CMS NOTES de la SMC

Volume 35 No. 7 November/novembre 2003

In this issue / Dans ce numéro

MESSAGE FROM THE VICE-PRESIDENT

Dr. Samuel Shen,
VP Western Provinces

Français page 17

International Council for Industrial and Applied Mathematics

The International Council for Industrial and Applied Mathematics (ICIAM) is the applied mathematics counterpart of the International Mathematics Union (IMU). At the ICIAM's 2003 council meeting in Sydney, Australia, CMS became an Associate Member of the ICIAM.

The ICIAM is governed by a president, past-president, president-elect, a secretary, a treasurer, and two members-at-large. The current president is Ian Sloan from Australia. The ICIAM website is *www.iciam.org*. The missions of the ICIAM are to promote industrial and applied mathematics globally, to promote interactions between member societies, to promote the goals of these societies, and to coordinate planning for periodic international meetings on industrial and applied mathematics. The Canadian Applied and Industrial Mathematics Society (CAIMS) is a small full member of the ICIAM and has one vote at the council meeting. (SIAM is a large full member and has two votes.) CMS, as an Associate Member, has one vote at the council. The ICIAM has four Associate Members: European Mathematical Society, London Mathematical Society, Swiss Mathematical Society, and CMS. The rights of an associate member are more limited than those of a full member.

Like the IMU, the ICIAM holds an academic conference once every four years. The past conferences were at Paris (1986), Washington DC (1991), Hamburg (1995), Edinburgh (1999) and Sydney (2003). ICIAM conferences follow a format similar to those of the ICM (International Congress of Mathematicians) and the SIAM (Society of Industrial and Applied Mathematics). An ICIAM congress has about 27 plenary and parallel invited lectures, a number of mini-symposia, sessions for contributed talks, and poster sessions. Each mini-symposium lasts two hours and includes four speakers. One may organize more than one mini-symposium on a research topic. The contributed sessions consist of 15-minute talks.

continued on page 9

CMS NOTES
NOTES DE LA SMC

Les *Notes de la SMC* sont publiés par la Société mathématique du Canada (SMC) huit fois l'an (février, mars, avril, mai, septembre, octobre, novembre et décembre).

Rédacteurs en chef
Robert J. MacG. Dawson;
S.Swaminathan
notes-redacteurs@smc.math.ca

Rédacteurs-gérant
Graham P. Wright
gpwright@smc.math.ca

Rédaction
Éducation: Edward Barbeau;
Harry White
notes-education@smc.math.ca
Réunions: Monique Bouchard
notes-reunions@smc.math.ca
Revues: Peter Fillmore
notes-redacteurs@smc.math.ca
Recherche: Vacant
notes-recherche@smc.math.ca

Assistante à la rédaction
Nathalie M. Blanchard

Note aux auteurs: indiquer la section choisie pour votre article et le faire parvenir au *Notes de la SMC* à l'adresse postale ou de courriel ci-dessous:

Société mathématique du Canada
577, avenue King Edward
C.P. 450, Succursale A
Ottawa, Ontario, Canada K1N 6N5

Téléphone: (613) 562-5702
Télécopieur: (613) 565-1539

courriel : notes-articles@smc.math.ca
Site Web : *www.smc.math.ca*

Les *Notes*, les rédacteurs et la SMC ne peuvent être tenus responsables des opinions exprimées pas les auteurs. Les fichiers d'option de style utilisés pour la production de ce volume sont une version modifiée des fichiers conçus par Waterloo Maple Software, © 1994, 1995.

ISSN : 1193-9273 (imprimé)
1496-4295 (électronique)

EDITORIAL

Robert J. MacG. Dawson

The Complex Numbers We Can't Live Without

In the early morning of Monday, September 29, 2003, Hurricane Juan made landfall at Halifax, Nova Scotia. Winds gusted to about 175 kph, and high waves and storm surge caused extensive coastal damage. Thousands of trees blew over, claiming two lives, altering Point Pleasant Park and the Public Gardens for generations, and knocking out power lines and transformers throughout the city.

