Volume 49 Number 2 2022

The Australian Mathematical Society

Gazette

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Gazette of AustMS, CIAO,
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Ballarat, VIC 3353, Australia

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Web: www.austms.org.au/gazette

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- Classroom notes on presenting mathematics in an elegant way
- Items relevant to mathematics education
- Letters on relevant topical issues
- Information on conferences, particularly those held in Australasia and the region
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- Reports on the business and activities of the Society
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Editorial

David and I welcome you to the May issue of the Gazette of the Australian Mathematical Society.

Let us begin by congratulating the recently elected Fellows of the Australian Academy of Science: Professor John Cannon of The University of Sydney, Professor Catherine Greenhill of the University of NSW, and Professor Kate Smith-Miles of The University of Melbourne.

We record with sadness the passing of Algy Howe, Roger J. Hosking, Neville John de Mestre, Barry Jones, and John Henry Coates.

After nearly a decade, there is a new government in Australia. Firstly, we should celebrate that the transition, unlike in many countries in the world, was a smooth and peaceful one. We hope that after years of decline in real terms in support for universities and for research, this may gradually be turned around. We can also hope that the new Minister will not interfere in decisions regarding ARC grants. One positive sign is that Professor Glyn Davis, former Vice-Chancellor of the University of Melbourne, has been appointed Secretary of the Department of Prime Minister and Cabinet.

Ole Warnaar says in his President's Column "Some universities have already announced that traditional classroom teaching will not return. It is also unclear how quickly and to what extent international students will return to our campuses." He also says "The AustMS Inclusive Conference Guide, see https://austms.org.au/meetings, which clearly outlines the expectation that organisers of events held under the auspices of the AustMS give due consideration to issues of equity and accessibility." These are not just words to be mouthed, but rather they require appropriate actions. On a very happy note, Ole announces The Rodney Baxter Prize for Mathematical Physics which is a new and very welcome prize. As Ole says: "Rodney Baxter is considered to be one of the true greats in the fields of statistical mechanics and mathematical physics".

We have begun in this issue a new column called "Fun With Numbers" by Geoffrey Campbell, whose PhD was supervised by Rodney Baxter. We hope you enjoy this column.

In this issue we include a "Letter to the Editors" by Associate Professor Artem Pulemotov of the University of Queensland. This letter expresses a contrary view to that of the president in the March issue of the Gazette regarding how to interact with Russian mathematicians in light of the Russian invasion of the Ukraine. It is perfectly healthy for mathematicians to have differing views on how best to respond to the invasion. I am reminded of my heritage: my maternal grandparents left Kyiv and Odessa because of pogroms, and they migrated to Australia via Harbin, China which was a safe haven for them for a decade.

In the AMSI report by Tim Marchant, Director of AMSI, and Lisa Farrar, COO of AMSI, we have an article on Industry engagement in the Mathematical Sciences.

Tom Keegan, Executive Officer of MATRIX, reports on MATRIX Collaborations, Upcoming Research Programs, and MATRIX-AMSI PhD Student Symposia, and there is a Call for MATRIX-MFO Tandem Workshops 2023, a Call for MATRIX Research Programs, and information about MATRIX-Simons Fellowship Program, the MATRIX-Simons Young Scholar Program, the MATRIX-Simons Collaborative Fund, the MATRIX-Simons International Family Fund, the MATRIX-Simons Travel Grant Scheme, their Online Seminar Series, Become a Friend of MATRIX, and Research Investment and Expenditure into the Mathematical Sciences.

In the article by the AustMS Secretary, Deborah Jackson, there is information about the Election of officers and ordinary members of Council, a call for Nominations to Council Subcommittees, Society Offices and Editorships. There is also a call for nominations for the 2023 ANZIAM Medal, the 2023 E.O. Tuck Medal, the 2023 J.H. Michell Medal, and the Walter and Lyn Bloom Travelling Fellowships. There is also an announcement of the appointment of a new social media and news coordinator for AustMS, Associate Professor Vera Roshchina of UNSW. As mentioned earlier, there is a new Inclusive Conference Guide. There are also details of the new Rodney Baxter Prize for Mathematical Physics.

You are encouraged to test yourself on the Puzzle Corner prepared by Peter Higgins.

As usual the News section reports on activities at Australian universities. This includes Seminars, PhD completions, Awards and other Achievements, Appointments, Departures, Promotions, Conferences and Courses.

We conclude by noting that in the March issue of the Gazette we had Classroom Notes by Neville De Mestre. So right to the end Neville was contributing to the teaching of mathematics.

David and I hope you enjoy this issue of the Gazette.

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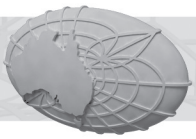
Sid Morris retired after 40 years as an academic. He received BSc (Hons) from UQ in 1969 and PhD from Flinders in 1970. He held positions of Professor, Department Head, Dean, Deputy Vice-Chancellor, CAO and CEO. He was employed by the universities: Adelaide, Ballarat, Flinders, Florida, La Trobe, UNE, UNSW, UQ, UniSA, Tel-Aviv, Tulane, Wales, and Wollongong. He was Editor of *Bull. AustMS* and *J. Research & Practice in IT*, and founding Editor of *AustMS Lecture Series* and *J. Group Theory*. He has been on the AustMS Council for 25 years and its Vice-President. He received the Lester R. Ford Award from the MAA. He has published 170 journal papers and 4 books for undergrads, postgrads and researchers, plus 2 online books, 1 translated into 8 languages and supplemented by YouTube videos and a Facebook group of 10,000 members. In 2016 he was ordained as a Rabbi. In 2020 he published the 4th edition of his 1,000-page book *The Structure of Compact Groups*. He enjoys spending time with his three grandchildren.



President's Column

Ole Warnaar*

I write this column shortly before heading off to the US, where my wife and I will attend the graduation of our eldest daughter. It will be my first international trip in almost two and a half years, and hopefully it is a sign that the worst finally is behind us in terms of COVID-19. It remains to be seen, however, what a post-pandemic world will look like for academia in Australia. Some universities have already announced that traditional classroom teaching will not return. It is also unclear how quickly and to what extend international students will return to our campuses. At my own university, the University of Queensland, enrolment numbers of international students for 2022 are well below expectations, and although it is too early to draw any conclusions from this for the long term, it is clear that Australian universities will continue to operate in a constrained fiscal environment in the foreseeable future. Perhaps the recent change in government will mean more support for the higher education sector, although the refocusing of research funding away from basic research towards manufacturing started under the previous coalition government is set to continue. Labor has stated that it *aim(s) to prioritise the new funding for universities which are able to offer additional courses in national priority areas like clean energy, advanced manufacturing, health and education, or where there are skills shortages.* There are certainly also positives to come out of the global pandemic. We all now have ample experience with online and/or hybrid conferences, and the opportunity to virtually attend meetings will not just make Australian academics less isolated, but will also help to reduce the environmental impact associated with travel and in-person conference attendance. It will also make it easier for those for whom travel is difficult, such as people with health issues, disabilities or carer responsibilities, to participate in meetings. This should especially benefit those with young families, particularly women. The EDI Committee of the AustMS recently produced *The AustMS Inclusive Conference Guide*, see https://austms.org.au/meetings which clearly outlines the expectation that organisers of events held under the auspices of the AustMS give due consideration to issues of equity and accessibility. I encourage you all to read the document and to use it as a guide when organising your next meeting.

In last September's Presidential Column I mentioned a letter, co-written with AMSI Director Tim Marchant, to the then Minister for Education Alan Tudge, calling for AMSI and AustMS to be given the opportunity to work together with the Australian Curriculum, Assessment and Reporting Authority (ACARA) to address some of the serious shortcomings in the draft National Curriculum for Mathematics released for public consultation in April 2021. This led to an invitation to Tim and myself to attend an ACARA workshop in Sydney on the 15th of March. The aim of this workshop was to finalise the curriculum before an

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ACARA board meeting on the 28th of March was set to recommend the draft to the Education Council — the Federal and State Ministers for Education — which was scheduled to meet on the first of April to make a final decision on the adoption of the new curriculum. I note the extremely short timeline, especially in view of the entire revision process — without meaningful AMSI or AustMS involvement — having taken close to two years. I also note the earlier flat-out rejection of engagement with AustMS by ACARA CEO David de Carvalho in July last year, and the fact that neither Tim nor I are experts in mathematics curricula but were prevented from consulting with experts on school mathematics and mathematics curricula within AMSI and AustMS as were bound by a deed of confidentiality. ACARA did agree to my request to include Prof. Tim Brown in the workshop. Tim had been part of a small AMSI/AustMS working group advising the minister's office on several not-publicly-released draft mathematics curricula prepared by ACARA after last year's public consultation process had been completed. Perhaps not so much the workshop itself, but the days following the workshop did give the three of us the opportunity to carefully scrutinize the curriculum and make a large number of suggestions for correction and improvement. Many of the most egregious errors, there were some real doozies, have been eliminated from the final version that was approved by the Education Council. Nonetheless, quite a number of issues that we raised have not been addressed, and it is clear that the new curriculum could have been much better if the whole process had not been so flawed and ACARA had not left the mathematics profession out of the process till the very last moment. A real opportunity to design a world-class mathematics curriculum for our schools has been lost.

