial Fellow 2008–2012, she was also an Invited Speaker at the 2011 International Congress for Industrial and Applied Mathematics (ICIAM) in Vancouver, being the sole invitee from our region. Professor Landman is an exceptional supervisor of higher degree students in the mathematical sciences. To date, she has supervised nine Doctoral students and ten Post-Doctoral appointments, many of whom have gone on to successful careers in academe and industry. Many of her students are women, who she has encouraged and mentored.

She has an exemplary record of leadership in a generation of collaborative research programs; this is particularly demonstrated through her role as the Director of the Mathematics-in-Industry Study Group (MISG) during the period 1993–1997. As Director, she provided strong leadership to the Applied Mathematics community, bridging the interface between the University of Melbourne and the community, and expanding the mathematics profession's public profile through extensive media coverage. She played a large role in developing MISG into the professional organisation that is today recognised nationally and internationally.

Her Curriculum Vitae shows much other service to Applied Mathematics and the ANZIAM organisation, including membership of the ANZIAM Journal Editorial Board since 2010. Over her career Professor Kerry Landman has been a constant supporter of ANZIAM, and she is recognised for the excellence of her numerous presentations at the ANZIAM conferences.

For all these contributions, Professor Kerry Landman is to be awarded the ANZIAM Medal for 2014.

Winner of the 2014 J.H. Michell Medal

The J.H. Michell Medal is awarded annually by ANZIAM to at most one outstanding new researcher who has carried out distinguished research in applied or industrial mathematics within Australia and New Zealand. At the recent ANZIAM Annual Meeting, the 2014 J.H. Michell Medal was awarded to Dr Ngamta (Natalie) Thamwattana.

Citation for the 2014 J.H. Michell Medal

Dr Ngamta (Natalie) Thamwattana has made pioneering contributions in the areas of granular materials and nanotechnology. Natalie was awarded her PhD in 2005 for her work on exact solutions and analysis of important industrial granular flows, such as discharge from hoppers. Soon after that, Natalie was a co-founder of the Nanomechanics Group at The University of Wollongong. Her work in that area involves the interaction of atomic and molecular nanostructures, producing accurate and simply expressed analytical results for calculations that had previously been attempted only by numerical methods.

Natalie has published 60 fully refereed research articles in journals including *Proceedings of the Royal Society of London Series A*, *Physical Review B*, *Physical Review E*, *Journal of Physics: Condensed Matter*, *Journal of Nanoparticle Research*, *Quarterly Journal of Mechanics and Applied Mathematics*, *Journal of Mathematical Chemistry* and *Philosophical Magazine*. In addition, Natalie has published 11 conference papers and a book chapter and is co-author on a provisional patent. So far, Natalie has supervised five PhD students to completion.

Natalie has been a wonderful ambassador to potential and current students for science and mathematical studies. In 2009, she presented a subject, 'Mathematics for Nanotechnology' at the AMSI Summer School. In a similar vein, Natalie has served on the Australian Mathematical Society committee for early-career researcher events and has coordinated three such events. In 2011, Natalie was chair

of the NSW ANZIAM Branch and also organised a function for women in mathematics at the annual meeting of the Australian Mathematical Society. Currently, Natalie chairs the AustMS selection committee for Lift-Off Fellowships and Van der Poorten Travelling Fellowships.

Having two young children has not stood in the way of Natalie's achievements during her early career. She goes about all her work with great insight and displays infectious enthusiasm. Dr Ngamta Thamwattana is a worthy recipient of the J.H. Michell Medal.

TM Cherry Prize

Alona Ben-Tal presents the awards to David Khoury (left) and Matthew Chan (right)

A student prize was introduced in 1969 at Victor Harbor, and is awarded annually to the best student paper presented at the Conference. In May, 1976, ANZIAM (then the Division of Applied Mathematics) adopted the title TM Cherry Student Prize in honour of one of Australia's leading scientists, Professor Sir Thomas MacFarland Cherry, Kt, Sc.D., F.A.A., F.R.S. Mr David Khoury (University of New South Wales) and Mr Matthew Chan (University of Sydney) were awarded the TM Cherry Prize for the best student talks at the ANZIAM 2014 Conference for their talks 'Removal of Malaria Parasites by an Infected Host' and 'Modelling the Spread of a Deliberate Wolbachia Introduction' respectively.

The AF Pillow Applied Mathematics Top-up Scholarship

The AF Pillow Applied Mathematics Trust offers an annual 'top-up' scholarship to a student holding either an Australian Postgraduate Award (APA) or equivalent award for full-time research in Applied Mathematics leading to the award of a PhD. The aim of the AF Pillow Applied Mathematics Top-up Scholarship is to increase the quantity and quality of postgraduate students in the field of applied mathematics in Australia. Ms Audrey Markowskei (Macquarie University) was awarded the AF Pillow Applied Mathematics Top-up Scholarship for 2014.

John Croucher
University Teacher of the Year

Statistician and longstanding AustMS member, John Croucher, Professor of Management at the Macquarie Graduate School of Management, was presented with the Prime Minister's Award for University Teacher of the Year by Senator Scott Ryan on 19 November 2013.

The award has a value of $50 000, and is the premier university teaching award in Australia. It is made to an academic with 'an exceptional record of advancing student learning, educational leadership and scholarly contribution to teaching and learning'. This is Professor Croucher's fourth National Teaching Award, previous ones being in 2006, 2007 and 2012.

John Croucher with Senator Scott Ryan

The citation from the Office for Learning and Teaching reads as follows.

> For over 35 years Professor John Croucher has been a leading statistician and educator with an international reputation for excellence and innovation. Embracing a philosophy of making statistics relevant and transformative, John is a national and international multi-award winner for his superior learning, innovation, teaching skills, community outreach and research.
>
> Professor Croucher is also a prolific author and much of his work is directed to the improvement of learning and teaching at all levels. He was awarded the prestigious Distinguished Alumni Award from Macquarie for bringing scientific methods, not only to thousands of students, but also to over one million readers of his weekly newspaper column. In 2009 he voluntarily instigated a community outreach program for the Indigenous students in Papua New Guinea where he designed and lectured in a creative pioneer MBA degree. For his outstanding achievements John was made a Visiting Professor and awarded an honorary PhD for his 'outstanding contribution to the development of humanity'.

General Algebra and its Applications 2013

La Trobe University, Melbourne

15–19 July 2013

Marcel Jackson*

Summary

This workshop and conference was built around the celebration of the retirement and 65th birthday of eminent Australian algebraist Professor Brian Davey. It was the first major international event in the area of universal algebra (also known as general algebra) to be held in Australia. The themes are based around interactions of universal algebra with disciplines such as semigroup theory, logic and computer science. In particular, universal algebraic tools have been very successful in classifying the complexity of constraint satisfaction problems, and contributions to this were a particular focus. The list of invited speakers includes the world leaders in these connections.

Organising committee

- Marcel Jackson (La Trobe University), Chair
- James East (University of Western Sydney)
- Tomasz Kowalski (La Trobe University)
- George McNulty (University of South Carolina)
- Todd Niven (La Trobe University, Monash University)

Topics covered

Universal algebra, semigroup theory, ring theory, computational mathematics, algebraic methods in constraint problems, theoretical computer science, category theory.

Special presenters

- Libor Barto (Charles University in Prague)
- Andrei Bulatov (Simon Fraser University)
- David Clark (SUNY New Paltz)
- Igor Dolinka (University of Novi Sad)
- Peter Jipsen (Chapman University)
- Marcin Kozik (Jagiellonian University)
- Andrei Krokhin (Durham University)
- Miklos Maroti (Bolyai Institute, Szeged)
- Ralph McKenzie (Vanderbilt University)
- Hilary Priestley (Oxford University)

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- Mikhail Volkov (Ural Federal University)
- Ross Willard (University of Waterloo)

Full-length talks were also given by Brian Davey, and by George McNulty.

Report

The event *General Algebra and Its Applications* (GAIA2013) took place at La Trobe University's Franklin Street city campus over the five days 15–19 July 2013. This event was supported financially by La Trobe University, AMSI and the Australian Mathematical Society, and celebrated Brian Davey's retirement and 65th birthday. Fittingly, there were exactly 65 successfully registered participants, 46 of whom were international participants, visiting from 20 countries covering Asia, Europe, North America and Africa.

The event included 14 longer plenary workshop talks giving overviews and big-picture synopses of current research in a range of fields in and around universal algebra. Amongst the topics covered were

- duality theory,
- axiomatisability and equational logic,
- Maltsev conditions,
- semigroups and idempotents,
- evolutionary computing and universal algebra,
- complexity of constraint satisfaction problems, and other constraint-based computational problems,
- computational mathematics in universal algebra.

Accompanying the 14 longer talks, were a further 28 shorter contributed talks, again demonstrating a breadth of research in universal algebra, orders and lattices, semigroup theory, ring theory, category theory, computational mathematics, logic interactions, and theoretical computer science. One highlight was the announcement of a major new contribution toward the resolution of a cherished

theory problem in universal algebra (the Park-Jónsson problem). This, along with history and proof overview, was the content of Willard's talk: the proof itself was finalised only days before the start of GAIA2013.

The program also included a problem workshop which was held during Tuesday lunchtime. This two-hour session was aimed at the presentation and discussion of unsolved problems and ideas that might reasonably serve as future research directions for postgraduate students and early career researchers.

Brian Davey has written numerous songs at and about algebra conferences, and many students and colleagues have enjoyed and/or endured singing sessions at meetings and seminars. GAIA2013 was no exception, with 23 limerick verses written by Brian and other participants and performed in an epic close to the event.

A special issue of the journal *Algebra Universalis* has been attached to GAIA2013. The issue is open to general submissions in honour of Brian Davey, but will accommodate the breadth of research covered in GAIA2013. The problem list created during the problem workshop will also be included in this issue.

Organisers' opinion of success

The original funding application estimated budget on the basis of 40 participants including invited speakers, 12 either AustMS members or from AMSI institutions and 6 students. In the end there were 65 genuine registrants, 19 AustMS or AMSI members and 13 students. One registrant did not physically attend due to worsening illness, but paid registration, and was scheduled to present via Skype, health permitting. This participant was sent the conference booklet and bag as well as a get-well-soon card signed by the physically attending participants.

The large number of registrants forced the five-day event to include parallel sessions, which we had originally hoped to avoid. Nevertheless, we were able to maintain a breadth of content that ensured good attendance within parallel sessions.

Aside from the resounding success in registration numbers, the conference had a great feel, with a number of participants indicating an enthusiasm for further conferences in the future or for future visits. Both the organising team, and the birthday celebrator were extremely happy with the event.

6th Australia-China Workshop on Optimization: Theory, Methods and Applications

Guillermo Pineda-Villavicencio*

Summary

Optimization is a field of mathematics with numerous contemporary applications, and the 6th Australia-China Workshop on Optimization provided an opportunity to showcase recent advances. It was held at the University of Ballarat on 28 and 29 November 2013, sponsored by the University of Ballarat and the Australian Mathematical Sciences Institute (from the Australian part), and by the Chongqing Normal University and Shanghai University (from the Chinese part). A full list of the sponsors appeared on the workshop website (http://federation.edu.au/faculties-and-schools/faculty-of-science/school-of-science-and-technology/research/conferences-and-workshops/the-6th-australia-china-workshop-on-optimization-theory,-methods-and-applications) and in the delegate packs. So did full details of the workshop program, including abstracts of all the talks. There were 41 registered participants, including two keynote speakers: Professor Joe Dong (University of Sydney) who spoke about Intelligent Systems for Power System Security Assessment, and Professor Kok Lay Teo (Curtin University), who spoke about A Free Terminal Time Optimal Control Problem. Another 20 speakers gave invited short talks of 30 minutes each. The topics of the talks ranged from the theory of mathematical programming and optimisation to their applications to fields as diverse as traffic management, electricity grids, cell division, and scheduling problems.