Residents (including both your editors) awoke to a city without power; this was the beginning of a blackout that lasted, on some streets, for a week or more. Universities, businesses, and nonessential services closed. Cooking was done on barbecues and Coleman stoves; evenings were lit by candles and kerosene lamps. A hundred thousand refrigerators slowly started to thaw; a generator was a possession more envied than a yacht or a swimming pool.

Similar stories have played out, in recent years, in Ontario and Quebec. The ice storm of 1998 caused far greater devastation than Hurricane Juan, keeping some areas in the dark for a month or more. On August 14th of this year, another massive blackout occurred – this time not caused by any natural disaster, but by snowballing technical failures. In every case, most of those involved emerged with a renewed appreciation of that staple of our society, alternating current.

It was Thomas Edison who first put forward the idea of delivering centrally-generated electricity to homes and businesses; but he initially sent direct current over the transmission lines. This had many drawbacks, notably the difficulty of obtaining any voltage other than the line voltage except by wasteful methods involving huge, hot resistors. Moreover, it was difficult to avoid transmission losses, so the fixed voltage supplied by the system varied from place to place.

George Westinghouse and Nikola Tesla, on the other hand, pioneered the use of alternating current. This had several advantages. Firstly, an AC motor could be far simpler than any DC motor, because the constant change in the voltage provided the lack of equilibrium needed to keep the motor moving. (Some AC motors — like those found in electric clocks — have no moving part other than the rotor, and no switching mechanisms!) Secondly, alternating current can be converted to almost any voltage (with a compensating change in current) by the use of a transformer. This device shares the elegant simplicity of the simplest AC motors: it has no moving parts, and typically consists of nothing but two copper coils sharing an iron core. Yet, mysteriously, when an alternating current is placed across one coil, an answering potential — at the same frequency but a different voltage — appears across the other.

The development of efficient transformers — and many other important developments in AC technology — is due in a large part to Charles Proteus Steinmetz. Steinmetz, who worked for Westinghouse after he emigrated form Europe to the USA, was a strong believer in the power of theory — a view diametrically opposed to that of Edison, who famously relied on painstaking experiment and repeated trials. The archetypal Steinmetz story, on the other hand, involves Steinmetz,

hired as a consultant by General Electric to diagnose a problem with a generator, studying it for some time and then chalking an "X" on the casing. He is said to have left instructions to cut into the casing at that point and remove a certain number of turns of wire. This (so the tale runs) proved successful, and Steinmetz submitted an itemized bill that read:

"Marking an X on the side of generator: $ 1.00

Knowing where to mark it: $999.00"

Steinmetz's single biggest contribution was probably the discovery was that alternating currents were most naturally measured, not by positive real numbers (like coal, oil, or gas), or by real numbers (like direct current), but by complex numbers. This insight was the beginning of modern power engineering, as well as the basis of the theory of electronic filtering circuits. Instead of treating a passive filter network as made up of resistors, capacitors, and coils, all acting differently and described by a complicated system of differential equations, an electronic engineer may consider them all as resistors — but the "resistances" of the capacitors and coils will be imaginary numbers, and functions of the frequency. Complex analysis and Fourier transforms also play their part in allowing the effect of a filter on complex signals to be precisely predicted.

Today, although the basics of complex numbers are taught in high school, the phrase "the square root of minus one" still has a slight sound of, well, unreality about it. The unfortunate term "imaginary number" may be partly to blame here. Be that as it may — a major power blackout illustrates just how real a complex number can be.

THIRD COMPETITION FOR THE NSERC-CMS "MATH IN MOSCOW" SCHOLARSHIP

The second competition took place in September 2003. Sébastien Labbé, Sherbrooke University is the winner of this competition. He will benefit from a $10,000 scholarship to attend the winter semester 2004 at the Moscow Independent University.