I would like to conclude this column with some much more positive news. Several months ago the AustMS was approached by emeritus Professor Rodney Baxter (ANU) with the offer of making a very significant donation to the Society for the establishment of *The Rodney Baxter Prize for Mathematical Physics*. As many of you will probably know, Rodney Baxter is considered to be one of the true greats in the fields of statistical mechanics and mathematical physics, famous for his exact solution of the 8-vertex model, the discovery of what is now known as the Yang–Baxter equation, and for many other breakthrough contributions that have profoundly impacted mathematics and physics. The Yang–Baxter equation played a key role in the discovery of quantum groups by Drinfeld and Jimbo, and influenced the work of the late Vaughan Jones on knot theory, who coined the term 'Baxerization' for turning knot invariants into solutions of the Yang–Baxter equation. Rodney Baxter's work on exactly solvable two-dimensional lattice models was also crucial in testing the hypotheses of universality and conformal invariance of two-dimensional critical systems, paving the way for the development of two-dimensional conformal field theory. Rodney Baxter's list of major awards is extensive and includes the 1980 Boltzmann Medal, the 1987 Dannie Heineman Prize for Mathematical Physics, the 2006 Lars Onsager Prize, a 2013 Royal Medal and the 2021 Henri Poincaré Prize. In the past few months, Rodney Baxter, AustMS and ANZAMP have worked closely together to make the prize a reality,

and I am very happy to announce that the inaugural Rodney Baxter Prize for Mathematical Physics in recognition of an "outstanding and internationally significant contribution to the area of Mathematical Physics" will be awarded at the 2023 ANZAMP Annual Meeting. The Rules of the prize, including eligibility criteria may be found at https://austms.org.au/awards-grants/.

Ole Warnaar is Chair and Professor of Pure Mathematics at the University of Queensland. His research interests include algebraic combinatorics, number theory and the theory of special functions. He currently serves on the MATRIX advisory board, AMSI scientific board and is the chair of the organising committee of the Simon Marais Mathematics Competition. Ole is a Fellow of the Australian Academy of Sciences, Fellow of the Australian Mathematical Society, and joint recipient of the 2020 George Szekeres Medal. In his spare time he coaches judo and enjoys rock climbing, running, hiking, reading and art house movies.

Letters to the Editors

In his column in the previous issue of the Gazette, President Ole Warnaar addressed the matter of the mathematical community's response to the Russian war in Ukraine. As a Ukrainian-born Australian, I understand and appreciate the opening of his column and the support for Ukraine that it expresses. However, I believe that shifting focus to the defence of Russian mathematicians further in the text was untimely and ill-advised. Let me explain.

Right now, the war is in its very active stage. Numerous Ukrainian mathematicians are losing their lives, family members, property, institutions, ability to work, etc. The problems encountered by Russians, such as the possibility of being "ostracised" or difficulty publishing a paper, are considerably smaller and less pressing. Yet the President's column glosses over the hardships of Ukrainians with one sentence before engaging in a detailed discussion of the misfortunes of Russians. Such an approach to the matter inevitably sends the wrong message about our priorities. Saying that the plight of Ukrainians should be our primary concern doesn't make much of a difference if the next half a page is spent making the Russian case. The wrong message is later passed on to the politicians and the wider society.

The President chose the case of *Journal of Molecular Structure* as an example of overreach in the current treatment of Russians around the world. However, I find the position of this journal's editor-in-chief, Rui Fausto, reasonable. The Elsevier representative quoted in the President's column makes a manipulative statement suggesting that the journal discriminates on the basis of ethnic origin or citizenship. This is clearly not the case. Rui Fausto writes that they refuse to accept papers coming out of Russian institutions. To emphasise, their action is aimed at institutions, not individuals. There are very few private research institutions in Russia. Universities, labs, etc. in that country are all part of the state. This is the very state responsible for the devastation in Ukraine. Russian universities, for example, aid the war effort by providing expertise, helping with propaganda and so on. At the very least, they give important political support to the ruling class. Sanctioning them makes perfect sense.

Finally, the President writes that Russians are powerless to stop the war. This is false. Strong civic resistance would undoubtedly interfere with Putin's plans. Is it dangerous to resist in Russia? Is it difficult? Of course. However, the Ukrainians have shown that resistance is possible under overwhelming propaganda (2004 revolution) and police oppression (2014 revolution). There are plenty of other examples around the world. Do the Russian mathematicians strike? Protest in the streets? Make strong public statements against the war? Send donations to the Ukrainian army or at least Ukrainian humanitarian causes? Maybe, there are isolated examples of this, but they are certainly not systematic.

Polling by the Chicago Council on Global Affairs and the Levada Centre shows 81% of support for Putin and his war effort among the Russian population. In academia, a strongly worded pro-war address was issued by heads of over 260 educational

institutions. The lead signatory was the rector of Moscow State University, Viktor Sadovnichiy, a mathematician. Since a picture is worth a thousand words, I will include a photo from Voronezh State University of Technology published on the 10th of March. A simple Google search returns many similar images from other Russian institutions.

I have known President Ole Warnaar personally for about ten years. I am certain that he is on the right moral side of the war, as are the overwhelming majority of Australians. I have no doubt that he meant well when he prepared his column. I am writing this letter because I hope that it will help establish the proper framework for the discussion of the war among Australian mathematicians. Even though we are far away, our actions and the messages we send to the wider community can have an effect on the events in Ukraine. I want to make sure that our contribution is as positive as possible.

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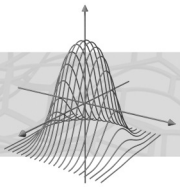

Puzzle Corner

Peter M. Higgins*

Welcome to Puzzle Corner 72 of the Gazette of the Australian Mathematical Society. In this first section I shall introduce the "Snow and the Golden Ratio". After that I shall give a solution to Puzzle Corner 71 "Unavoidable Sets of Words". I would be happy to receive your solution to Puzzle Corner 72 not later than June 30, 2022. The email address for solutions is austmspuzzles@gmail.com. Any particularly interesting solutions received before the deadline will be mentioned in the next Puzzle Corner or, if size warrants, included in the section "Addendum to Puzzle Corner" which is edited by Alex Bishop and me.

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Snow and the Golden Ratio

In Puzzle Corner 68 of July 2021 readers were invited to solve the differential equation $f'(x) = f^{-1}(x)$, which led to a solution in which the Golden Ratio featured heavily. Today's problem is similar in that regard, but otherwise completely different. I do not know its precise origin, for I came across it by chance some years ago and only recall that the source said it was taken from an American College text published in 1942.

Problem. Steady snowfall began during the morning. At noon, the snow plough set out, clearing two miles of road in the first hour, and one mile in the second. When did it start snowing?

There may look to be insufficient information to answer but there is, provided we accept one implicit assumption: the speed of the plough is inversely proportional to the depth of snow on the highway.

Solution to Unavoidable Sets of Words

Problem 1. $X = \{a^2, b^2, ab\}$ is unavoidable as for any word w of length greater than 2, either w has a factor a^2 or b^2 or w begins with one of ab or bab. On the other hand $X_1 = \{a^2, b^2\}$ is avoidable as X_1 is avoided by all words of the form $(ab)^m$, while $\{a^2, ab\}$ is avoided by all powers of b, and $\{b^2, ab\}$ is avoided by all powers of a.

Problem 2. If $n = 1$ then the single word w must be a power of each letter of A. Since $k \geq 2$ this is only possible if that power is 0 in which case $w = \varepsilon$, the empty word, and so $X = \{\varepsilon\}$, thus anchoring the induction. Let $n \geq 2$ and

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suppose inductively that the result holds for all unavoidable sets of lesser cardinal. Suppose to the contrary that all words of X have length at least n. Write $|w|$ for the length of a word w and take w to be a word of maximal length that avoids X. It follows that $|w| \geq n-1$ and we may write $w = uv$, where $|v| = n-1$. By choice of w we infer that wa_i has an X-factor (a factor contained in X) for every $a_i \in A$. Such a factor must be a suffix of wa_i as w does not meet X. Therefore we may factorise each word wa_i as $u_i v_i a_i$, where $v_i a_i \in X$ and v is a suffix of each v_i.

Now consider the set $Y = (X \cup \{v\}) \setminus \{v_1a_1, v_2a_2, \cdots, v_ka_k\}$. Then Y is also unavoidable and of lesser cardinal than X. However, the length of each word of Y is at least $n-1$, contrary to the inductive hypothesis. Therefore X does indeed contain a word of length less than n.