Participants came not only from six Australian and four Chinese universities, but also from CSIRO, NICTA and Chile. Fifteen participants were students, who took good advantage of the opportunities provided by the workshop. The program occupied two full days, with no parallel sessions, thus enabling participants to hear everything of interest to them and have stimulating discussions during the breaks.

The workshop provided, at no cost for each participant, morning tea, lunch and afternoon tea for both Thursday 28 and Friday 29 of November, one ticket to the conference dinner on Thursday, and one ticket to the social activity. We look forward to the 7th Workshop, to be held at Chongqing Normal University.

Organising committee

1. Andrew Stranieri (University of Ballarat)
2. Zhiyou Wu (Chair, University of Ballarat)
3. Musa Mammadov (University of Ballarat)
4. Julien Ugon (University of Ballarat)

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5. David Yost (University of Ballarat)
6. Regina Burachik (University of South Australia)
7. Guillermo Pineda-Villavicencio (Secretary and Treasurer, University of Ballarat)
8. Vera Roshchina (University of Ballarat)

Social activities

The social activities consisted of a buffet dinner on 28 November at the Ballarat Regional Multicultural Council and a day trip to the Grampians National Park on Saturday 30 November.

Delegate feedback

We did not conduct a comprehensive feedback survey, but informal discussions suggested it was a useful forum for both learning about a broad spectrum of recent developments, and providing a springboard for future collaboration. One delegate, Associate Professor Sanming Zhou (University of Melbourne), wrote afterwards 'It was a nice workshop that I enjoyed very much'.

László (Laci) György Kovács

1936–2013

Laci Kovács arrived in Australia in October 1963 to take up a position as Fellow in the newly-created Department of Mathematics in the Research School of Physical Sciences at the Australian National University in Canberra. Laci quickly adapted to living in Australia and became a citizen as soon as he could. He was rapidly promoted to Senior Fellow, a position he held till his retirement in 2001. He continued his association with the ANU as a Retired Visiting Fellow (in the Mathematical Sciences Institute) until his sudden death on 28 July 2013 during a visit to Brisbane for a family birthday. Laci was a very talented mathematician. He was a problem-solver and communicator par excellence. Laci was fortunate to be able to make a career exercising these talents. He amply repaid that good fortune in a generous and unassuming way.

Laci was born on 18 August 1936 in Budapest, Hungary, as the first child of József, who was a theologian and a minister in the Reformed (Calvinist) church and Erzsébet (Bertók) who was also a theology graduate. Both his parents had done further study of theology in Scotland. His maternal grandfather was a bishop in the Reformed Church at Munkács (now Mukacheve). His other grandfather was a school teacher. Laci is survived by two siblings who live in Hungary. In 1941 József became a pastor in Munkács when his father-in-law retired. In 1944 the Soviet Union took over Munkács and Laci had to go to a Ukrainian elementary school. It was there he was drawn to mathematics by seeing a goniometer. Its use was explained to him as a reward for doing his Ukrainian homework. In 1949 József became a pastor in Debrecen, which had been the centre of the Reformed Church in Hungary.

From 1950 to 1954 Laci attended the Gymnasium (grammar school) of the Reformed Church in Debrecen. There he expanded his interest in, and skills at doing mathematics through KöMaL (the Mathematical and Physical Journal for Secondary Schools), which had been founded in 1894 and was circulated monthly

to schools in Hungary. These skills were further enhanced through regular extra-curricular sessions provided by some of the mathematicians at the university, including the algebraists Tibor Szele and Andor Kertész. Laci had solutions published in KöMaL from 1951. With another student he wrote a half-page in KöMaL encouraging other young people to take part in such activities. In 1954 he became one of the prizewinners in the Kürschák competition, a famous competition started in 1894 whose winners included people like Szegő, Haar, Fejér, Riesz, and Teller. During his school years Laci developed a love for opera, music and literature. He learnt English privately. Before entering university he was awarded an Honorable Mention in the Miklós Schweitzer Memorial Competition, on which the Sydney University Mathematical Society Problem Competition is modelled.

Laci went on to study mathematics, physics and education at the Lajos Kossuth University in Debrecen. He continued to be successful in the Schweitzer competition gaining outright first prize in 1954 and sharing first or second prize in 1955, 1956 and 1957. Quite a few of his solutions were published, illustrating that he had already developed a polished style of presentation. At university Laci was strongly influenced by Szele and Kertész. His research career began as an undergraduate leading to a paper on regular rings and one on abelian groups. Sadly Szele died in 1955 at a young age. Laci wrote an obituary in KöMaL. Kertész also died quite young. At a meeting in Debrecen to mark the 80th anniversary of Kertész' birth, Laci presented a warm tribute to his mathematical and personal guidance. Laci completed his studies in 1958, qualified to be a secondary school teacher of mathematics and physics.

At the university, Laci was a Demonstrator and Assistant in Mathematics. In the latter position he helped with editorial tasks for *Publicationes Mathematicae*. He proved to be outstanding at editorial detail. During his time there a Hungarian translation of Kuroš' influential Russian text on the theory of groups was prepared, together with the appendix written for the German edition by B.H. Neumann. Laci had a copy of the Hungarian edition in his office at ANU. It contains his editorial markings especially on the appendix.

Reading the appendix is most likely what drew Laci to seek to study with Bernhard Neumann in Manchester. He was able to do this in 1958 with support from a Research Studentship given to him by the University College of North Staffordshire, now the University of Keele. He lived in Keele for the first two years of his time in Britain and had James Wiegold as local supervisor. While at Keele he used his training to teach at a local secondary school for girls, Goudhurst College, to familiarise himself with English usage in school mathematics. His general English improved quickly. His written and spoken English became, apart from a slight accent, more fluent, wide-ranging and nuanced than many native speakers. This can be observed from his publications especially in the surveys.

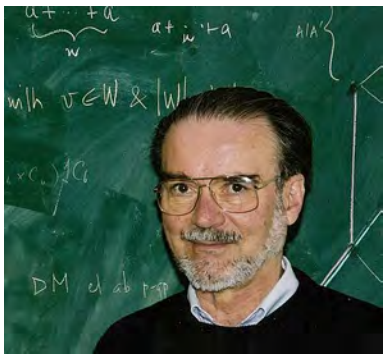
Laci spent the summer of 1960 in Tübingen in Germany studying under Helmut Wielandt.

After successfully completing a Master's degree with a thesis on *Groups with Regular Automorphisms of Order Four* and a doctorate with a thesis on *Groups with Automorphisms of Special Kinds*, Laci was appointed to be an Assistant Lecturer at the Victoria University of Manchester in 1960. He was promoted to Lecturer in 1963. He gave an invited address at the British Mathematical Colloquium in 1961.

The political turmoil in Hungary meant that Laci did not return there for about 20 years. After that he returned quite frequently. An honorary doctorate was conferred on him by the University of Debrecen in 2003. The citation notes, among other things, his long and continuing association with the University. He also resumed his editorial association with *Publicationes Mathematicae*; there is a tribute to him in Volume 83.

Laci came to ANU to work in a team being built by Bernhard Neumann. He proved to be a very good team player. During his long career at ANU he supervised about 20 doctoral students and had a strong influence on many other students. He gently encouraged young algebraists who held positions at ANU and interacted actively with visitors to ANU. This is shown by the long list of people with whom he wrote papers and the acknowledgements of his help in many other papers. He examined externally for higher degrees both nationally and internationally.

Visits overseas were an important part of working at the ANU. For Laci such visits included extended stays in New York; in Manchester and Oxford; in Milano, Padova and Firenze; in Debrecen; in Essen; and at the Mathematisches Forschungsinstitut at Oberwolfach in Germany under the Research in Pairs scheme. They also included many other meetings at Oberwolfach, two International Congresses of Mathematicians (Vancouver 1974, Berkeley 1986) and conferences/workshops in the UK, Germany, USA, Canada, Hungary, Ireland, Italy, Korea, Norway and New Zealand. On these visits he gave many seminar talks. Laci was a lucid and well-organised lecturer. He preferred to use blackboards and then to use them sparingly. He was an artist in this medium. He took care about what went on the board and where it was placed. He has been known to give a 40-minute lecture using just one well-constructed board. Laci was able to communicate mathematics clearly enough to allow discussion by phone. His phone could be engaged for longish periods.



In more recent years he taught at several summer graduate schools in Italy. In these he developed a great rapport with many of the students. To quote from just two of them who had continuing association with him: 'Laci has been much more than a supervisor or a friend for me, he has been something like a father, or

even more. His influence on me has been very strong in many respects, of course the scientific one, but this is certainly not the most important.' 'Laci's life is an inspiration for many of us.'

Laci was a problem solver rather than a theory builder, though of course he often turned the art into science. He brought with him to Australia, and disseminated, the problem solving and expository skills he had learnt in Hungary. His research was characterised by his approach to problem solving and the clarity and care of his reporting of the results. This involved careful analysis of his arguments to reveal their essence and often to show the way forward to simpler and more general results. Here I can do no more than hint at some of his contributions. I should mention his ubiquitous use of lattice diagrams to guide and illustrate his thinking — such a diagram can be seen in the last photo.

In his last year in Manchester, Laci attended a course of lectures on varieties of groups by Hanna Neumann. These were preparation for her now well-known and influential monograph *Varieties of Groups*, which she wrote in Canberra. As that book shows, Laci played a significant role in improving our understanding of varieties in the 1960s. This was the subject of his invited address to the annual meeting of the Society in 1967. During the 1970s this successful era was summed up by Laci in several surveys. The one in a volume to mark Bernhard Neumann's 70th birthday was a timely and beautiful account. There has been only somewhat limited progress on varieties since then.

In the process of his work on varieties, and other problems, Laci developed an excellent understanding of modular and integral representations of groups. He continued to develop his understanding of these representations and produced many useful results about them often stimulated by questions from others. He was attracted to other problems where his techniques could lead to worthwhile contributions. For example, his investigations into maximal subgroups of finite groups led to a definitive account of primitive permutation groups. This account underlies theoretical treatment of primitive permutation groups and the algorithms behind handling these groups in the computer algebra system Magma. His interest in representations drew his attention to modular Lie representations from the late 1970s. This went on to be the dominant topic of his research, in a team, from the mid-1990s. It had an emphasis on representations of general linear groups. However the highlight has been a complete decomposition theorem for Lie representations for a cyclic group of prime order p in characteristic p.

Laci often responded to questions with well-polished letters. A typical example is a letter to Charles Curtis on a lemma of Brauer which was published by the *Bulletin of the London Mathematical Society* on the advice of a perceptive editor. Some of his work appeared only in research reports at ANU; yet he published more than a hundred papers, over more than half a century, mostly on groups and Lie algebras and their representations. Among the others is a paper with John Burns on the bisection of a quadrilateral by a line through a vertex. This reflects his continuing love of problems in Euclidean Geometry and his work with beginners in mathematics.