We wish him a very interesting and exciting semester.

NSERC - CMS Math in Moscow Scholarships

The **Natural Sciences and Engineering Research Council** (NSERC) and the **Canadian Mathematical Society** (CMS) are pleased to announce three scholarships of $10,000 each. Canadian students registered in a mathematics or computer science program are eligible.

The three scholarships are to attend a semester at the small elite Moscow Independent University.

Math in Moscow Program
www.mccme.ru/mathinmoscow/

Application details
www.cms.math.ca/bulletins/Moscow_web/

For additional information please see your department or call the CMS at 613-562-5702.

Two scholarships will be awarded in the spring competition

Deadline
April 15, 2004
to attend the Fall 2004 semester

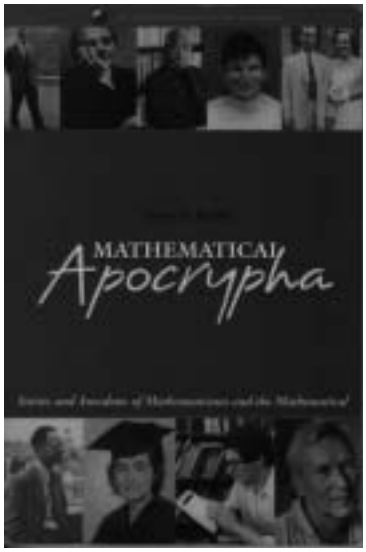
One scholarship will be awarded in the fall competition

Deadline
September 30, 2004
to attend the Winter 2005 semester

HELL-BENT ON TELLING STORIES ABOUT EACH OTHER

Book review by Robert Paré, Dalhousie University

Mathematical Apocrypha
By Steven G. Krantz
MAA Spectrum 2002 xii+ 214 pages



Adrien Pouliot (1896-1980), whose name will be familiar to readers of the *Notes*, was the moving force behind the creation of the Faculty of Science at Laval University and then the department of mathematics. He was also instrumental in founding Radio Canada in the Prairies. The accomplishment of such feats required that he hobnob with politicians and other influential people, which he did enthusiastically. He was my teacher in the mid 60's and was already a legend. He was an energetic lecturer and his love of the subject was contagious. At one point there was a joke circulating among the students, one better suited to the locker room than the classroom. I don't remember the details but it involved letters associated to numbers, input of arbitrary numbers from the listener and calculations to be performed. One fellow said "Let's tell it to Pouliot!" I was shocked. You couldn't tell that sort of joke to your professor. But they went ahead anyway and I watched from the sidelines. Pouliot's reaction wasn't at all what I expected. He laughed so hard he was bent in two, his face red. When he regained his composure, he said "I have to tell this one to Jean Lesage". Jean Lesage was the premier of Quebec at the time. Later, Pouliot told us Lesage had enjoyed the joke.

In the preface to his book, Mathematical Apocrypha, Steven Krantz says "... [he has] never encountered a group that is so hell-bent on telling stories about each other as are mathematicians". I would agree with that. In the book under review, Krantz collects almost 500 such stories grouped loosely under the headings: Great Foolishness; Great Affrontery; Great Ideas; Great Failures; Great Pranks; Great People. There is an index with all the names mentioned in the book, names ranging from Archimedes, Euclid, Euler to Atiyah, Grothendieck, von Neumann to Clint Eastwood, Art Garfunkel and Brooke Shields.

Krantz has an engaging style of writing and none of the stories is mean-spirited. Some of the stories I had heard before with some differences, often significant. In his preface, he writes: "My title is not meant to suggest that the stories contained herein are in any sense unreliable or fabricated. Rather, the title is meant in part to attract the potential reader's attention and in part to suggest an entree to some fun. Most of the stories here are in fact verifiable, and have been checked (in the fashion of investigative reporters) with other witnesses."