Problem 3. We are to prove that

$$\lfloor \log_k n \rfloor \leq M_n \leq \lceil \log_k n + \log_k(\log_k n) \rceil.$$

To see the first inequality, define the nonnegative integer m by the inequalities $k^m \leq n < k^{m+1}$. Taking logs gives $m \leq \log_k n < m+1$, and since m is an integer it follows that $m = \lfloor \log_k n \rfloor$. Now since $X = A^m$ is an unavoidable set all of whose members have length m and $|X| = k^m \leq n$, the left hand inequality is established.

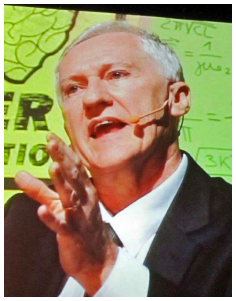
We next prove the right-hand inequality. Let m denote the minimum length of words of X, an unavoidable set of length n over a k-letter alphabet. For each $w \in X$, select an m-factor (a factor of length m) $w \in A^m$. The set X' of these m-factors is also an unavoidable set with $|X'| \leq |X| \leq n$. For any $v \in A^m$ we have that X' meets all sufficiently high powers v^r, so that X' contains a member of the cyclic conjugate class of each word v. The size of each such class is at most m so that $n \geq |X| \geq |X'| \geq \frac{k^m}{m}$. Taking logarithms then gives: $\log_k n \geq m - \log_k m$ whence

$$m \leq \log_k n + \log_k m. \tag{1}$$

By Problem 2, $m < n$ and so we may replace m by n on the right in (1) to obtain $m < 2\log_k n$. In turn we replace m by $2\log_k n$ in (1) to obtain:

$$m < \log_k n + \log_k(2\log_k n) \quad \Rightarrow \quad m < 1 + \log_k n + \log_k(\log_k n) \tag{2}$$

Since the inequality in (2) is strict and m is an integer, we conclude that $m \leq \lceil \log_k n + \log_k(\log_k n) \rceil$. Since M_n is the maximum value of m taken over all unavoidable sets of cardinal no more than n, the right-hand inequality follows.



Peter Higgins is a Professor of Mathematics at the University of Essex. He is the inventor of Circular Sudoku, a puzzle type that has featured in many newspapers, magazines, books, and computer games all over the world. He has written extensively on the subject of mathematics and won the 2013 Premio Peano Prize in Turin for the best book published about mathematics in Italian in 2012. Originally from Australia, Peter has lived in Colchester, England with his wife and four children since 1990.

Ramanujan 6-10-8 identity

Geoffrey B Campbell*

Abstract

We give two new simple identities like the Ramanujan 6-10-8.(Berndt [1, Volume IV].

Ramanujan's 6-10-8 identity

A famous result found in Ramanujan's Notebooks is the 6-10-8 identity.
If $ad = bc$ then

$$\begin{aligned} &64(A^6 + B^6 + C^6 - D^6 + E^6 - F^6)(A^{10} + B^{10} + C^{10} - D^{10} + E^{10} - F^{10}) \\ &\quad = 45(A^8 + B^8 + C^8 - D^8 + E^8 - F^8)^2, \end{aligned} \tag{1}$$

where $A = a + b + c$, $B = b + c + d$, $C = c + a + d$, $D = d + a + b$, $E = a - d$, and $F = b - c$. This result has been extended by various people. So here we state two new similar identities that are easier to prove than Ramanujan's result. Obviously more can come from our method below.

A new 10-6-8 and a 14-6-8 identity

If $a^2 + b^2 = c^2$ then

$$18(a^{10} + b^{10} - c^{10})^2 = 25(a^6 + b^6 - c^6)^2(a^8 + b^8 + c^8), \tag{2}$$

$$6(a^{14} + b^{14} - c^{14}) = 7(a^6 + b^6 - c^6)(a^8 + b^8 + c^8). \tag{3}$$

Examples

$$\begin{aligned} 18(3^{10} + 4^{10} - 5^{10})^2 &= 25(3^6 + 4^6 - 5^6)^2(3^8 + 4^8 + 5^8), \\ 18(5^{10} + 12^{10} - 13^{10})^2 &= 25(5^6 + 12^6 - 13^6)^2(5^8 + 12^8 + 13^8), \\ 18(8^{10} + 15^{10} - 17^{10})^2 &= 25(8^6 + 15^6 - 17^6)^2(8^8 + 15^8 + 17^8), \\ 18(7^{10} + 24^{10} - 25^{10})^2 &= 25(7^6 + 24^6 - 25^6)^2(7^8 + 24^8 + 25^8), \\ 6(3^{14} + 4^{14} - 5^{14}) &= 7(3^6 + 4^6 - 5^6)(3^8 + 4^8 + 5^8), \\ 6(5^{14} + 12^{14} - 13^{14}) &= 7(5^6 + 12^6 - 13^6)(5^8 + 12^8 + 13^8), \\ 6(8^{14} + 15^{14} - 17^{14}) &= 7(8^6 + 15^6 - 17^6)(8^8 + 15^8 + 17^8), \\ 6(7^{14} + 24^{14} - 25^{14}) &= 7(7^6 + 24^6 - 25^6)^2(7^8 + 24^8 + 25^8). \end{aligned}$$

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Outline of the proof of (2) and (3)

We note here the following elementary identities.

$$\begin{aligned}
&(x-y)^3+(z-x)^3+(y-z)^3 = -3(x-y)(x-z)(y-z),\\
&(x-y)^4+(z-x)^4+(y-z)^4 = 2(x^2-xy-xz+y^2-yz+z^2)^2,\\
&(x-y)^5+(z-x)^5+(y-z)^5\\
&\quad = -5(x-y)(x-z)(y-z)(x^2-xy-xz+y^2-yz+z^2)\\
&(x-y)^7+(z-x)^7+(y-z)^7\\
&\quad = -7(x-y)(x-z)(y-z)(x^2-xy-xz+y^2-yz+z^2)^2.
\end{aligned}$$

From these we easily see

$$\begin{aligned}
&18((x-y)^5+(z-x)^5+(y-z)^5)^2\\
&\quad = 25((x-y)^3+(z-x)^3+(y-z)^3)^2((x-y)^4+(z-x)^4+(y-z)^4),\\
&6((x-y)^7+(z-x)^7+(y-z)^7)\\
&\quad = 7((x-y)^3+(z-x)^3+(y-z)^3)((x-y)^4+(z-x)^4+(y-z)^4).
\end{aligned}$$

Upon setting $a = x-y$, $b = z-x$ and $c = y-z$, these become: If $a+b+c = 0$, then

$$\begin{aligned}
18(a^5+b^5+c^5)^2 &= 25(a^3+b^3+c^3)^2(a^4+c^4+c^4),\\
6(a^7+b^7+c^7) &= 7(a^3+b^3+c^3)(a^4+b^4+c^4).
\end{aligned}$$

Our equations (2) and (3) are just subsets of these where we have used Pythagorean triples. □

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[3] Piezas, Tito III. Ramanujan 6-10-8 Identity. From MathWorld – A Wolfram Web Resource, created by Eric W. Weisstein.
https://mathworld.wolfram.com/Ramanujan6-10-8Identity.html

Geoffrey Campbell completed his PhD at Australian National University in 1998 under Rodney Baxter and has enjoyed continued affiliation with the ANU Mathematics Department for 30 years. He also served as a Visitor with LaTrobe University Mathematics and Statistics Department for 8 years. His career has spanned both Federal and State government roles including Prime Minister and Cabinet and a Royal Commission. Geoffrey is writing a text/monograph on Vector Partitions for Chapman and Hall Publishers, and is also a published poet in Australia.

2022 Australian Academy of Science Fellows

The Australian Academy of Science recently elected three mathematical scientists as Fellows. Our congratulations to all of them! Their citations follow.

Professor John Cannon

The University of Sydney

John Cannon is a world expert on the development and implementation of algorithms in pure mathematics. He is the father of the computer algebra system Magma, which is used on a daily basis by thousands of mathematicians in over 70 countries. As part of Magma, Cannon and his team have developed hundreds of algorithms which solve difficult problems in algebra, geometry, group theory, and number theory, as well as in a number of other areas. He has also coordinated the work of over 500 mathematicians who have contributed to the Magma system, and built a world leading research group in computational algebra.

Professor Catherine Greenhill

University of New South Wales

Catherine Greenhill is internationally recognised as a leading expert in asymptotic, probabilistic and algorithmic combinatorics, undertaking research at the interface between combinatorics, probability and theoretical computer science. She tackles difficult, fundamental questions about ubiquitous combinatorial objects, such as graphs and hypergraphs. She has achieved major breakthroughs including establishing the efficiency of a natural algorithm for generating graphs, and finding threshold values for the emergence of certain structures in random hypergraphs. Her highly cited research provides new formulae and algorithms that have found broad applications in many areas, including cryptography and physics.