As well as his research and teaching of graduate students, Laci from time to time taught undergraduate courses. Laci served many terms as acting head of the Department of Mathematics. He was a sound though somewhat reluctant administrator. Laci played a significant role in the organisation of three international conferences on the theory of groups: in 1965 — the first international conference in Australia on a mathematics topic — he was 'the tireless secretary', in 1973 and in 1989 — to mark B.H. Neumann's 80th birthday. He helped edit the proceedings of the first and single-handedly edited the proceedings of the third. He helped organise a Summer Research Institute of the Society on Algebra at ANU in 1978.

Laci wanted to spread the experience of doing mathematics that he enjoyed as a school student. So in 1965 he and I started a series of mathematics enrichment evenings for high school students in Canberra. He was active in these for more than 25 years. They still continue in other hands. He helped Peter O'Halloran with the founding of the Australian Mathematics Competition and with Olympiad activities. Laci was one of the first recipients of a BH Neumann Award for important contributions over many years to the enrichment of mathematics learning. For a number of years he taught at the AAMT-ANU Summer School for talented high school students.

Laci was founding Associate Editor for the *Bulletin of the Australian Mathematical Society* (1969–1979). Its early success in nearly meeting Bernhard Neumann's editorial dream of speedy publication was significantly enhanced by Laci's work in that role. The *Bulletin* has become an internationally respected journal. He was Associate Editor for non-commutative algebra for the *Journal of the Australian Mathematical Society Series A*. He served on the editorial board of *Publicationes Mathematicae* from 2001, that of *Communications in Algebra* (1985–1990), that of the *Journal of Group Theory* (1997–2001) and that of *Periodica Mathematica Hungarica* (from 1998). He was an advisor for the ANU subseries of the Springer *Lecture Notes in Mathematics*. His editorial expertise expanded to becoming an expert in TEX and its various dialects.

He was honoured with a special issue of *Journal of the Australian Mathematical Society* to mark his 65th birthday.

Laci married Alison Ashbrooke in England. They had three children, Ilona, Piroska and Michael. In the early 1970s Laci and Alison separated. He continued to take an active part in raising the children. In the early 1980s he found in Margaret Oates someone with whom he shared a deep love of music. They married and continued their concert- and opera-going together in many places around the world. Laci combined his interest in mathematics and in music by giving technical support to Margaret for lectures she has given and to many others with his expertise in hi-fi and recording. It was a great pleasure to him that Margaret also shared in his wider mathematics family. They were generous hosts to many mathematical visitors. Through Margaret, Laci expanded his appreciation of wine, food and art. These became an increasingly important part of their trips to Europe. He was particularly fond of the culture and people of Italy. He took an active interest in his grandchildren.

The sense of loss felt on his death is well summed up by his former student (now Sir) Michael Brady who wrote: 'I learned so much from Laci, only some of it from Mathematics. What a truly lovely, gentle man.'

Many, I in particular, will very much miss his love for and enjoyment at doing mathematics, his encyclopaedic knowledge and his sage and willingly-given advice. Sadly this document suffers from lack of his critical input.

I am indebted to and thank Laci's family: Margaret, his brother Peter and his son Michael, for help with the personal background; and others especially Csaba Schneider and George Berzsenyi for help with Hungarian background and Hungarian; and Cheryl Praeger and Ralph Stöhr for help with mathematics background.

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Lift-Off Fellowship report
On the periodicity of subtraction games

Nhan Bao Ho*

My PhD thesis is aligned with the field of combinatorial games. A combinatorial game is a two-player game in which the players move alternately with neither skipping nor cooperation. There is no hidden information and no element of luck, and so each player understands well the state of the game after each move. There is typically a finite number of moves, so the game must end. The player who makes the last move wins.

In my PhD research (under the supervision of Dr Grant Cairns at La Trobe University), I investigated several variants of the game known as Nim. Many questions had became apparent during this work and the Lift-off Fellowship gave me an excellent chance to expand my study.

My first task was to examine my conjecture on the periodicity of subtraction games. A subtraction game involves a pile of tokens and a finite set S. Two players take turns to move, removing a number of tokens from the given pile, provided that this number belongs to S. It is well known that subtraction games are ultimately periodic [4]. However, there has not been a comprehensive solution for the periodicity of subtraction games, even with 3-element subtraction set S.

In my early work [2], I conjectured from the computation that the periodicity of the nim-sequence of a subtraction game and that of the winning/losing state coincide. The conjecture proposes a link to the periodicity of octal games in which subtraction games form a special subclass. Many attempts were made on this conjecture. I also gave a talk on this conjecture at SIAM Conference on Discrete Mathematics (Dalhousie University, June 2012). The conjecture was disproved recently, based on counterexamples found by Grant Cairns. For example, in the subtraction game with $S = \{4, 6, 11, 14\}$, the period of winning/losing state is 17 while the period of nim-sequence is 34. A further draft of this article was submitted for publication.

With the support of the fellowship, I was able to expand my work on another game called Max-Welter. The paper was finally published in *Discrete Mathematics* [3].

During this fellowship, I also obtained some progress on solving a problem on Wythoff's game I proposed in my thesis. This resulted in an article [1], written

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jointly with Professor Aviezri S. Fraenkel. This work was presented in Integers Conference 2013 (University of West Georgia) and will be submitted for publication.

I gratefully acknowledge the support of the Lift-off Fellowship. It provided me a perfect boost after my PhD research.

References

[1] Fraenkel, A.S. and Ho N.B. When are translations of P-positions of Wythoff's game P-positions? Preprint.
[2] Ho, N.B. Subtraction games with three element subtraction sets. Preprint. Available at http://arxiv.org/abs/1202.2986v1.
[3] Ho, N.B. The Max–Welter game. (2014). *Discrete Math.* **318,** 41–47.
[4] Guy, R.K. (1991). *Fair game: How to Play Impartial Combinatorial Games*. COMAP, Arlington, MA.

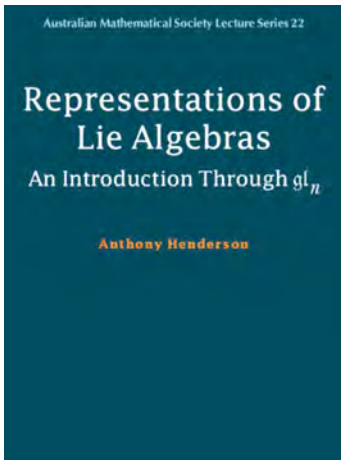
I completed my Bachelor of Science (Mathematics) in 2002 in Vietnam. From 2006 to 2007, I studied Master of Science and Technology Education at La Trobe University, with an honour thesis titled 'Completely positive maps for real and complex C*-algebras', under the supervision of Associate Professor Peter Stacey. I obtained my PhD degree in 2012, with a thesis titled 'Combinatorial aspects of variants of the game of Nim', under the supervision of Associate Professor Grant Cairns. I will finish my six-month Endeavor Research Fellowship at Monash University in August 2014 before returning to my home country to continue my teaching career at Quangtri Teacher Trainning College.

Book Reviews

Representations of Lie Algebras: An Introduction Through $\mathfrak{g}_n$

Anthony Henderson
Cambridge University Press, 2012, ISBN 978-1-107-65361-0

This 156-page paperback, by Anthony Henderson of the University of Sydney, is the latest in the Australian Mathematical Society Lecture Series, a series of research monographs and textbooks suitable for graduate and undergraduate students. The book is a worthy entry in the latter category, continuing the tradition of well-written innovative texts on advanced subjects.



The structures we now call Lie algebras originate in the work of Sophus Lie in the 1890s on the symmetries of systems of differential equations, and integration techniques for them. Lie called these groups of symmetries 'continuous groups'; the name 'Lie group' is due to E. Cartan in the 1930s. Lie studied n-dimensional complex representations of a continuous group G; that is, differentiable homomorphisms of G into the group of invertible $n \times n$ complex matrices. In general, these maps are non-linear and Lie's idea was to linearise by considering their projections into the tangent space of G at the identity. The result is a mapping of G into a subalgebra $\mathfrak{g}$ of the full $n \times n$ matrix ring Mat_n over $\mathbb{C}$ which preserves the operations, in the sense that if α, β in G map to a, b in $\mathfrak{g}$, then the product $\alpha\beta$ maps to the commutator $[a, b] = ab - ba$. Lie demonstrated the fundamental properties of this product, namely that $[a, a] = 0$ and $[a, [b, c]] + [b, [c, a]] + [c, [a, b]] = 0$. He showed that structural properties of G are reflected in algebraic properties of $\mathfrak{g}$, which Lie called an 'infinitesimal group' but which we now call a Lie algebra, this name being due to H. Weyl in 1934. Engel, Cartan, Killing, Weyl and Serre completed the structure theory of finite dimensional Lie algebras and their modules, and used the natural correspondence between representations of G and modules over its Lie algebra $\mathfrak{g}$ to classify representations of Lie groups. More recently, Lie algebras and their generalisations have found applications in areas far removed from Lie groups, such as free groups and general relativity theory.

This history presents a dilemma to those teaching Lie algebras to undergraduates, who might be expected to have adequate backgrounds in calculus, differential equations, linear algebra and group theory, but not in differential geometry and topological groups. The definitive texts, such as N. Bourbaki (*Lie Groups and Lie Algebras*) and J.E. Humphries (*Introduction to Lie Algebras and Representation*

Theory) are certainly unsuitable for such students. One possible solution is to ignore the historical motivation altogether, and just treat Lie algebras as algebraic structures in their own right. This is the route taken for example by N. Jacobson in his book *Lie Algebras*.

Henderson takes a different approach. Building on his students' mathematical background, he concentrates on a single Lie group $G = \mathrm{GL}(\mathbb{C}^n)$ and its associated Lie algebra $\mathfrak{gl}_n = \mathrm{Mat}_n(\mathbb{C})$ equipped with the commutator product. In doing so, he abandons any attempt to reach the peak of the theory: the classification of simple Lie algebras and their modules. Instead, he concentrates on arguments specific to $\mathfrak{gl}_n$, and the classification of $\mathfrak{gl}_n$-modules by their highest weights.

Using matrix calculations rather than axioms, he presents all the multilinear algebra and calculus required to describe the connections between G and $\mathfrak{gl}_n$, the description of $\mathfrak{gl}_n$ as the algebra of 1-parameter subgroups of G, and the relationship between group and algebra representations. Similarly, using terms familiar to students, he discusses the important subgroups of G, namely the special linear group $\mathrm{SL}(\mathbb{C}^n)$ and the special orthogonal group $\mathrm{SO}(\mathbb{C}^n)$ and their Lie algebras $\mathfrak{sl}_n$ and $\mathfrak{so}_n$.

Having established his type examples, Henderson is now free to present the axiomatic definition of Lie algebras, their algebraic properties, and a complete description of $\mathfrak{g}_n$ in the cases $n = 1,\ 2$ or 3. Before presenting the general theory of $\mathfrak{g}$-modules, he tackles the special case of the classification of modules over $\mathfrak{sl}_2$, with the theory always rooted in explicit matrix calculations. He introduces the machinery to deal with duality, tensor products, Hom-spaces, bilinear forms and Casimir operators and finally deals with integral modules over $\mathfrak{gl}_n$.