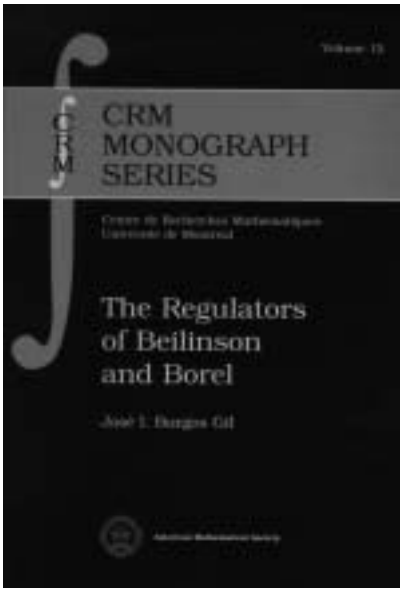
I was glad to get the verified versions of these stories, and many more as well. This is a book you can put down. But then you will want to pick it up again, and again. With its over 50 photographs, it gives a wonderful picture of the characters who people our profession.

Let me end with another anecdote of my own, not because I have any aspirations of becoming the Canadian Steven Krantz, but merely for reasons of symmetry. In the 70's, we used to have several week-end category theory meetings each year at Columbia. It was easier to pass immigration if you had a passport but it was not necessary for Canadians. Once, when I didn't have mine and was asked for identification, I produced my library card. I thought that would do it as it had my picture, but the immigration officer wanted something with my date of birth, a driver's license for example. I could see his suspicions rise when I said I didn't have a driver's license. After some discussion, I told him my date of birth, which he typed into his computer. After looking at the screen for what seemed a long time, he asked "Are you coming to New York to prove some theorems?" Amazed, I asked "Does it say that on your computer?" "No", he said, "your library card says Department of Mathematics".

It's nice to know that some members of the public know that what we do is not just multiply big numbers. The present book will certainly help change the public's view of the mathematical community as consisting of stuffy individuals working in an arid and arcane field, but it is probably mathematicians themselves who will enjoy it most.

THE REGULATORS OF BEILINSON AND BOREL

Book review by James D. Lewis, University of Alberta.



The Regulators of Beilinson and Borel
by José I. Burgos Gil
CRM Monograph 15
AMS 2002 xi + 104 pages

A General Overview

In his celebrated work on higher regulators and values of L-functions, Beilinson [Be] introduced his definition of a regulator map from the algebraic K-theory of algebraic varieties over **R**, to real Deligne cohomology. He introduced a number of far reaching conjectures in the subject of motives, K-theory and number theory. In a special instance, his regulator can be compared with Borel's regulator, and he outlines a proof that these two regulators coincide. A number of people have tried to give a precise proof to Beilinson's claim. For example, Rapoport [Ra] was able to prove that both regulators agree up to a rational number. In [Z], Dupont, Hain and Zucker conceived of a novel way to compare these two regulators. Although they were not successful at this, they did conjecture the more precise relationship between these two regulators. Namely, that the Borel regulator is twice Beilinson's regulator. This book gives a complete proof of the aforementioned relationship between these two regulators. The approach is based on Beilinson's original argument, and relies on the earlier work of Rapoport (op. cit.).

Background

Borel's regulator is seen as a generalization of Dirichlet's regulator to higher K-theory. The definition of Dirichlet's regulator is given as follows. Let k be a number field, and $\mathcal{O}$ its ring of integers, with group of units $\mathcal{O}^\times$. Dirichlet introduces a map $\rho : \mathcal{O}^\times \to \mathbf{R}^{r_1+r_2}$, where r_1 and $2r_2$ are the number of real (resp. complex) embeddings of k in its algebraic closure. The image is contained in a hyperplane H, which contains $\rho(\mathcal{O}^\times)$ as a lattice. That is, one has an isomorphism