Professor Kate Smith-Miles

The University of Melbourne

Kate Smith-Miles is renowned for spearheading a new paradigm in reliable algorithm testing, through her Instance Space Analysis methodology. This is a mathematically rigorous foundation for "stress-testing" algorithms, including innovative techniques for generating unbiased test instances and visualisation of insights into algorithm reliability. A much-needed solution to the long-standing problem of algorithmic trust, it is transforming academic research practice across many fields, and supporting industry partners keen to avoid disasters when deploying critical algorithms.

AMSI News

Lisa Farrar* and Tim Marchant**

Industry engagement in the Mathematical Sciences

Australian research in the Mathematical Sciences has been growing in its global impact over the last decade. The Australian Research Council's Excellence for Research in Australia (ERA) 2018 evaluation illustrates this trend, with the number of universities rated as above or well above world standard in the Mathematical Sciences FOR code, increasing from 18 in ERA 2015 to 25 in ERA 2018.

In contrast, industry engagement data from ERA 2018 demonstrates the lack of collaboration with the Mathematical Sciences compared to other disciplines. The Mathematical Sciences write 2.3% of Australia's academic papers and earn 2.4% of national competitive grants (HERDC Category 1) but derive only 1.1% of industry income (HERDC Category 3) and 0.7% of research commercialisation income. Additionally, outcomes from the ARC's national competitive grants schemes show that over the past ten years the Mathematical Sciences has captured approximately 6% of the ARC Discovery grant funding pool and received only 1% of the ARC Linkage grant funding pool — with only two grants awarded in the last four years.

Over the past few years, the Australian Government implemented many initiatives to drive research commercialisation and increase the level of university-industry research engagement. To further drive industry research the Australian Government has recently proposed changes to the research block grant funding formula; the weighting for government funded research (cat 1 and 2) goes down while the weighting for industry research (cat 3) increases. AMSI operates APR.Intern, Australia's only national research student internship program, spanning all industry sectors and academic disciplines. APR.Intern has placed close to 900 interns with 440 industry partners and from 2017–2021, successfully delivered the National Research Internships Program (NRIP) on behalf of the Department of Education, Skills and Employment. After the completion of the NRIP program in 2021, APR.Intern has moved forward into a new phase and in 2022 continues to deliver research internships to connect the university and industry sectors. Changes to the program in 2022 now allow the placement of PhD and Masters by Research students and the previous cap on international student interns has been removed.

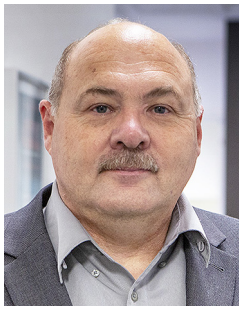
Given the drivers towards research commercialisation and closer university and industry research collaboration, it is vital that the Mathematical Sciences increases its level of industry engagement. Research student internships represent an excellent mechanism for building bridges between the university and industry

*AMSI COO and National Program Manager, APR.Intern

**AMSI Director

sectors. APR.Intern wishes to support the closing of this gap by placing increased numbers of Mathematical Science interns. Please encourage your research students to submit an intern EOI on the APR.Intern website and contact the APR.Intern staff if you have existing industry partners, who may be interested in sponsoring an internship.

Lisa Farrar is Chief Operating Officer of the Australian Mathematical Sciences Institute (AMSI) and National Program Manager of AMSI's industry engagement arm, the Australian Postgraduate Research Intern (APR.Intern) program. She has over 25 years' experience leading teams and organisations to deliver strategic excellence across a broad range of sectors, both in Australia and overseas. With core competencies in leadership, strategy, partnerships, engagement, marketing and brand management, Lisa is passionate about building and leading teams to deliver on organisational vision. Lisa has lived and worked in Melbourne, San Francisco, Seattle and worked extensively in Sub Saharan Africa. Holding a Senior Executive MBA from Melbourne Business School, a Bachelor of Business and AICD company director qualifications, Lisa has over 10 years' experience as a Non-Executive Director and Chair on government and not-for-profit Boards.



Tim Marchant is Director of the Australian Mathematical Sciences Institute (AMSI) and an Honorary Professor of Applied Mathematics at the University of Wollongong. During his career at the University of Wollongong, Tim was Head of the School of Mathematics and Applied Statistics 2007–2009 and Dean of Research 2009–2020. He has undertaken senior leadership roles within the Mathematical Sciences, including President of the Australian Mathematical Society, Chair of ANZIAM and Director of the Mathematics in Industry Study Group. Tim has also had a range of external leadership roles, having twice been an executive member of the Council of Deans and Directors of Graduate Studies and a member of the Endeavour Awards and National Colombo Plan selection panels. Tim gained a PhD in Applied Mathematics from the University of Adelaide in 1988 and has published more than 100 research papers. His research areas include nonlinear optics, waves and combustion theory. Tim is a Life Master at the Illawarra Bridge Club and speaks intermediate level Mandarin.

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MATRIX

Tom Keegan*

MATRIX Collaborations

MATRIX has been delighted to host program organisers and participants in-person at Creswick in January-May of this year across seven research programs, and one other research program online (https://www.matrix-inst.org.au/events-01/past-events-archive/.

Over the 12 months MATRIX has won an ARC LIEF grant, a first for research infrastructure in the mathematical sciences, and reaffirmed and built new international partnerships, with:

- the Mathematisches Forschungsinstitut Oberwolfach (MFO),
- the Research Institute for Mathematical Sciences (RIMS) in Kyoto,
- the Simons Foundation,
- the Mathematical Sciences Research Institute (MSRI) in Berkeley, and
- the Institute for Basic Science (IBS) in South Korea.

Domestically MATRIX is continuing a PhD symposium series together with AMSI and has hosted two MATRIX-SMRI research symposia built around a distinguished researcher or publication.

Check out the various funding opportunities below through our research programs and MATRIX-Simons fellowship and travel grants.

Upcoming Research Programs

MATRIX looks forward to the following eight research programs planned for the remainder of 2022:
https://www.matrix-inst.org.au/events-01/programs/

- Mathematics of Tissue Dynamics
  - Program Organisers: Domenic Germano (The University of Melbourne), Adriana Zanca (The University of Melbourne), Ryan Murphy (Queensland University of Technology), Emine Endes (Heriot-Watt University), James Osborne (The University of Melbourne)
- Cell Motility in Dynamic Environments
  - Program Organisers: Douglas Brumley (The University of Melbourne), Jennifer Flegg (The University of Melbourne), Jean-Baptiste Raina (University of Technology Sydney), Arezoo Ardekani (Purdue University), Lars Behrendt (Uppsala University)

*MATRIX, Creswick, http://www.matrix-inst.org.au/

- 2D Supersymmetric Theories and Related Topics (In-person post online)
  - Program Organisers: Johanna Knapp (The University of Melbourne), Jock McOrist (University of New England), Gabriele Tartaglino-Mazzucchelli (The University of Queensland); Emanuel Scheidegger (Peking University)
- Complex Networks Winter Workshop
  - Program Organisers: Lewis Mitchell (The University of Adelaide), Laurent Hébert-Dufresne (The University of Vermont), Antoine Allard (Université Laval), Juniper Lovato (The University of Vermont), Dion O'Neale (The University of Auckland), Mehwish Nasim (The University of Adelaide), Maire-France Gévry (Université Laval)
- Theory and Applications of Stable Polynomials
  - Program Organisers: James Saunderson (The University of Melbourne), Ngoc Mai Tran (The University of Texas)
- MATRIX-RIMS Tandem Workshops 2022
- IBS-CGP and MATRIX workshop on Symplectic Topology
  - Program Organisers: Young-Geun Oh (Institute of Basic Science, Centre for Geometry and Physics), Brett Parker (The Australian National University), River Chiang (National Cheng Kung University)

MATRIX-AMSI PhD Student Symposia

MATRIX and AMSI support PhD students in the mathematical sciences around Australia to design and run their own research symposia. The focus of each symposium is on exchanging ideas, collaborating and building relationships with your peers.
https://www.matrix-inst.org.au/events-01/phd-student-research-symposia/

In March 2022, the following symposium was hosted online:

- Machine Learning and Decision Making: Theory, Algorithms and Applications
  - Symposium Organisers: Jun Ju (The University of Queensland), Yeming Lei (The University of Queensland), David Maine (The University of Queensland)

We look forward to the following three symposia planned for the remainder of 2022:

- PhD Student Symposium in Combinatorics (online)
  - Symposium Organisers: Afsane Ghafari Baghestani (Monash University), Yudhistira Bunjamin (The University of New South Wales), Jodie Lee (The University of New South Wales), Thomas Lesgourgues (The University of New South Wales), Jack Neubecker (The University of Queensland), Angus Southwell (Monash University)
- Graduate Talks in Geometry and Topology Get-Together $(GT)^3$ (MATRIX, Creswick)

  - Em Thompson (Monash University), Grace Garden (The University of Sydney), Ellena Moskovsky (Monash University), Yossi Bokor (The University of Sydney), James Morgan (The University of Sydney), Max Carter (The University of New South Wales)
- Categories and Companions Symposium (CACS 2022) (MATRIX, Creswick)
  - Jack Crawford (The Australian National University), Matthew Di Meglio (Macquarie University), Nicola Di Vittorio (Macquarie University), David Farrell (Macquarie University), Eli Hazel (Macquarie University), Yustyna Klish, James Koussas (La Trobe University)

Call for MATRIX-MFO Tandem Workshops 2023

The institutes MATRIX in Creswick (Australia) and MFO in Oberwolfach (Germany) invite proposals for a tandem workshop taking place simultaneously at MATRIX and MFO in the week of 17–23 September 2023 or 24–30 September 2023.