The final chapter is a précis of the important results in the theory of Lie algebras which are not covered in the text, in particular the classification of simple finite dimensional complex Lie algebras and their representations. It also includes an annotated bibliography of the important monographs in the subject.

The exposition is in the form of a well-honed course of 24 lectures, suitable as a text for a unit taught in 3rd and 4th year in Australian universities and as a preparation for studying the more advanced texts cited above. Each chapter is accompanied by exercise sets, and Henderson presents complete solutions to all the exercises. This may not accord with the wishes of many teachers who would otherwise be attracted to the text, but in fact most of the problems are an essential component in understanding the theory.

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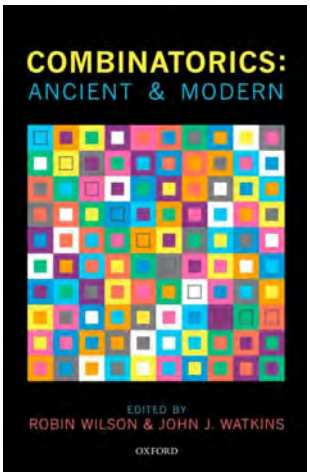
Combinatorics: Ancient and Modern

Robin Wilson and John J. Watkins (Eds)
Oxford University Press, 2013, ISBN 978-0-19-107-965659-2

Combinatorics is one of those areas of mathematics in which the logical development closely parallels the historical development. Counting and enumerating patterns occur in the earliest historical records, preceding set and numerical partitions and later magic squares and graphical designs. Thus a book which presents the subject chronologically will also present topics of increasing complexity.



This book is a survey of the fascinating history of combinatorics from enumeration of arrangements of letters or symbols in early Indian and Chinese manuscripts to such recent developments as Redfield–Pólya pattern counting, the 4-colour theorem, Ramsey theory and algorithmic graph theory.

Individual chapters have been contributed by 16 authors, all experts in their field, as well as being noted expositors. The introduction by Donald E. Knuth is an overview of 2000 years of combinatorics, from the earliest lists of binary 6-tuples found in the Chinese *I Ching*, through the poetic metres of sacred Vedic chants and classical Greek poetry, the permutations of all sets of 5 of the 22 Hebrew consonants found in kabbalistic literature, melodic patterns of 6 notes possible in an 8-note scale in early Christian music, calculations of 5×5 determinants in 16th Century Japan, the combinations achievable by rolling several dice, the enumeration of trees by Cayley, up to the development after 1950 of electronic computers which changed our perception of what 'difficult' means.

The introduction is followed by seven more-detailed chapters on early combinatorics, beginning with combinations and permutations in early Sanskrit texts by Takanori Kusuba and Kim Plöfker, in Chinese divinatory practices by Andrea Bréard, in the Islamic world by Ahmed Djebbar, in rabbinical commentaries by Victor J. Katz, in Europe of the Renaissance and early modern period by Eberhard Knobloch, and on to the so-called Pascal's triangle and its many precursors, by A.W.F. Edwards.

The later chapters trace the subsequent story, from Euler's contributions to topics such as partitions, polyhedra and Latin squares to 20th Century advances in combinatorial set theory, block designs, enumeration and graph theory. The authors include Robin Wilson, one of the editors of the volume, Norman Biggs, E. Keith Lloyd and Lowell Beinecke. George E. Andrews' chapter on the history of numerical partitions from Leibniz, Euler and Sylvester to Ramanujan is particularly striking. The book concludes with some combinatorial reflections by Peter J. Cameron.

This is a well-designed and produced volume, superbly illustrated and, in the words of the cover blurb by Ronald Graham, 'the first time that such a compilation has been attempted and in the opinion of this reader, it succeeds brilliantly'.

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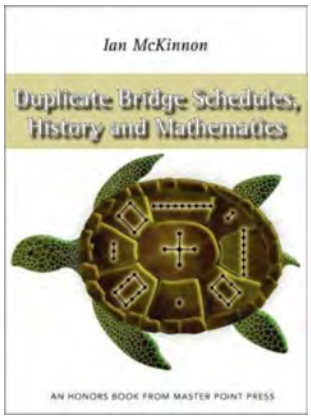
Duplicate Bridge Schedules, History and Mathematics

Ian McKinnon
Oxford University Press, 2013, ISBN 978-0-19-107-965659-2

The author, Ian McKinnon, started a degree in mathematics in the 1960s but then discovered a passion for bridge which led to him giving up on his studies. Soon Ian also became a tournament director, and this book is his labour of love joining his interests in mathematics and bridge.



The main audience for this book will undoubtedly be tournament directors. Parts of the book are of interest to amateur bridge players who play in pair or team tournaments (this reviewer used to play in tournaments but now just plays casual rubber bridge with colleagues). For those unfamiliar with tournament bridge, it should be explained that in rubber bridge there can be a large element of luck depending on whether you are dealt good or poor hands. A well-run tournament seeks to eliminate this chance by designing the sequence of games so that the exact same hand is played over and over by different players. The hands are carried from table to table using boards. At the end of the event, the players can then be compared fairly as (ideally) they have all played the same hands and their relative performance on the hands can be fairly assessed.

This book is very long (over 420 pages), and most of it is fairly technical as it exhaustively lists the optimal movements for any number of pairs/teams and for all kinds of tournaments.

Such information is only likely to be of interest to directors. The author has studied extensively the mathematical literature on the topic of bridge tournaments, some of which is relatively recent. He also has extensive knowledge of the history of bridge movements which is comprehensively explained. The author himself has done a lot of research on fair movements, and some of the listed sequences are ones of his own invention.

Where the maths comes into the topic of bridge tournaments is in the discussion of what 'best' means in the context of movements (a movement describes at what table the players sit and which boards they play, at each round). In an ideal world one would want to compare players who have played exactly the same hands, so that luck is completely eliminated and the result fair. Unfortunately, in practice this is not always possible, but a tournament should aim to be as fair (balanced) as possible. Part 6 of the book discusses this topic in detail, making use of Balanced Incomplete Block Designs (the same that are also used in statistical experiments). Latin squares (or variations thereof) and mutually orthogonal Latin squares also often show up, mostly to describe movements and a brief introduction to them is given in Part 1 (this part even covers magic squares and Sudoku, as an introduction to Latin squares).

As far as the mathematics goes, it is interesting, but the notation often caused me much head-scratching and I found the definitions/explanations often too informal (his definition of isomorphic Latin squares is one that comes to mind in this context). As a pure mathematician I found this a little unsettling! For this reason, in my opinion, mathematicians who are not bridge players are unlikely to find much in the book to be of interest.

The Appendices contain, among other things, some papers on the mathematics of bridge tournaments reproduced in their entirety, some discussions on self-orthogonal Latin squares, block designs and even on golf tournament problems!

Another element of interest for the curious bridge player is a comprehensive history of tournaments (Part 2) and how the idea of removing the luck factor emerged in the middle of the 19th century. This story actually starts with whist before moving to bridge. It is instructive to learn of the different systems used in practice (they did not think of the boards to carry cards from table to table right away!). There are a lot of pictures of old boards, which I found entertaining.

So in conclusion, this book is a must-have for tournament directors, an interesting read (skipping some sections) for the bridge player eager to know more about how tournaments are organised and about the history of their beloved game. For those unfamiliar with bridge, this book is unlikely to be of much interest.

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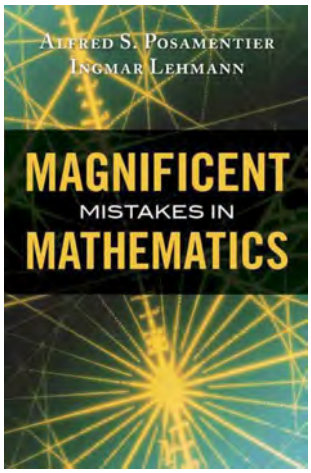
Magnificent Mistakes in Mathematics

Alfred S. Posamentier and Ingmar Lehmann
Prometheus Books, 2013, ISBN 978-1-61614-747-1

There are three sorts of mistakes in mathematics. The first, which I call Errors, are similar to typographical errors. They are due to lapses in concentration and include thinking one digit but writing another, transposing adjacent letters or numbers, omitting a minus sign or a bracket, inadvertently skipping lines when copying a proof and so on. A famous example occurred in William Shanks' 1874 calculation of a 707-digit approximation to π. He mistakenly wrote a 5 for a 4 in the 528th digit, thus throwing out many of the subsequent digits as well. Errors are characterised by the fact that they are, or should be, picked up by the author on careful re-reading, or by a later reader, as Shanks' error was. Thus although we nearly all make Errors from time to time, they cause no lasting harm.



The second sort of mistakes I call Fallacies. These are not normally present in the works of mature mathematicians, but they occur in abundance in students' homework. They include dividing by zero, taking square roots or logs of negative numbers, misusing the symbol ∞, geometrical reasoning based on faulty diagrams, over-reliance on calculators and misuse of algebraic operations on conditionally convergent real series. In short, Fallacies are based on careless use of algorithms whose hypotheses are not satisfied. They are usually not picked up by the perpetrators, but easily identified by more knowledgeable observers.

The final type of mistakes are called Magnificent Mistakes by the authors of the book under review. These are essentially Fallacies which occur at a much deeper level, and are uncommonly fruitful in the sense that when finally recognised, they lead to major advances in mathematics. For example, the Pythagorean belief that any two lengths have a common measure was fallacious, but led via Book 10 of Euclid to Dedekind's axiomatisation of the real numbers. Fallacious proofs of Euclid's parallel postulate led to non-Euclidean geometry. Cauchy's proof that pointwise limits of continuous functions are continuous led to the discovery of uniform convergence as well as formal rules for manipulating quantifiers. Other examples include the famous mistake in Poincaré's Prize paper on the 3-body problem, recognised by himself, which had notable repercussions in dynamical systems theory. Fallacious beliefs about factorisation of algebraic integers in number fields had major rôles in advancing algebra and number theory.

The title of the book under review led me to anticipate a broad survey of Magnificent Mistakes and their consequences, but unfortunately I was disappointed. Although the Introduction and the first chapter, entitled 'Noteworthy Mistakes by

Famous Mathematicians', promised much, the book delivered little. The authors state that mistakes were made and claim that they were fruitful; they do not always explain what precisely were the errors, how they were discovered, or what were the consequences. In several cases, the supposed mistakes were simply conjectures that turned out to be false.

The probable reason for this disappointing lapse is the intended audience of this book. Both authors are veteran mathematics educators, A.S. Posamentier at a small New York college, and I. Lehmann, retired from Humboldt University in Berlin, but still closely engaged in mathematics enrichment activities for secondary students. Their book, which requires no more than high-school-level competence, is aimed at school students and their mentors. The only mistakes dealt with in depth are obvious Fallacies, and here there is overkill. For example, there are a dozen examples of calculations leading to absurd results because they contain camouflaged divisions by zero. Similarly, there are numerous false results obtained by manipulating inconsistent linear systems, faulty conclusions from assuming that a pattern in an initial segment of a sequence of integers extends to a general rule and misdrawn diagrams leading to fallacious geometric conclusions. There are examples of fallacious reasoning in probability, and somewhat off-target, optical illusions.

Most of the Fallacies in this book are probably derived from howlers actually committed by the authors' own pupils, and students should certainly be warned of the pitfalls attending careless use of algorithms. While this publication contains many amusing examples which serve this purpose, it hardly fulfills the promise suggested by its title.