The workshop is held simultaneously in both locations. 10–20 participants may be hosted at MATRIX and 10–25 participants at MFO, who can interact in an intense way locally and in addition share a certain number of joint lectures/discussions via zoom (for example Oberwolfach 9–11 am could match up with MATRIX at 5–7 pm). Talks given outside this time slot can be recorded via zoom for viewing by participants at the other institute, but not publicly. The next deadline for tandem workshop proposals is Sunday, 31 July 2022. Guidelines can be found at https://www.matrix-inst.org.au/matrix-mfo-tandem-workshop-2023-guidelines/

Call for MATRIX Research Programs

Anyone can apply to organise a MATRIX research program. Every research program should have ample unstructured time to encourage collaborative research. Longer programs can have an embedded conference or lecture series. Short workshops focusing on a special theme are also welcome. The MATRIX Family Fund provides additional support to participants with families.

The MATRIX Scientific Committee selects programs on scientific excellence as well as on the participation rate of high-profile international participants and/or business and industry partners, among other criteria.

The next deadline for research program proposals in 2022–2024 is **Friday, 23 September 2022**. Expressions of interest may be submitted at any time. Guidelines can be found at https://www.matrix-inst.org.au/guidelines/

Research Program Organisers are encouraged to supplement base funding from MATRIX through other schemes including the: MATRIX-Simons Collaborative Fund, MATRIX-Simons Travel Grant Scheme, International Visitor Pro-

gram of the University of Sydney Mathematical Research Institute; AMSI and AustMS/ANZIAM workshop funding scheme; and AustMS travel grants.

https://www.matrix-inst.org.au/funding-opportunities/

MATRIX-Simons Fellowship Program

The MATRIX-Simons Fellow program supports eminent international scholars in the mathematical sciences to make an extended visit to MATRIX, and to lead a research program in an emerging area or as part of a special theme year.

The Fellowship will provide a return airfare and cost for domestic travel to Australian universities (up to AUD3,850), and a stipend of AUD35,000 for housing and living expenses. For further information:
https://www.matrix-inst.org.au/fellowship-program-guidelines/

Applications close: **Friday, 23 September 2022**

MATRIX-Simons Young Scholar Program

MATRIX-Simons Young Scholars will co-organise and participate in a MATRIX research program, and interact with MATRIX-Simons Fellows or other leading researchers from around the world. Scholars are encouraged to also make an extended visit to an Australian university on a collaborative project.

The scholarship will provide a return airfare (up to AUD3,100), housing (up to AUD2,100) and a stipend of AUD1,050 for living expenses for a two-week visit to MATRIX and to support travel costs associated with a visit to an Australian university. For further information:
https://www.matrix-inst.org.au/young-scholar-program-guidelines/

Applications close: **Friday, 23 September 2022**

MATRIX-Simons Collaborative Fund

MATRIX has launched a new fund to enhance collaborations and co-funding opportunities with external partners. The fund is made available by a generous grant from the US-based Simons Foundation. Access to this resource will become available to research program organisers with significant contributions to their MATRIX Research Program from funding bodies, institutions or external partners in business, industry and government, or private donors. Funding will be available to support research programs scheduled in 2022, 2023 and 2024. For further information: https://www.matrix-inst.org.au/collaborative-fund-guidelines/

MATRIX-Simons International Family Fund

The MATRIX-Simons International Family Fund is designed to lower the barrier for participation in mathematics research by mathematicians with carer responsibilities. The Fund supports the costs of international airfares for children and

partners or carers, on top of additional housing, living support and access to local child care services (where required).

Funding will be allocated on a case-by-case basis according to need. The Fund provides a per diem for a family, which may include a partner or carer, to cover the costs of housing and meals. The Fund will support each family with up to 14 nights housing (up to $2,140) and living expenses (up to $780).

The Fund will also support a return economy airfare subsidy of up to $4,580 per family, and cover child care costs up to $130 per child/day for up to 14 days.

Australian-based researchers may access the MATRIX Family Fund that allows researchers with caring responsibilities to attend MATRIX research programs by providing additional housing and support for children as well as a partner or carer. For further information:
https://www.matrix-inst.org.au/international-family-fund-guidelines/

MATRIX-Simons Travel Grant Scheme

MATRIX provides partial travel support in the form of grants of up to $1,250 to those invited to participate in research programs at Creswick in 2022, 2023 and 2024. Preference may be given to participants from developing countries especially in the Asia-Pacific region and to applicants from diverse backgrounds.

This scheme is made available by a generous grant from the US-based Simons Foundation. For further information:
https://www.matrix-inst.org.au/travel-grant-scheme-guidelines/

Online Seminar Series

MATRIX hosts monthly online seminars. For information on upcoming seminars and access to recordings of past seminars, visit:
https://www.matrix-inst.org.au/events-01/online-seminars/

Become a Friend of MATRIX

Contributions to MATRIX help grow mathematical research in Australia and the Asia-Pacific region. Support from researchers in the mathematical sciences is key to success in leveraging further support from funding agencies and donors, and will contribute to enhanced opportunities for students, early career researchers and under-represented groups.
https://www.matrix-inst.org.au/donations/

We would be delighted for you and those in your network/s to become a Friend of MATRIX and show your support with a tax-deductible gift. You will receive a Friend of MATRIX 2022 edition mug for a contribution of $150 or more, and recognition as a private donor and an invitation to a special event for $1,000 or more.

Research Investment and Expenditure into the Mathematical Sciences

Published by MATRIX and AMSI, an update to the *Research Investment and Expenditure into the Mathematical Sciences* report has been published that analyses investment and expenditure in Australia to support research in the mathematical sciences over the period 2008–2021/22 using current publicly available date from the Australian Bureau of Statistics (ABS), the Australian Research Council (ARC) and the National Medical and Health Research Council (NHMRC).

The report includes the latest release from the ABS of 2020 data on HERD expenditure, displaying the worrying trend that investment by higher education institutions into pure basic and strategic research continues to decrease, and in particular that investment in mathematical sciences research (pure & applied) by higher education institutions took a $32 million hit in 2020 ($45 million in real terms).

The report can be accessed at: https://www.matrix-inst.org.au/research-investment-and-expenditure-into-the-mathematical-sciences-update

Further Information

MATRIX is a national partnership between the University of Melbourne, Monash University and the Australian National University, with the University of Queensland and the ARC Centre of Excellence for Mathematical and Statistical Frontiers (ACEMS) as Associate Members.

Comments, suggestions and requests are always welcome. Please send these, as appropriate, to:

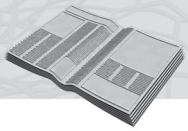
Director: Jan de Gier (jdg@matrix-inst.org.au)

Deputy Directors: David Wood (davidw@matrix-inst.org.au)
Peter Bouwknegt (peterb@matrix-inst.org.au)

Support team: Tom Keegan (Executive Officer) (tomk@matrix-inst.org.au)
Joy Lukman (Programs Coordinator) (office@matrix-inst.org.au)

Website: https://www.matrix-inst.org.au
Twitter: https://twitter.com/MATRIX_Inst
LinkedIn: https://www.linkedin.com/in/matrix-australia/

Tom Keegan is the Executive Officer of MATRIX. He has worked in research and graduate research management in the university sector in Victoria for the past 17 years. He provides expertise in managing high-level strategic initiatives, resources and operational planning for MATRIX. Tom is a member of the Australasian Research Management Society (ARMS) and former member of the ARMS Victoria-Tasmania Chapter Executive. https://www.linkedin.com/in/tomkeegan2/0



News

General News

Wave Science Seminar

A new virtual seminar series, KOZWavinar, will be launched in 2022 for the Australasian wave science community. The first KOZWavinar will take place on Tuesday 7 June 2022 from 1–3 pm (AEST) with three inaugural guest speakers: Ross McPhedran (University of Sydney, Australia), Ludmila Adam (University of Auckland, New Zealand) and Hidetaka Houtani (University of Tokyo, Japan). More information is available at https://kozwaves.github.io/KOZWavinar/.

UNSW High School Mathematics Competition

UNSW will hold the 60th annual High School Mathematics Competition on 8 June 2022. The competition includes around 60 schools, attracting over 700 participants every year. The exam questions for Senior and Junior levels are created by Dr Denis Potapov. The Prize presentation is likely to be held in September.

Completed PhDs

Edith Cowan University

- Dr Tony Greening, *Social disorganisation theory and violent crime: A spatial-econometric analysis of Chicago and Sydney*, supervisors: Ute Mueller and Aiden Fisher.
- Dr Eva Lai, *Integrating multiple sources of data to construct a time series of recreational catch and effort for the West Coast Bioregion of Western Australia*, supervisors: Ute Mueller, Glenn Hyndes and Karina Ryan.

La Trobe University

- Dr llia Donhauzer, *On asymptotic properties of non-linear functionals of random fields*, supervisor: Andriy Olenko. Illia also has been selected to participate in the 9th Heidelberg Laureate Forum, 2022.

University of Adelaide

- Dr Gagani Ranathunga, *Mathematical modelling of unsteady tube stretching with internal channel pressurisation for fabricating electrospray ionisation emitters*, supervisors: Yvonne Stokes, Michael Chen and Heike Ebendorff-Heidepriem.

University of Melbourne

- Dr Tianshu Cong, *Convergence rate for statistics of point processes*, supervisors: Aihua Xia and Nathan Ross.

University of Sydney

- Dr Connor Smith, *Resampling based model selection for correlated and complex data*, supervisor: Samuel Mueller.
- Dr Yue He, *Estimation of Levy process under high-frequency setting*, supervisors: Ray Kawai and Marek Rutkowski.
- Dr Kane Townsend, *Sylow classes of parabolic subgroups in finite reductive groups*, supervisor: Anthony Henderson.
- Dr Yingxin Lin, *Statistical modelling and machine learning for single-cell data harmonisation and analysis*, supervisor: Jean Yang.

Awards and other achievements

La Trobe University

- Mitra Jazayeri has achieved the status of Fellow of the Higher Education Academy (FHEA) in recognition of attainment against the UK Professional Standards Framework for teaching and learning support in higher education.

University of Melbourne

- Kate Smith-Miles has been elected a Fellow of the Australian Academy of Sciences.
- James McCaw was awarded the ANZIAM EO Tuck Medal earlier in the year. There is a citation online: https://www.anziam.org.au/The+2022+EO+Tuck+Medal

University of South Australia

- Amie Albrecht has been accredited as a Fellow of the Australian Mathematical Society.
- A/Prof Peter Pudney, A/Prof Amie Albrecht and Emeritus Prof Phil Howlett were awarded a Linkage Grant of $285638 for a 3-year project with TTG Transportation Technology (now Trapeze Rail). "This project aims to develop new scheduling and control methods that will enable railways to reduce their demand for electricity during peak demand periods, without undue disruption to the timetable. These new methods and systems will integrate with — and expand the capabilities of — an Australian train control system that is used by railways around the world. This will enable better management of electricity within a region and better use of renewable energy sources, with significant cost savings for railways and the wider community."

University of Southern Queensland

- Professor Ravinesh Deo from the School of Mathematics, Physics and Computing (with PhD Researcher Chris Davey) was awarded $30,000 under Artificial Intelligence for Decision Making Initiative funded by Office

of National Intelligence (ONI) and the Defence Science and Technology Group (DSTG) to develop Artificial Intelligence and Machine Learning expertise. The project defines network packet dataset, application protocols with position and data type of fields and values in training, and evaluation of a new sequence-to-sequence model, byte level sequence-to-sequence network and classification of data type associated in network packets to evaluate generalisation capability.

University of Sydney

- John Cannon has been elected a Fellow of the Australian Academy of Sciences.
- Samuel Jelbart was awarded the Faculty of Science Prize for Outstanding PhD Thesis.
- Nicholas James was awarded the Faculty of Science Prize for Outstanding Academic Achievement.
- Nalini Joshi was elected as an honorary member of the Real Sociedad Matemática Española (Royal Spanish Mathematical Society).
- PhD student Harry Robertson was named a 2022 Westpac Future Leaders Scholar.

University of Wollongong

- Andrew Zammit Mangion has been awarded the 2022 Early Investigator Award from the Statistics and the Environment (ENVR) Section of the American Statistical Association. Andrew's citation reads: For highly impactful methodological and interdisciplinary research in spatio-temporal statistics applied to investigating causes and effects of a changing climate, for the development of important computational-statistical tools and related software, and for service to the profession.

UNSW Sydney

- Catherine Greenhill has been elected a Fellow of the Australian Academy of Sciences.
- Dr Amandine Schaeffer is the lead Chief Investigator on an ARC Linkage project that will shed new light on bluebottle dynamics, pathways, and distribution on beaches. In partnership with Surf Life Saving Australia, the project — funded at $441,371 — will develop the first bluebottle risk prediction tool for Australia's popular beaches. The research team also includes Professor Moninya Roughan (CI), Dr Jasmin Lawes, Professor Kylie Pitt (CI), Professor Alistair Poore (CI), A/Prof Anne Molcard, Dr Timothy Ingleton, Dr Meredith Campey, Mr Shane Daw, and Dr Saima Aijaz.

Appointments, departures and promotions

La Trobe University

- Dr Rupert Kuveke was recently appointed as lecturer in Statistics and Data Science (teaching-focused.)

Monash University

- Dr Vladka Seckarova was recently appointed as Assistant Lecturer.
- Dr Judy-anne Osborn was recently appointed as Lecturer.

University of South Australia

- Dr Belinda Chiera has been promoted to Associate Professor.
- Dr Josh Chopin commenced in January 2022 as Lecturer in Mathematical Sciences.
- Dr Lyron Winderbaum commenced in January 2022 as Lecturer in Mathematical Sciences.
- Dr Alex Tam commenced in April 2022 as Lecturer in Mathematical Sciences.

University of Southern Queensland

- Statistics Lecturer Catriona Croton left USQ on 24 May 2022.

University of Sydney

- As of July, after 21 years of outstanding service, Professor Anthony Henderson will transition to work as a mathematician for the Department of Defence.

Conferences and Courses

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

Information given here is the most up to date available to us at the time of going to press. You should check the relevant webpages, or contact the organisers directly, for updates.

For a summary of upcoming MATRIX programs at Creswick, see the article by Tom Keegan in this issue.

AMSI Winter School: New directions in representation theory

Dates: 20 June 2022 to 1 July 2022
Venue: The University of Queensland
Web: https://ws.amsi.org.au/

Representation Theory has undergone a revolution in recent years, with the development of new techniques which has led to resolution of many problems

previously considered to be intractable. The school aims to provide participants with a taste of these new techniques and exciting recent developments in the area.

It is expected that all participants will be proficient in advanced algebra at an undergraduate level as a prerequisite for the program.

Girls Do the Maths

Date: 22 June 2022
Venue: UNSW Sydney
Web: https://www.unsw.edu.au/science/our-schools/maths/engage-with-us/high-school-students-and-teachers/girls-do-the-maths

UNSW's School of Mathematics and Statistics will once again run its annual day of free workshops for female students in their final years of high school (years 10–12). Through interactive workshops, panel talks, and tours of UNSW facilitates (including a drop in on an undergraduate mathematics lecture) students will learn about university life, their career options, and the importance of mathematics from academics and senior university students. Topics covered will include mathematical modelling, Peter's Party Planning Problems, and counting conundrums.

Guest speaker: Hamideh Anjomshoa (2022 Women in Mathematics and Statistics Ambassador)

International Congress of Mathematicians

Dates: 6–14 July 2022
Venue: Online
Web: https://www.mathunion.org/icm/virtual-icm-2022

The International Congress of Mathematicians 2022 (ICM 2022) will now take place as a fully virtual event. The virtual ICM 2022 schedule is now available via a link on the webpage. Lectures are scheduled to take place between 9:00 and 18:00 CEST every day. Participation is free of charge, but registration will be required.

Prior to ICM 2022, the IMU will host its 19th General Assembly in Helsinki, Finland, on 3–4 July 2022. On 5 July 2022, the IMU will hold the IMU Award Ceremony 2022 as a live event at Aalto University in Helsinki. The winners of the Fields Medals, IMU Abacus Medal, Chern Medal Award, Carl Friedrich Gauss Prize and Leelavati Prize will be announced there, and the awards handed over. This event will be streamed. On the day after (6 July), the 2022 Fields Medalists and IMU Abacus Medalist will give prize winner lectures live in Helsinki. Admission to these lectures will be open to all who wish to attend. The lectures will also be streamed live.

Statistics and Mathematical Modelling in Combination

Dates: 16–18 November 2022
Venue: La Trobe University
Web: https://www.mathematics.org.au/sys/public/home.php?conf_id=57

Deterministic modellers and statisticians have a lot to be gained by working as a team in which both types of approaches are used. The combination of statistics and classical dynamics has long been a fertile field, tracing back to statistical mechanics from the end of the 19th century and stochastic differential equations from the 1920s. The need to combine the two modelling approaches has never been greater and neither has the opportunity for affordable high-performance computation. During the COVID-19 pandemic, agreement has been found between agent-based models and differential compartment equations in modelling infection numbers. Each approach gives confidence to the other, and this suggests scope for new hybrid models.