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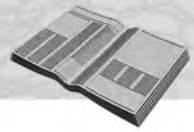

NCMS News

Nalini Joshi*

Journal Rankings?

Imagine you are being judged on your research. How would a colleague make this judgment? On what basis does a promotion or appointment committee in your department make this judgment? What about your University or Employer Organisation? How does the competitive granting body in your country judge your track record? You may like to believe that the truth of your research results makes an irrefutable case for you at each stage. I write this article to remind you that 'truth' varies with the eye of the beholder.

Judgment of quality in mathematical sciences relies on many elements. One element used in many scientific areas is *production rate*, i.e. the number of papers published by an author each year. Lower production rates are common in more abstract or theoretical areas of mathematics, but in areas directly related to applications, a larger production rate may be more common. While we can cite studies which show that the average production rate across all mathematical sciences is much less than one, the boundary between fields where they are much higher or lower is not easy to define. Many mathematicians would say that one paper that makes a huge impact across mathematics is much more important than production rate. At the same time, mathematical referees have been known to say a higher production rate in high-quality journals is a hallmark of research leadership. Such changeable criteria, expressed in different fields and by different people within the mathematical sciences, make our judgment of research quality appear subjective and, therefore, opaque to others.

To counter variable, apparently subjective criteria, Faculties, Universities, Research Funding Bodies seem to prefer what they call 'objective' measures. These are usually based on bibliometric measures, including citations, h-index, impact factor, MCQ, SciImago and Eigenfactor. The flaws and constraints of each of these measures are evident to anyone who has analysed them. A famous article showing the unreliability of the impact factor is *Nefarious Numbers* by Doug Arnold and Kristine Fowler, reproduced in the *Gazette* of the AustMS **38**(1) (2011) 9–16. The IMU/ICIAM/IMS publication *Citation Statistics*[1] by R. Adler, J. Ewing and Peter Taylor, describes the usage of citations in mathematics as 'naïve' and 'losing crucial information that is essential for the assessment of research'. The IMU report observes that most citations in mathematics are 'rhetorical', i.e. acknowledging an explanation or conversation rather than seminal invention of an idea.

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[1] http://www.mathunion.org/fileadmin/IMU/Report/CitationStatistics.pdf

For these reasons, as well as the lower numbers of papers published, we have been allowed to use peer review as a criterion for judging the quality of research in the 0101 Pure Mathematics Field of Research code in the ERA in Australia. But in the remaining mathematical fields of research codes, citation analysis was used, leading to results that do not appear to correspond to what most people in the mathematical sciences believe to be appropriate. AustMS has recommended to the ARC that citation analysis be used in combination with peer review for all 01 Mathematics Field of Research Codes.

To overcome some of the flaws of bibliometric measures, the IMU/ICIAM Working Group on the feasibility of ranking journals in mathematics[2] recommended that the IMU and ICIAM should implement a scheme to produce journal rankings that would be overseen by mathematicians around the world. The working group's report was published in *Gazette of the AustMS* **38**(5), November 2011, 241–250[3]. Unfortunately, the emotive nature of the responses ensured that the recommendations never got off the ground.

But, people and organisations around the world continue to use journal rankings, whether based on bibliometric data or peer review, whether we like it or not. The AustMS journal rankings (produced in 2009 for the first ERA) are still being used to judge the quality of mathematical output around the world. Individual journals use it to promote their quality, e.g. take a look at the website of the South East Asian Bulletin of Mathematics[4] . It is rare to see a case for promotion (or appointment) in Australia that does not include an enumeration of the AustMS ranking of journals in which the candidate published. People proudly proclaim their number of publications in A* or A journals and silently hope that those in B and C rated journals are ignored. The report of the IMU/ICIAM Working Group referred to above describes ranked lists of journals used in several countries around the world. I also recently learnt about the journal rankings in Chile[5].

Google Scholar, which has reported citations of scholarly references for a long time, now makes available lists of 'top publications' by research area. There are 26 subcategories under the heading Physics and Mathematics. Amongst these are categories such as Algebra, Geometry, Mathematical Analysis, Mathematical Physics, Pure and Applied Mathematics[6]. Unlike many of the other sources of bibliometric data, for which subscriptions are needed, these sources are freely available to anyone. Many use Google Scholar in addition to subscription-based services such as ISI Thompson to provide evidence for the impact of their research in applications for ARC grants.

[2]The group consisted of eight people from six countries and was chaired by the writer of this column.
[3]See also http://www.mathunion.org/Publications/reports-recommendations.
[4]http://www.seams-math.org/index.php?option=com_content&view=article&id=13&Itemid=46, accessed 26 January 2014.
[5]http://www.conicyt.cl/fondecyt/grupos-de-estudios/matematicas/criterios-de-evaluacion-curricular-concurso-regular-2013-matematicas/
[6]Click on Metrics at http://scholar.google.com and choose Physics & Mathematics. Subcategories are available below this category.

Whether you agree with these mechanisms or not, mathematical scientists in Australia are being ranked. Faculties now ask departments and discipline areas to provide criteria by which their staff members' research can be judged. Where departments make the case for research quality when low citation numbers may skew the argument, guess what they are providing to back up their judgments? Yes, you guessed it: the 2009 AustMS journal rankings. Journal rankings is a contentious issue. But it is not going to go away.

Nalini Joshi is the Chair of Applied Mathematics at The University of Sydney and was the President of the Australian Mathematical Society during 2008–2010. She was elected a Fellow of the Australian Academy of Science in 2008, became the Chair of the National Committee of Mathematical Sciences in 2011, and was elected to the Council of the Australian Academy of Science in 2012.

AMSI News

Geoff Prince*

Clouds on the PhD horizon

While our decadal planners are considering formal coursework requirements for Australian PhD programs in the mathematical sciences, doubts about the value of PhDs per se are being raised in government.

Concerns about the number and employability of PhD graduates have been around for a while (just search 'too many PhDs'). They vary from concern about the mismatch between academic and research jobs and graduate numbers, the employability outside academia of current graduates and the responsibility or otherwise of academics who are seen as using cheap labour to solve arcane problems. Little of this disquiet is based on solid evidence, mainly because we don't have much of it! Even today the absence of data and analysis won't stand in the way of a populist policy agenda. We need to think now about how we will answer the charge that we are training would-be academics with no long-term future in our universities.

At the end of January this year, Ron Sandland and I spent a couple of days in Canberra talking to senior public servants. Even though the new government's policies around science and innovation are still under development, it was clear from our discussions that industry demand is a key driver right now. Government subsidy to industry is off the table. In other words, if industry wants PhDs then government may aid supply. And, with doubts around the efficacy of PhDs, lack of industry demand may mean a reduction in supply. The irony is that the Australian private sector employs few research-trained staff by international standards (see the article by Alan Pettigrew[1]), itself both a reflection and cause of low demand, while accepted wisdom says that research drives innovation and productivity growth.

Now I am not in favour of the university sector rolling over once again in response to the sticks and carrots of government. But I am concerned that university mathematicians, and to a lesser extent statisticians, have not faced the fact that many of their PhD graduates and postdocs pursue non-academic research careers. I do believe that we care about their academic career paths. For example, we give our PhD students tutoring experience and we foster their communication skills. We give our postdocs lecturing experience and tutor their grant-writing skills. Most importantly, we encourage their publication in the best journals and their attendance at conferences. I don't think we do this through personal self-interest, and yet we make very little effort to prepare them for research outside the universities, their most likely destination. If we did, they would ALL be able to write and code algorithms, numeric or symbolic, and they would all be encouraged to take

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[1]Pettigrew, A.G. Australia's Chief Scientist, Occasional Paper Series 1, Issue 2 (May 2012). Australia's position in the world of science, technology & innovation. http://www.chiefscientist.gov.au/wp-content/uploads/OPS2-OECD-for-web-FINAL.pdf.

occasional courses in optimisation, encryption, financial mathematics or systems biology. The number of AMSI internships and enrolments in the ATN's Industrial Doctoral Training Centre would be a lot higher if we took a broader view of career preparation.

My point here is that in applying our deep concern for our students' careers more broadly we would not only help them but it would protect us from over-zealous university management cutting our HDR enrolments in response to signals from government.

At a discipline-wide level, I am pleased to say that a new initiative led by AMSI will grow and strengthen the connections between graduate education in the universities and research in our government agencies. As a direct result of the Maths of Planet Earth program last year DSTO, CSIRO, the ABS and the BoM along with 16 universities have agreed to start a network which will see agency researchers communicating directly with undergraduates, postgraduates and early career researchers. Specific outcomes are

- enhanced employment opportunities for our students
- better graduate recruitment outcomes for the agencies
- improved student retention into university maths and stats programs
- new joint research between agencies and universities in the mathematical sciences
- direct agency input into graduate programs
- greater involvement of the agencies in AMSI's workshop and flagship programs.

I hope that it will also mean greater involvement with the academic community, including the learned societies, of the many PhD graduates of ours who do and will undertake research outside of academia.

PhD training is fundamental to scholarship and we have to do all we can to maintain its currency.

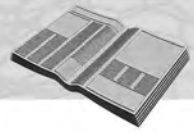
I completed a BSc (Hons) and secondary Dip Ed at Monash University in the 1970s and moved to La Trobe where I undertook a PhD in 1981 in geometric mechanics and Lie groups. I did a postdoc at the Institute for Advanced Study in Dublin.

I've taught at RMIT, UNE and La Trobe University, where I was Head of Department a couple of times in the last decade. I worked at AMSI from 2004 through to 2006 in part as executive director to Garth Gaudry and I oversaw the introduction of the AMSI/ICE-EM Access Grid Room project. I became AMSI director in September 2009.

My research interests lie mainly in differential equations and differential geometry and I work with friends in Europe: Mike Crampin, Willy Sarlet, Olga Krupkova and Demeter Krupka.

My partner is a mathematician and we have two children with a refreshing lack of interest in mathematics. On the margins I brew beer and ride a bike.

I'm a proud Fellow of the Society and am currently a Council member and a steering committee member.



News

General News

Federation University Australia

The University of Ballarat and the Gippsland campus of Monash University have merged, to form a new institution, Federation University Australia. The existing school structure will remain in place until the middle of 2014.

Effective Teaching, Effective Learning in the Quantitative Disciplines

The AustMS website is the home of the on-line professional development unit 'Effective Teaching, Effective Learning in the Quantitative Disciplines'. The unit was developed under an ALTC grant, by a project team of mathematicians, and is now in its fourth year. The unit will be coordinated from Macquarie University and La Trobe University in 2014.

The unit is available free to AustMS members. The modules are available for all to view; by formally enrolling and completing three assessment tasks, participants can receive a certificate of completion. By negotiation with your home institution, you may be able to substitute this discipline-based unit for more generic teaching-and-learning training that they require, or as one unit in a Graduate Certificate of Higher Education, as some participants have already done.

The unit is suitable both for tutors and lecturers. The assessment tasks must be completed when one is teaching a class, as they involve production of teaching and assessment materials and reflection upon them.

The unit will commence in late February for first semester participants. It is also intended to run in second semester. It can also be taken across both semesters.

Visit http://www.austms.org.au/Professional+Development+Unit for more information. The unit outline, which includes details of assessment, may be viewed there, or contact the coordinator, Dr Katherine Seaton (k.seaton@latrobe.edu.au).

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UK New Year Honours

Members may be interested to know that two friends of mathematics in Australia, Celia Hoyles and Frances Kirwan have become Dames Commander of the British Empire in the UK 2014 New Year Honours. Celia was AMSI keynote speaker at the 'Maths for the Future' forum and Francis has been a long-standing member of AMSI's Research Advisory Committee.

Completed PhDs

La Trobe University

- Dr Brett Stanley, *Dynamics and presentations of shift maps defined by orders*, supervisors: John Banks and Marcel Jackson.
- Dr Dilshani Tissera, *Confidence intervals in regression that utilize uncertain prior information about a vector parameter*, supervisors: Paul Kabaila and David Farchione.
- Dr Michael Malloy, *Contributions to meta-analysis for continuous response data*, supervisors: Robert Staudte and Luke Prendergast.

Macquarie University

- Dr Camell Kachour, *Aspects of globular higher category theory*, supervisors: Michael Batanin and Ross Street.

Monash University

- Dr Yu (Oscar) Tian, *The hybrid stochastic-local volatility model with applications in pricing FX options*, supervisor: Fima Klebaner.

RMIT

- Dr Chathuri Jayasinghe, *Nonparametric approach to reliability and its applications*, supervisors: P. Zeephongsekul and Yan Wang.

University of Melbourne

- Dr Leigh Humphries, *Effective solutions to problems in descriptive set theory*, supervisors: the late Greg Hjorth, Lawrence Reeves and Greg Restall.
- Dr Jose Ayala Hoffmann, *Classification of the homotopy classes and minimal length elements in spaces of bounded curvature paths*, supervisors: Hyam Rubinstein, Doreen Thomas and Marcus Brazil.

- Dr Yacov Salomon, *Unimodal density estimation with applications in expert elicitation and decision making under uncertainty*, supervisors: Peter Taylor, Michael McCarthy and Brendan Wintle.
- Dr Omar Ortiz Branco, *Schubert calculus for p-compact groups*, supervisors: Arun Ram and Craig Westerland.
- Dr Alan Simpson, *On some model comparison problems*, supervisor: Guoqi Qian.
- Dr James Woodcock, *Convective methods of pumping and drag reduction*, supervisors: Ivan Marusic and John Sader.
- Dr Jason Nassios, *Oscillatory flows of a slightly rarefied gas: a kinetic theory investigation*, supervisor: John Sader.
- Dr Callum Sleigh, *Eynard–Orantin theory of the A-polynomial*, supervisors: Paul Norbury and Arun Ram.

University of New South Wales

- Dr Alexandr Usachev, *Subclasses of Dixmier (singular) traces and related classes of measurable operators*, supervisors: Fedor Sukochev and Denis Potapov.
- Dr Stephen Maher, *The application of recoverable robustness to airline planning problems*, supervisors: Gary Froyland and Cheng-Lung Wu.
- Dr James Nichols, *Quasi Monte Carlo methods with applications to partial differential equations with random coefficients*, supervisors: Ian Sloan and Frances Kuo.

University of Sydney

- Dr Nigel Chan, *Uniform convergence on non-linear cointegrating regression*, supervisor: Qiying Wang.
- Dr Phillip Howes, *Geometry of Painlevé' equations and birational maps*, supervisor: Nalini Joshi.
- Dr Yinan Zhang, *p-adic verification of class number computations*, supervisors: Mark Watkins and Claus Fieker.

University of Wollongong

- Dr Ali Algarni, *Comparing worked examples and problem-solving methods in teaching mathematics to ESL students at tertiary level*, supervisor: Anne Porter and Carole Birrell.

Awards and other achievements

University of Adelaide

Mathai Varghese has been elected Fellow of the Royal Society of South Australia.

Deakin University

PhD student Ms Veelasha Moonsamy was awarded the (ISC)2 Foundation Women's Scholarship valued at $5250. (ISC)2 is dedicated to building the next generation of information security professionals through this scholarship program aimed at students from high school through post-graduate work and the Women's Scholarship is aimed at encouraging exceptional women to enter this exciting and growing field.

La Trobe University

- Professor Brian Davey has been made an Emeritus Professor, and a celebration dinner was held following the conferral in October.
- Nhan Bao Ho has won a 2014 Endeavour Research Fellowship.
- Reinout Quispel has received a three-year ARC DORA Fellowship, and a discovery grant with John Roberts through UNSW.

Monash University

- ARC DECRA: Dr Jennifer Catto, Dr Heiko Dietrich, Dr Greg Markowsky, Dr Mark Flegg.
- ARC Future Fellowships: Dr Daniel Price, A/Prof David Wood and Dr Julie Clutterbuck (joining Monash in July 2014).
- ARC Discovery: Dr Tim Garoni, Dr Greg Markowsky and Dr Andrea Collevecchio for their project entitled 'Finite Markov chains in statistical mechanics and combinatorics'.

Macquarie University

On 19 November 2013, Professor John Croucher was announced as the Prime Minister's University Teacher of the Year.

Queensland University of Technology

Recent ARC Category 1 grant outcomes include

- ARC Discovery Project $321 000 A/Prof Scott McCue (and others). Project Summary: Asymptotic analysis plays a vital role in studying the complex interfacial dynamics that are fundamental for practical problems in fluid mechanics such as the withdrawal of oil and gas from underground reservoirs and the optimal design of ship hulls to minimise wave drag. These applications exhibit extremely small physical effects that may be crucially important but cannot be described using classical asymptotic analysis. This project will develop state of the art mathematical techniques in exponential asymptotics to address this deficiency in the classical theory, and provide a deeper understanding of pattern formation, instabilities and wave propagation on the interface between two fluids.
- ARC Discovery Project $303 000 A/Prof Matthew Simpson and A/Prof Scott McCue (and others). Project Summary: Ghrelin is a recently discovered growth factor that regulates appetite and promotes tumour growth by enhancing cell invasion. The mechanisms by which ghrelin enhances cell

invasion are, at present, unknown. This innovative project will develop a new hierarchy of multiscale mathematical models that will be used to quantify how ghrelin modulates cell behaviour (motility, proliferation and death) and provide insight into the precise details of how ghrelin promotes cell invasion. This project will demonstrate the potential for ghrelin-based strategies to control cell invasion. By linking appetite regulation and tumour growth, the outcomes from this project will inform Australian health policy in this important area.

- ARC Future Fellowship $617 220 A/Prof Matthew Simpson. Project Summary: Cancer and chronic wounds are a national, and indeed, international health problem set to worsen as our population ages. Predictive and interpretive tools are required to improve our understanding of collective cell migration in relation to cancer and chronic wounds. This project will produce new validated mathematical tools for predicting collective cell migration in a general framework that can deal with application-specific details, such as the role of cell shape and cell size. Although cell shape and size are known to affect collective cell migration, standard mathematical models ignore these details. This project will produce new predictive mathematical modelling tools that are validated by new experimental data.
- ARC DECRA $389 564 Dr Petrus van Heijster. Project Summary: Defects, or heterogeneities, are common in nature and technology and therefore in mathematical models. This project will underpin the effects a defect can have on the dynamics of a model, characterise the new patterns created by a heterogeneity and see how the dynamics can be controlled by manipulating the heterogeneity. Moreover, these new insights will be applied to a model for skin cancer, resulting in a more appropriate model and a mathematically justifiable analysis of a very important scientific problem.
- ARC Centre of Excellence for Mathematical and Statistical Frontiers of Big Data, Big Models, New Insights! $20 000,000 Lead by Professor Peter Hall (UniMelb).

UNSW Canberra

- Jason Sharples and Harvi Sidhu were awarded an ARC Discovery Indigenous Grant (2014–2016) for their project 'Understanding the role of terrain geometry in eruptive bushfire behaviour'.
- Colin Simpson (UNSW Canberra) and Marwan Katurji (University of Canterbury, New Zealand) have been awarded an Intersect HPC Resource Allocation of 320 000 processor hours from the National Computing Facility, for their project entitled 'Numerical investigation of the impact of low-level jets on fire behaviour'.

University of Sydney

- Geoffrey Vasil was awarded a Discovery Early Career Researcher Award (DECRA) for 2014–2016.
- Samuel Mueller, Stephan Tillmann, and Ruibin Zhang were awarded Discovery Projects for funding commencing in 2014.

- Leo Tzou was awarded a Future Fellowship for 2013–2017
- Leon Poladian was awarded funding as a co-Chief Investigator for the Office for Learning and Teaching proposal 'Development and implementation of MathBench for Australian universities to improve quantitative skills of science and mathematics students'.
- Alex Molev was awarded a University Bridging Grant for 2014.

University of Western Australia

- Professor Cheryl Praeger has been elected Foreign Secretary of the Australian Academy of Science for four years from June 2014.
- S.P. Glasby, A.C. Niemeyer and C.E. Praeger were awarded ARC discovery project DP140100416, Finite linearly representable geometries and symmetry.

University of Wollongong

- Dr Jiakun Liu has been awarded a DECRA for his project 'Fully nonlinear partial differential equations in optimisation and applications'.
- Prof Song-Ping Zhu and Dr Wenting Chen have been awarded a Discovery Grant for a project entitled 'The effect of bans on short selling: a comprehensive study'.
- Dr Caz Sandison and A/Prof Annette Worthy were part of a successful OLT project led by Prof Merrilyn Goos and Prof Joseph Grotowski at the University of Queensland, entitled 'Inspiring mathematics and science in teacher education'.

Appointments, departures and promotions

University of Adelaide

- Melissa Tacy (Northwestern U.) has joined as Lecturer in Pure Mathematics.

La Trobe University

- Geoff Prince has been promoted to Professor at La Trobe University. He resigned from La Trobe University in January 2014, and will now be full time at AMSI. He will remain affiliated with La Trobe in an honorary capacity.
- Theodoros Kouloukas has been appointed as Research Officer until the end of 2014.
- Dimetre Triadis has finished a one-year appointment as Lecturer (Level B).

Monash University

- Dr Thomas Hall and Dr Boris Miller both retired from the School of Mathematical Sciences at the end of 2013, but remain in the school on adjunct appointments.
- Prof Louis Moresi has moved to a Research Professorship at University of Melbourne.
- Dr Jennifer Flegg has commenced as Lecturer. Jennifer's research interests include applying mathematical techniques to biological processes, such as wound healing, tumour growth and malariology. Other research interests include undergraduate mathematics education.
- Dr Mark Flegg has commenced as Lecturer. Mark's research interests are in applied mathematics, mathematical biology (cellular and developmental), modelling of particle and molecular kinetics and interactions, mathematical modelling of ultrasound.
- Dr Bernhard Mueller has commenced as Lecturer. Bernhard's research interests lie in the field of computational astrophysics with an emphasis on general relativistic hydrodynamics and neutrino transport in core-collapse supernovae.
- Dr Kay Shelton has commenced as Research Fellow. Kay's research interests include tropical meteorology, tropical cyclones, intraseasonal and interannual variability, weather in climate models.
- Dr Yi (Vivian) Huang has commenced as a Research Fellow. Vivian's areas of interest include cloud microphysics, remote-sensing and in-situ measurements of clouds and precipitation, numerical forecasting, boundary layer meteorology.
- Dr Alison Demaria has commenced as MAXIMA Program Manager. MAXIMA is the Monash Academy for Cross amd Interdisciplinary Mathematical Applications, and was launched in September 2013 (see *Gaz. Aust. Math. Soc.* **40**(5), p. 338).
- Ian Wanless has been promoted to Professor (Level E) with effect from January 2014.