Asia Pacific Forum on Mathematics for Industry Mathematics (theme on Public Health and Sustainability)

Dates: 21–23 November 2022
Venue: La Trobe University
Web: A link with more information about the Forum will appear soon on the webpage of the preceding conference

AustMS 2022 Conference

Dates: 6–9 December 2022
Venue: UNSW Sydney
Web: coming soon

The annual AustMS Conference will be hosted by UNSW School of Mathematics and Statistics from 6–9 December. As always, it will bring together researchers and educators in the mathematical sciences from across Australia and around the world. In addition to plenary lectures, the scientific program will include special sessions on a wide range of research topics across pure and applied mathematics, as well as an Education Afternoon for teachers. The conference will also include a social component aimed at providing networking opportunities and fostering collaboration.

Plenary Speakers will include:

- Martin Bridson (University of Oxford)
- Serena Dipierro (University of Western Australia)
- Michael Donovan and Judy-Anne Osborn [Dr Yunupingu Lecturers]
- Nigel Higson (Penn State University)
- Mark McGuinness [ANZIAM Lecturer] (Victoria University of Wellington)
- Lewis Mitchell (The University of Adelaide)
- Lisa Piccirillo (Massachusetts Institute of Technology)
- Makiko Sasada (University of Tokyo) (to be confirmed)
- Anne Schilling [ANZAMP Lecturer] (University of California, Davis)

Registration is expected to open around July–August.

For further details, please contact the organisers: Pinhas Grossman (Chair), Arnaud Brothier, Quoc Thong LeGia, Vera Roshchina, Mircea Voineagu, Beatta Zarrabi.

Vale

Allen G. Howe

It is with sadness that we report the sudden passing of Algy Howe, at the age of 79.

Algy was the Society's Treasurer between 1994 and 2019, and an Honorary Member of AustMS in recognition of his many years of exceptional service.

Algy was born on the third of August 1942, and grew up in Guyra, NSW. He attended Armidale High School, before commencing his undergraduate studies at the University of New England in 1960. Algy completed his BSc Honours degree at UNE in 1963 and moved to the ANU in 1964 to undertake his doctoral degree in mathematics under the supervision of Andrew Coppel.

Following the successful completion of his PhD, specialising in differential equations, he took up a temporary lectureship at the University of Queensland in early 1967. Later in the year he commenced a two-year postdoctoral position at Brown University in the United States. In August 1969, Algy commenced his appointment as Lecturer in the Department of Pure Mathematics, in the Faculty of Arts at ANU, under the Headship of Hanna Neumann. He subsequently remained at ANU throughout the rest of his career.

Algy unexpectedly passed away on 21 December 2021, and will be deeply missed by all of those in our community who have had the pleasure of knowing him.

The Society wishes to expresses its condolences to his wife Maisie and children Marc and Melissa.

Roger J. Hosking

It is with sadness that we report the passing of Adjunct Professor Roger Hosking, University of Adelaide.

Prof Hosking joined the Society in 1975, was a Fellow of the AustMS (FAustMS), and a Life member. He was a Deputy Chair of ANZIAM from 1989 to 1990 and then Chair of ANZIAM from 1992 to 1993, and Deputy Chair again in 1993. He was an AustMS Council member from 1988 to 1991 and a Vice-President of the Society between 1990 and 1991. Our deepest condolences to Prof Hosking's family.

Neville John de Mestre

It is with sadness that we report the passing of Emeritus Professor Neville de Mestre. Professor de Mestre joined AustMS in 1982. He was a Council member in 1988 and Chair of ANZIAM from 2001 to 2003. He was a Life Member of AustMS and ANZIAM. Our deepest condolences to his family.

Barry Jones

It is with sadness that we report the passing in April of another former AustMS Treasurer, Barry Jones. Barry joined UQ's Department of Mathematics as a lecturer in 1968, working in abstract algebra and category theory. He was Treasurer of AustMS from 1983 to 1993.

John Henry Coates FRS

We are sad to report the passing of renowned Australian number theorist John Coates. He grew up in Possum Bush NSW, completed a BSc at the Australian National University and a PhD at Cambridge, under the supervision of Alan Baker. He held several positions in the United States before his first professorial appointment at ANU. He moved soon after to University of Paris XI, and then the École Normale Supérieure, before settling in Cambridge. He supervised over 30 doctoral students, including Andrew Wiles.

Election of officers and ordinary members of Council

Officers of Council

According to Paragraph 34 (i) of the AustMS Constitution, after the AGM in December 2022, Professor S. Ole Warnaar will move from being the President of the AustMS to being Immediate-Past-President, and Professor Jessica Purcell will move from being President-Elect to being President.

According to Paragraph 34 (iii), the positions of Secretary and Treasurer will be appointed by Council at its December 2022 meeting.

Nominations are invited for one Vice-President for the Session commencing after the Annual General Meeting to be held in December 2022. According to Paragraph 34 (ii) of the Constitution, current Vice-President Aidan Sims is eligible for re-election.

Officers of Council

The present Officers of the Society are:

President:	Ole Warnaar
President-Elect:	Jessica Purcell
Vice-President:	Aidan Sims
Secretary:	Deborah Jackson
Treasurer:	Lilia Ferrario
Vice-President (Chair of ANZIAM):	Natalie Thamwattana
Vice-President (Chair of ANZAMP):	Phillip Isaac

Ordinary Members of Council

Nominations are invited for three positions as Ordinary Members of Council, who shall be elected for a term of three consecutive sessions. Note that according to Paragraph 34(iv) of the Constitution, Greg Oates, Tim Trudgian and Marcy Robertson are not eligible for re-election at this time as Ordinary Members. According to paragraph 35 of the Constitution, representatives from Tasmania and the ACT will be required, to ensure that the Officers and elected members of Council include residents from all the States and the ACT.

The present elected Ordinary Members of Council are:

1. Members whose term of office expires after the AGM in 2022:
   Greg Oates Tim Trudgian Marcy Robertson
2. Members whose term of office expires after the AGM in 2023:
   Murray Elder Regina Burachik Serena Dipierro
3. Members whose term of office expires after the AGM in 2024:
   Artem Pulemotov Hamideh Anjomahoa Pierre Portal

To comply with Paragraphs 61 and 64 of the Constitution, all nominations should be signed by two members of the Society and by the nominee who shall also be a Member of the Society.

Nominations should reach the Secretary no later than *Friday 22 July 2022*.

Alternatively, members are encouraged to send informal suggestions to the Nominations and Publications Committee, by emailing the Secretary at Secretary@austms.org.au.

The incumbents would be pleased to speak with anyone interested in nominating.

For the information of members, the following persons are currently ex-officio members of Council for the Session 2021–2022.

Vice President (Annual Conferences):	Regina Burachik
Vice President (Learning and Teaching):	Chris Tisdell
Representative of ANZIAM:	Simon Clarke
Representative of ANZAMP:	Nathan Clisby
Public Officer of AustMS and AMPAI:	John Cossey
Chair, Equity, Diversity and Inclusion Committee:	Nalini Joshi
Member elected to Steering Committee:	Alan Welsh

Editors: Sid Morris/David Yost (Gazette)
John Loxton (Bulletin)
Jon Berrick (Journal of AustMS)
Gary Froyland (Lecture Series)
Andrew Bassom / Mike Meylan (ANZIAM Journal)
Tony Roberts (ANZIAM Journal Supplement/Electronic Editor)
Ross Moore (Web Site)

The Constitution is available from the Society's web pages, at https://austms.org.au/about-us/the-australian-mathematical-society-incorporated- constitution/

Nominations to Council Subcommittees, Society Offices and Editorships

The Nominations and Publications Committee makes recommendations to Council on membership of Council subcommittees, Officers appointed by Council and Editors of the Society's publications. In carrying out its responsibilities, the Committee seeks to foster diversity of representation.

On behalf of the committee, I now call for expressions of interest from members willing to serve in any positions that may become open next year or in future years.

The subcommittees of Council for which nominations are sought from Society members from time to time are the AustMS Medal Committee, the George Szekeres Medal Committee, the Gavin Brown Prize Committee, the Mahler Lecturer Committee, the Fellowship Committee, the Accreditation Committee, the Student

Conference Support Committee, the Standing Committee on Mathematics Education, the Accreditation Committee, the Membership and Marketing Committee and the Equity, Diversity and Inclusion Committee. In addition, Early Career Representatives, who organise Early Career Workshops, are nominated by the committee.

Some of the positions require particular expertise or experience and it will therefore assist the committee if those willing to serve briefly indicate the subcommittees or positions for which they consider themselves best suited and their relevant experience.

The 2023 ANZIAM Medal: call for nominations

Nominations are now sought for the ANZIAM Medal, which is the premier award of ANZIAM, a Division of the Australian Mathematical Society.

Closing date: **1st November 2022**.