University of Melbourne

- Aurore Delaigle has been promoted to Professor.

University of NSW

- Peter Brown has been promoted to Senior Lecturer.

Queensland University of Technology

- Professor Steven Stern joins us from the Australian National University, commencing this year as the Australian Bureau of Statistics Professor of Statistics.
- Dr Gentry White started his position as Lecturer in the School after previously working as a research fellow with Professor Tony Pettitt at QUT and prior to that in the Institute for Social Science Research at the University of Queensland.

- Dr Robyn Araujo commenced as Lecturer in February. Robyn joins us from the Center for Applied Proteomics and Molecular Medicine at George Mason University in Virginia, USA.

University of Melbourne

- Dr Alysson Costa has been appointed as Lecturer (Operations Research).
- Dr Charl Ras has been appointed asLecturer (Operations Research).
- Dr Steven Tobin has been appointed as Research Fellow.
- Dr Hassan Doosti has left the university.
- Dr Stephen Griffeth has left the university.
- Dr Martina Lanini has left the university.
- Dr Trevor Welsh has left the university.

University of New South Wales, Canberra

- New Visiting Fellow (Adjunct Professor) Bob Cechet is working with Jason Sharples on bushfire-related projects.

University of Southern Queensland

- Dr Christine McDonald has been promoted from Level B to C.
- Dr Trevor Langlands has been promoted from Level B to C.
- Dr Jamie Shield has been promoted from Level B to C.
- Associate Professor Linda Galligan has been promoted from Level C to D.

University of Sydney

- David Ivers has been promoted to Associate Professor.
- Emma Carberry has been promoted to Senior Lecturer.
- Peter Kim has been promoted to Senior Lecturer.
- Sheehan Olver has been promoted to Senior Lecturer.
- John Ormerod has been promoted to Senior Lecturer.
- James Parkinson has been promoted to Senior Lecturer.
- Stephan Tillmann has been promoted to Senior Lecturer.

University of Western Australia

- Dr Neil Gillespie left his position of Research Associate in October 2013 to take up a position at the University of Bristol, UK.
- Dr Miccal Matthews commenced on 6 January 2014 as Assistant Professor.

University of Wollongong

- Professor Song-Ping Zhu has been appointed Head of School.
- Dr Glen Wheeler has been appointed to a continuing position.
- Dr Marianito Rodrigo has been promoted to Senior Lecturer.
- Dr Shuaian Wang has completed probation and been been confirmed as Lecturer.
- Dr Nathan Brownlowe has had his fixed-term contract confirmed.

New Books

Deakin University

Batten, L.M. (2013). *Public Key Cryptography: Applications and Attacks*. John Wiley, Hoboken, NJ.

Flinders University

Avrachenkov, K.E., Filar, J.A. and Howlett, P.G. (2013). *Analytic Perturbation Theory and Its Applications* Society for Industrial and Applied Mathematics, Philadelphia, PA. (See http://www.ec-securehost.com/SIAM/OT135.html.)

University of New South Wlaes

Lord, S., Sukochev, F. and Zanin, D. (2013). *Singular Traces: Theory and Applications* (Stud. Math. **46**). de Gruyter, Berlin.

Conferences and Courses

Conferences and courses are listed in order of the first day.

Statistical Modelling and Analysis in Big Data Workshop

Date: 24 February 2014
Venue: QUT
Website: http://nanos2013.qut.edu.au

Big data is now endemic in business, industry, government, environmental management, medical science, social research and many other fields. One of the challenges is determining how to effectively model and analyse these data. This workshop brought together international experts in statistical modelling and analysis of big data, to share their experiences, approaches and opinions about future directions in this field.

Program and abstracts

The workshop program (http://nanos2013.qut.edu.au/downloads/big_data_workshop_program.pdf) featured speakers from Australia, the UK and the USA, drawn from universities, research institutions and government agencies.

Computational & Algorithmic Topology

Date: 2–4 April 2014
Venue: The University of Sydney
Website: http://www.maths.usyd.edu.au/u/tillmann/cats2014

Speakers

- Mark Bell (University of Warwick)
- Ben Burton (The University of Queensland)
- Nathan Dunfield (University of Illinois at Urbana-Champaign)

- Stefan Friedl (University of Regensburg)
- Joachim Gudmundsson (The University of Sydney)
- Joan Licata (Australian National University)
- Jessica Purcell (Brigham Young University)
- Hyam Rubinstein (The University of Melbourne)
- Saul Schleimer (University of Warwick)
- Jonathan Spreer (The University of Queensland)

Synopsis

This workshop at the University of Sydney will bring together experts and emerging researchers from Australia, the USA and Europe to report on recent results and explore future directions in computational and algorithmic topology. There will be a focus on problems in low-dimensional geometry and topology, and on the development of practical algorithms and their implementation. This is an area with an abundance of computational and algorithmic challenges, where practical solutions to many solvable problems, such as the homeomorphism problem, remain elusive.

Five of the ten speakers develop freely available software to assist in their theoretical research or in the analysis of their algorithms and computational techniques. This workshop aims to stimulate interaction between researchers in order to bring about new collaborations on difficult problems that cannot be tackled from one viewpoint alone.

Registration: Please register by emailing stephan.tillmann@sydney.edu.au.

Constructive Optimisation

Date: 16–17 April 2014
Venues: 16 April, Federation University Australia, Ballarat
17 April, RMIT University, Melbourne
Website: http://constructiveoptimisation.wordpress.com/

This two-day workshop is being held in honour of Professor Vladimir Demyanov's 75th birthday. It will be an intensive working meeting focussed on Nonsmooth Optimisation and adjacent fields, areas in which Australia is making a growing and visible international contribution. The main goal of this workshop is to connect researchers from adjacent areas, promoting discussion, new collaborations and introducing early-career researchers and students to different perspectives and directions of research in the field.

Professor Demyanov has made an immeasurable contribution to the field of nonsmooth optimisation, and his pioneering constructive techniques have made a significant impact on optimisation research in Australia. He has been working with a number of prominent Australian researchers, from Federation University, UNSW, RMIT, Swinburne and elsewhere. In particular, some of his most significant contributions to the field were made in collaboration with the late Professor Alex Rubinov.

If you are interested in participating, please contact us via the contact form on the website, or email us at constructiveoptimisation@gmail.com.

Cell Based and Individual Based Modelling (CBIBM

Venue: Pullman Cairns International, Cairns
Date: 10–12 June 2014
Web: http://www.cs.ox.ac.uk/conferences/CBIBM/

Deadline for abstract submission: 7 March 2014.

This is the final call for abstracts for presentation at this workshop. The workshop will be taking place as part of the 2014 International Conference on Computational Science in Cairns, Australia, and covers all aspects of cell-based and individual-based modelling and simulation, from methodological or tool developments through to applications of cell-based models.

2014 AMSI Winter School on Contemporary Aspects of Cryptography

Venue: University of Queensland
Date: 7–18 July 2014
Website: http://mathsofplanetearth.org.au/2014-winter-school/

GAGTA8: Geometric and Asymptotic Group Theory with Applications

Date: 21–25 July 2014
Venue: Newcastle, Australia
Web: https://sites.google.com/site/gagta8/

This 2014 edition of the highly successful conference series, GAGTA will take place in Newcastle Australia. GAGTA is a series of conferences organised periodically, since 2005, by researchers in Group Theory all over the world.

For more information, please see the website, or *Gazette* 40(5), pp. 353-354.

Workshop in Harmonic Analysis and its Applications

Date: 21–25 July 2014
Venue: Macquarie University
Web: http://rutherglen.science.mq.edu.au/ha2014/

This workshop will bring together leading international and Australian researchers as well as early-career researchers and PhD students, in Harmonic Analysis and related areas. For further details, see the website, or *Gazette* 40(5), p. 354.

International Congress of Mathematicians

Date: 13–21 August 2014
Venue: Seoul, Korea
Website: http://www.icm2014.org/

Note that the abstract submission deadline for the SEOUL ICM 2014 has been extended to 14 March 2014.

Registration will be available onsite, but discounts are offered for Advance Registration (by 10 July 2014) and early Advance Registration (by 10 May 2014).

38th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing

Date: 1–5 December 2014
Venue: Victoria University of Wellington, New Zealand
Web: http://msor.victoria.ac.nz/Events/38ACCMC

Contributed talks to the 38th ACCMCC will be sought from all areas of discrete and combinatorial mathematics and related areas of computer science.

The invited speakers are

- Mike Atkinson (University of Otago)
- Simeon Ball (Universitat Politècnica de Catalunya)
- Alice Devillers (University of Western Australia)
- Jaroslav Nesetril (Charles University)
- Sergey Norin (McGill University)
- James Oxley (Louisiana State University)
- Andrew Thomason (University of Cambridge)
- Mark Wilson (University of Auckland)
- Stefan van Zwam (Princeton University)

At this stage, the website contains only basic information. Information will be added as we get closer to the start date, so bookmark the page now. A further announcement will be made when registration opens. Please email queries to the head of the organising committee, Dillon Mayhew (dillon.mayhew@msor.vuw.ac.nz).

8th Australia–New Zealand Mathematics Convention

Date: 8–12 December 2014
Venue: University of Melbourne
Web: http://www.austms2014.ms.unimelb.edu.au/

This is a joint Australia–New Zealand meeting, incorporating the 2014 Australian Mathematical Society meeting and the 2014 New Zealand Mathematics Colloquium. The 2014 ANZAMP annual meeting will also be incorporated into this meeting as a special session.

Plenary speakers

- Rosalind Archer (University of Auckland, NZ)
- Mark Gross (University of California, San Diego, USA)
- John Hearn (RMIT, Australia), ANZIAM Lecturer
- Nicolas Monod (École Polytechnique, Switzerland)
- Robert Penner (Caltech, USA and Aarhus, Denmark)
- Jill Pipher (Brown University, USA)
- Nicolai Reshetikhin (University of California, Berkeley, USA)
- Hyam Rubinstein (University of Melbourne, Australia)

- Nina Snaith (University of Bristol, UK), Hanna Neumann lecturer
- Mariel Vazquez (San Francisco State University, USA)

Director: P.T. Norbury (University of Melbourne)

Vale

Peter Derrick Finch

Emeritus Professor Peter Derrick Finch, the Foundation Professor of Mathematical Statistics at Monash University, passed away at the age of 85 on 4 January 2014. A more detailed obituary appears on the Monash website, http://monash.edu/news/show/vale-peter-finch.

Visiting mathematicians

Visitors are listed in alphabetical order and details of each visitor are presented in the following format: name of visitor; home institution; dates of visit; principal field of interest; principal host institution; contact for enquiries.