Nominations for the Award can be made by any member of ANZIAM other than the nominee. A nomination should consist of a brief CV of the nominee together with the nominee's list of publications and a one-page resume of the significance of the nominee's work. Nominations should be forwarded in confidence, electronically in pdf format, to the Chair of the Selection Panel. Details will be available on the website soon.

Further details of the application process and the award criteria are on the ANZIAM website: www.anziam.org.au/The+ANZIAM+medal

The 2023 E.O. Tuck Medal: call for nominations

Nominations are now sought for the E.O. Tuck Medal, an award given in honour of the late Ernest Oliver Tuck, by ANZIAM, a division of the Australian Mathematical Society. The mid-career award is for outstanding research and distinguished service to the field of Applied Mathematics.

Closing date: **1st November 2022**.

Nominations for the Award can be made by any member of ANZIAM other than the nominee or members of the Selection committee. A nomination should consist of a brief CV of the nominee together with the nominee's list of publications, a one page resume of the significance of the nominee's research and a one page resume of the nominee's service contribution. Nominations should be forwarded in confidence, electronically in pdf format, to the Chair of the Selection Panel. Details will be available on the website soon.

Further details of the application process and the award criteria are on the ANZIAM website: www.anziam.org.au/The+EO+Tuck+Medal

The 2023 J.H. Michell Medal: call for nominations

Nominations are now sought for the J.H. Michell Medal, an award given in honour of John Henry Michell, by ANZIAM, a division of the Australian Mathematical Society. The award is for outstanding new researchers in Applied and/or Industrial Mathematics.

Closing date: **1st November 2022**.

Nominations for the Award can be made by any member of ANZIAM other than the nominee or members of the Selection committee. A nomination should consist of a brief CV of the nominee together with the nominee's list of publications and no more than a one page resume of the significance of the nominee's work. Nominations should be forwarded in confidence, electronically in pdf format, to the Chair of the Selection Panel. Details will be available on the website soon.

Further details of the application process and the award criteria are on the ANZIAM website: www.anziam.org.au/The+JH+Michell+Medal

AustMS Accreditation

The following members have been accredited as a Fellows of AustMS (FAustMS):

- Professor Serena Dipierro of the University of Western Australia.
- Professor Graeme Hocking of Murdoch University.
- Associate Professor Amie Albrecht of the University of the South Australia.

Walter and Lyn Bloom Travelling Fellowships

The **Walter and Lyn Bloom Travelling Fellowships** aim to assist early career mathematicians to spend research time overseas, to present papers at National and International Conferences and to make and maintain international contacts . The Fellowships are funded annually by Walter and Lyn Bloom.

Applications for the Walter and Lyn Bloom Travelling Fellowship should be emailed directly to the committee at bloom@austms.org.au by **3rd November 2022**.

Prospective applicants should follow the application procedures given at https://austms.org.au/awards-grants/awards/walter-and-lyn-bloom-travelling-fellowships/

News from the AustMS Council and its Committees

Mahler Lectureship Rule Change. The Mahler Lectureship Tours are usually held in odd years. Due to the global pandemic, the planned Mahler Lectureship 2021 Tour had been postponed until this year, an even year. In view of this change, a proposal to permanently change the Tour from odd to even years was proposed. This change was recently passed by Council.

News and social media. AustMS is pleased to announce the recent appointment of a new social media and news coordinator, Associate Professor Vera Roshchina, UNSW. Vera has taken up the role after Dr David Roberts, our inaugural social media and news coordinator, stepped down to pursue other commitments. We thank David for his great work in the role over the past eighteen months and look forward to Vera taking over. Remember to keep an eye out on our website, facebook, and twitter pages, for some great news and listings of upcoming events.

Inclusive Conference Guide. The AustMS EDI Committee has prepared an Inclusive Conference Guide. Members planning to organise an AustMS sponsored event are strongly encouraged to consult the guide which can be found in the Meetings and Events Section of the AustMS site.

The Baxter Prize. Emeritus Professor Rodney Baxter (ANU) is gifting the Society a generous amount for establishing The Rodney Baxter Prize for Mathematical Physics. Rodney Baxter has been one of the world's leading figures in the field of statistical mechanics and mathematical physics. Among his many honours are the 1987 Dannie Heineman Prize for Mathematical Physics, the 2006 Lars Onsager Prize, the 2013 Royal Medal and the 2021 Henri Poincar/'e Prize. The prize, initially valued at $5,000, will be awarded once every three years at the ANZAMP annual conference. Council have now approved the set of rules for the prize which will be posted on AustMS website soon.

Deborah Jackson AustMS Secretary
Email: Secretary@AustMS.org.au

Deborah Jackson (née Trueman) is a lecturer at La Trobe University. She began her academic career at Monash University and then moved to Swinburne University. After several years back at Monash, she joined La Trobe in 2010. Deborah was honorary Chair of the Victorian Algebra Group from 1996 to 2003 and its Secretary from 1994 to 1995. Deborah took over as Secretary of the Society in September 2019.

The Australian Mathematical Society

President:	Prof Ole Warnaar	School of Mathematics and Physics The University of Queensland Brisbane, QLD 4072, Australia. o.warnaar@maths.uq.edu.au
Secretary:	Dr D.C. Jackson	School of Engineering and Mathematical Sciences La Trobe University Bundoora, VIC 3086, Australia. d.jackson@latrobe.edu.au
Treasurer:	Prof Lilia Ferrario	Mathematical Sciences Institute Australian National University Canberra, ACT 0200, Australia. lilia.ferrario@anu.edu.au
Business Manager:	Ms May Truong	Department of Mathematics Building #145, Science Road Australian National University Acton, ACT 2601, Australia. office@austms.org.au

Membership and Correspondence

Applications for membership, notices of change of address or title or position, members' subscriptions, correspondence related to accounts, correspondence about the distribution of the Society's publications, and orders for back numbers, should be sent to the Treasurer. All other correspondence should be sent to the Secretary. Membership rates and other details can be found at the Society web site: www.austms.org.au.

Local Correspondents

ANU:	P. Bouwknegt	Southern Cross Univ.:	G. Woolcott
Aust. Catholic Univ.:	B. Franzsen	Swinburne Univ. Techn.:	N. Sukhorukova
Bond Univ.:	N. de Mestre	Univ. Adelaide:	T. Mattner
Central Queensland Univ.:	W. Guo	Univ. Canberra:	J. Ascione
Charles Darwin Univ.:	K. Khan	Univ. Melbourne:	B. Xia
Charles Sturt Univ.:	P. Charlton	Univ. Newcastle:	J. Turner
CSIRO:	R.S. Anderssen	Univ. New England:	B. Bleile
Curtin Univ.:	H. Bui	Univ. Queensland:	H.B. Thompson
Deakin Univ.:	L. Batten	Univ. South Australia:	G. Cheang
Edith Cowan Univ.:	U. Mueller	Univ. Southern Queensland:	T. Langlands
Federation Univ.:	D. Yost	Univ. Sunshine Coast:	P. Dunn
Flinders Univ.:	R.S. Booth	Univ. Sydney:	P. Kim
Griffith Univ.:	D. Harman	Univ. Tasmania:	B. Gardner
James Cook Univ.:	S. Belward	Univ. Technology Sydney:	S. Woodcock
La Trobe Univ.:	N. Kosytsina	Univ. Western Australia:	G. Wade
Macquarie Univ.:	A. Sikora	Univ. Wollongong:	G. Wheeler.
Monash Univ.:	A. Haley, G. Farr	UNSW Canberra:	T. Trudgian
Murdoch Univ.:	M. Lukas	UNSW Sydney:	V. Roshchina
Queensland Univ. Techn.:	P. Buenzli	Victoria Univ.:	A. Sofo
RMIT Univ.:	L. Tafakori	Western Sydney Univ.:	J. East

Publications

The Journal of the Australian Mathematical Society

Editor: Professor Jon Berrick
Sydney Mathematical Research Institute (SMRI)
The University of Sydney, NSW 2006, Australia

The ANZIAM Journal

Editor: Professor Andrew Bassom
School of Mathematics and Physics
University of Tasmania, Australia

Editor: Professor Graeme Hocking
School of Chemical and Mathematical Sciences
Murdoch University, WA 6150, Australia

Bulletin of the Australian Mathematical Society

Editor: Professor John Loxton
Western Sydney University, Penrith, NSW 2751, Australia

The *Bulletin of the Australian Mathematical Society* aims at quick publication of original research in all branches of mathematics. Two volumes of three numbers are published annually.

The Australian Mathematical Society Lecture Series

Editor: Professor Jacqui Ramagge
School of Mathematics and Statistics
The University of Sydney, NSW 2006, Australia

The lecture series is a series of books, published by Cambridge University Press, containing both research monographs and textbooks suitable for graduate and undergraduate students.

ISSN: 0311-0729

Published by The Australian Mathematical Publishing Association Incorporated
Typeset in Australia by TechType, ACT
Printed in Australia by Union Offset Printers, ACT

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