Prof Edward Bierstone; Toronto; 10–31 March 2014; pure; USN; Laurentiu Paunescu

Toralf Burghoff; University of Jena, Germany; 2 April 2013 to 31 March 2014; UOM; Kostya Borovkov

Dr Pavel Chigansky; The Hebrew University, Israel; 1 October 2013 to 30 September 2014; probability, stochastic processes, nonlinear filtering, control and stability; MNU; Kais Hamza

Mr Romain Couvreur; Écol Normale Supérieure, France; 1 February to 1 August 2014; UMB; Paul Pearce

A/Prof Nathan Dunfield; University of Illinois, USA; 3 February to 20 April 2014; UMB; Craig Hodgson

Dr Lance Fiondella; University of Massachusetts, USA; April to August 2014; computer science; RMIT; P. Zeephongsekul

Prof Martin Hazelton; Massey University, New Zealand; 10–14 February 2014; UWA; Adrian Baddeley and Gopal Nair

Ms Hong Diem Huynh; Cantho College, Vietnam; three weeks in April/May 2014; optimisation; FedUni; Alex Kruger

Prof Bruno Iochum; University of Provence; 21 April to 11 May 2014; mathematical physics; UWG; Adam Rennie

A/Prof Hanna Jankowski; York University, Canada; 9 August 2013 to 30 June 2014; UMB; Peter Hall

Prof Phan Quoc Khanh; Vietnam International University; three weeks in April/May 2014; optimisation; FedUni; Alex Kruger

Dr Uli Kraehmer; University of Glasgow; 22 March to 6 April 2014; noncommutative algebra; UWG; Adam Rennie

Prof Elena Kulinskaya; University of East Anglia, UK; 28 January to 30 April 2014; UMB; Richard Huggins

Hou Lvlin; National University of Defense Technology, PR China; 11 November 2013 to 11 November 2014; UWA; Michael Small

Prof Dugald MacPherson; University of Leeds; 7–28 February 2014; UWA; Cheryl Praeger

Hans D. Mittelmann; Arizona State University; March 2014; optimization; FedUni; Adil Bagirov

Yolanda Moreno; University of Extremadura; June 2014; functional analysis; FedUni; David Yost

Tanmoy Paul; Indian Institute of Technology, Hyderabad; 16 May to 15 July 2014; functional analysis; FedUni; David Yost

Priyia Prunglerdbuathong; Chulalongkorn University, Thailand; 2–8 March 2014; optimisation; FedUni; David Gao

Prof Jessica Purcell; Brigham Young University; 21 December 2013 to 20 August 20 2014; UMB; Craig Hodgson

Mr Fazli Rabbi; 31 January to 31 July 2014; stats; USN; Samuel Mueller

A/Prof Jakob G. Rasmussen; Aalborg University, Denmark; 10–14 February 2014; UWA; Adrian Baddeley and Gopal Nair

Sergey Semin; Nizhny Novgorod State Technical University, Russia; 21 September 2013 to 10 July 2014; ocean wave dynamics in the coastal zone; USQ; Yury Stepanyants

Mr Mikael Slevinsky; University of Alberta, Canada; 7 February 2014 to 31 May 2014; applied; USN; Sheehan Olver

Mr Wei Wu; UNSW; 30 July 2012 to 30 June 2015; financial maths; USN; Ben Goldys

A/Prof Yuezhu Wu; Changsu Institute of Technology; 1 October 2013 to 30 September 2014; Lie superalgebras; USN; Ruibin Zhang

Binzhou Xia; Peking University; 1 September 2012 to 20 March 2014; UWA; Cai Heng Li

Assoc Prof Jin-Xin Zhou; Beijing Jiaotong University; 16 November 2013 to 16 November 2014; UWA; Cai Heng Li

Prof Paul Zinn-Justin; Centre National de la Recherche Scientifique, France; 10 February to 20 April 2014; UMB; Jan de Gier

Nominations sought for the 2014 AustMS Medal

As announced in the November *Gazette*, the Medal Committee for the 2014 Australian Mathematical Society Medal is now seeking nominations and recommendations for possible candidates for this Medal, which will be awarded to a member of the Society, under the age of forty, for distinguished research in the Mathematical Sciences.

For further information, please contact (preferably by email) the Chair of the 2014 Medal Committee, Professor K.A. Smith-Miles, School of Mathematical Sciences, Monash University, PO Box 28M, Victoria 3800 (kate.smith-miles@monash.edu). Nominations should be received by 30 May 2014.

The other three members of the 2014 Medal Committee are Professor J.A. Filar (Outgoing Chair), Professor N.C. Wormald (Incoming Chair) and Dr L. Ward (one year).

The rules can be found at http://www.austms.org.au/The+Australian+Mathematical+Society+Medal+-+rules and a list of past winners appears at http://www.austms.org.au/AMSInfo/medal.html.

Nominations sought for the 2014 George Szekeres Medal

As announced in the November *Gazette*, the Medal Committee for the 2014 George Szekeres Medal is now seeking nominations and recommendations for possible candidates for this Medal. The George Szekeres Medal is awarded for outstanding research achievement for work done substantially in Australia. It is awarded only in even-numbered years.

Nominations, to be sent to the Committee Chair, should include: (a) an extended citation, not more than two pages in length, arguing the case for awarding the Medal to the nominee; (b) a shorter citation, of not more than 100 words, which may be used to report the candidate's achievements in the event that the nomination is successful; (c) a full list of publications of the candidate, with the most significant (up to a maximum of 20) marked by an asterisk; (d) a curriculum vitae of the candidate's professional career, highlighting any achievements which add support to the nomination; and (e) the names of between three and six suitable referees, along with a brief statement as to their appropriateness. Nominations close on 30 May 2014.

For further information, please contact (preferably by email) the Chair of the 2014 George Szekeres Medal Committee, Professor J.H. Rubinstein (Rubin@ms.unimelb.edu.au).

Other members of the 2014 George Szekeres Medal Committee are Professor A.J. Guttmann (Outgoing Chair), Professor P.G. Hall (Incoming Chair) and Professor A.L. Carey.

The rules can be found at http://www.austms.org.au/The+George+Szekeres+Medal+-+background and a list of past winners of the medal can be found at http://www.austms.org.au/The+George+Szekeres+Medal.

Nominations sought for the 2014 Gavin Brown Prize

As announced in the November *Gazette*, the 2014 Gavin Brown Prize Selection Committee is now seeking nominations and recommendations for possible candidates for this prize, to be awarded for an outstanding and innovative piece of research in the mathematical sciences published by a Member or Members of the Society. The award will be for a single article, monograph or book consisting of original research, and published in the nine calendar years preceding the year of the award.

To be eligible for the award of the Gavin Brown Prize, a publication must have at least one author who meets the following conditions:

(i) he/she must be a member of the Society, and must have been a member of the Society for the calendar year at the time of publication of the paper (back-dating of membership is not allowed);

(ii) he/she must be normally resident in Australia, and must have been normally resident in Australia at the time when the research was carried out.

In the case of publications with multiple authors, the prize will be shared by all authors. The existence of authors who do not meet the conditions above will not preclude this award, although the Selection Committee may take it into account in assessing the achievement of the author(s) who do meet those conditions.

The Selection Committee may deem a publication ineligible if an author has previously received an award from the Australian Mathematical Society for a body of research which included the publication in question.

A publication may be nominated for the award by any member of the Society who is not an author of that publication.

Nominators should provide a brief (1–2 pages) summary of what makes the nominated publication important and original, with appropriate references to prior or subsequent work in the field. These should be sent by email to the Chair of the selection committee, and all nominations should be received via email by 30 May 2014.

The Selection Committee may consult with appropriate external assessors.

For further information, please email the Chair of the 2014 Gavin Brown Prize Selection Committee, Professor N.S. Trudinger, Centre for Mathematics and its Applications, Australian National University, ACT 0200 (Neil.Trudinger@anu.edu.au).

The other members of the 2014 AustMS Gavin Brown Prize Selection Committee are Professor P.G. Hall (Outgoing Chair), Professor J.M. Borwein (Incoming Chair) and Dr C. O'Keefe (one-year member).

Alf van der Poorten Travelling Fellowship

As a result of a generous donation from the van der Poorten family, applications for the 2014 Alf van der Poorten Travelling Fellowship are now invited, subject to the following rules. Prospective applicants should visit the Society's website at http://www.austms.org.au/Alf+van+der+Poorten+Travelling+Fellowship for an application template before submitting an application electronically to the selection committee at van.der.poorten@austms.org.au before 16 May 2014.

The members of the selection committee are Dr Natalie Thamwattana (Chair), Professor Andrew Mathas and Dr Lesley Ward.

Rules for Alf van der Poorten Travelling Fellowship

1. The Alf van der Poorten Travelling Fellowship is offered annually to researchers who have obtained their PhD in pure mathematics from an Australian university.
2. To be eligible to apply, a candidate must have qualified for their PhD within two years of the closing date and they cannot have previously been awarded the Alf van der Poorten Fellowship. Applicants must have been members of the Society for at least twelve months at the time of application. (Backdating of membership to the previous year is not sufficient.) Preference may be given to applicants who are resident in Australia.
3. At most one Alf van der Poorten Fellowship will be awarded each year, unless no one of sufficient merit is found, in which case no Fellowship shall be awarded.
4. The Fellowship Committee of the Society will make recommendations to the President of the Society on the award of the Alf van der Poorten Fellowship.
5. Applications for the Alf van der Poorten Fellowship should include the completed application form, detailing a travel and research plan and budget (at most one page), a full CV and a letter from the awarding institution confirming when the applicant qualified for the award of their PhD. Applications should be sent to van.der.poorten@austms.org.au by 16 May in the year of the award.
6. The applicant should arrange for two letters of support from experts in their field to be sent directly to the committee care of van.der.poorten@austms.org.au.
7. The selection committee will recommend the amount to be granted, to a maximum of $5000, to a successful applicant, taking account of the proposed research and travel activities, the need for support and the research track record of the applicant relative to opportunity.
8. The Selection Committee reserves the right to consult with appropriate assessors.
9. In applying for an Alf van der Poorten Fellowship, applicants agree that if they are successful then their names, a citation and photograph can be

published on the web pages and in the journals of the Society and they agree to submit a report on their Fellowship after its conclusion.

10. The Alf van der Poorten Fellowships will be awarded, in the first instance, every year from 2011 to 2030. The amount of the award may be increased in consultation with the family of Alf van der Poorten.

Honorary Fellows: call for nominations

In the *Gazette* Vol. 33 No. 1, March 2006, pp. 69–70, the Rules for Honorary International Fellowship of the Australian Mathematical Society are listed. (See also www.austms.org.au/Publ/Gazette/2006/Mar06/austmsnews.pdf.)

In accordance with Rule 4(a) I hereby call for nominations. These should be sent electronically to secretary@austms.org.au before the end of August 2014.

Special Interest Meetings

Applications are now considered twice a year, at the start of June and the start of December. The next closing date is 6 June 2014. Applications are required at least three months in advance of the meeting.

If funding is being sought from both AustMS and AMSI, a single application should be made at http://www.amsi.org.au/component/content/article/881.

If funding is not being sought from AMSI, please use the application form available at http://www.austms.org.au/Special+Interest+Meetings and send it to the secretary, Assoc. Prof. Peter Stacey, Department of Mathematics and Statistics, La Trobe University, Victoria 3086 (Secretary@austms.org.au).

AustMS Accreditation

Dr Timothy A. Bodisco of the Queensland University of Technology and Dr Deborah C Jackson of La Trobe University have been accredited as Accredited Members (MAustMS).

Peter Stacey
AustMS Secretary
Email: P.Stacey@latrobe.edu.au

Peter Stacey joined La Trobe as a lecturer in 1975 and retired as an associate professor at the end of 2008. Retirement has enabled him to spend more time with his family while continuing with some research and some work on secondary school education. He took over as secretary of the Society at the start of 2010.