$$\rho \otimes \mathbf{R} : \mathcal{O}^\times \tilde{\to} H,$$

and the rank of $\mathcal{O}^\times$ is r_1+r_2-1. The covolume of this lattice,

$$R_D := \mathrm{Vol}\,(H/\rho\,(\mathcal{O}^\times)),$$

is called Dirichlet's regulator. By the class number formula, this number R_D connects the class number h and roots of unity w with a limiting value of Dedekind's zeta function $\zeta(s)$. More specifically,

$$(*) \qquad R_D = -\frac{w}{h} \lim_{s\to 0} \zeta(s)s^{-(r_1+r_2-1)}.$$

The definition of Dedekind's zeta function involves local data at the primes of $\mathcal{O}$. Thus this formula illustrates in a nontrivial way, the local to global principle. In the direction of generalization, the units $\mathcal{O}^\times$ are the same thing as the algebraic K-group $K_1(\mathcal{O})$. Borel introduced regulator maps r_{Bo} on the higher K-groups $K_{2p-1}(\mathcal{O})$ for $p \geq 2$, and arrived at a generalization of the formula in (*), expressed as the covolume $R_{Bo,p}$ of $r_{Bo}(K_{2p-1}(\mathcal{O}))$ with respect to a lattice of rank $d_p := \mathrm{rank}(r_{Bo}(K_{2p-1}(\mathcal{O}))$, taking the form

$$R_{Bo,p} \approx \mathbf{Q}^\times \lim_{s\to -p+1} \zeta(s)(s+p-1)^{-d_p}.$$

[For technical reasons, the Borel regulator r_{Bo} is a renormalized version of Borel's original definition.]

For a smooth algebraic variety X defined over **R** (for example a smooth complex variety X, viewed over **R** via $X \to \mathrm{Spec}(\mathbf{C}) \to \mathrm{Spec}(\mathbf{R})$), and from the Chern character map for higher K-theory, Beilinson introduces regulator maps from certain graded pieces of the K groups of X (with respect to the γ-filtration), called Absolute cohomology, to real Deligne cohomology. In the special

THE REGULATORS OF BEILINSON AND BOREL *continued*

instance where $X = \mathrm{Spec}(\mathcal{O})$, and where we put $H^l_{\mathcal{A}}(X,\mathbf{Q}(p)) = K_{2p-1}(\mathcal{O})\otimes\mathbf{Q}$, this gives a map

$$r_{Be} : H^l_{\mathcal{A}}(X,\mathbf{Q}(p)) \to H^l_{\mathcal{D}}(X_{/\mathbf{R}},\mathbf{R}(p)),$$

where $H^l_{\mathcal{D}}(X_{/\mathbf{R}},\mathbf{R}(p))$ is real Deligne cohomology, and where it is known that $r_{Be}\otimes\mathbf{R}$ is an isomorphism. The point is that it is known that $H^l_{\mathcal{D}}(X_{/\mathbf{R}},\mathbf{R}(p))$ has a natural $\mathbf{Q}$-structure, and with respect to this $\mathbf{Q}$-structure, the Beilinson regulator is given by $R_{Be,p} = \det(\mathrm{Im}(r_{Be}))$. Since this value is defined only up to a $\mathbf{Q}^\times$ multiplicative factor, one introduces a natural lattice in $H^l_{\mathcal{D}}(X_{/\mathbf{R}},\mathbf{R}(p))$ and correspondingly defines $R_{Be,p}$ in terms of a covolume with respect to this lattice. For number fields, Beilinson conjectures that

$$R_{Be,p} \approx \mathbf{Q}^\times \lim_{s\to -p+1} \zeta(s)(s+p-1)^{-d_p}.$$

Thus if these regulators coincide, then Borel's theorem is a particular case confirmation of Beilinson's conjectures. In [Be], Beilinson claims and sketches a proof that r_{Be} and r_{Bo} coincide. The point of this book is to provide all the necessary ingredients in the proof that these regulators coincide up to a factor of two, namely $r_{Bo} = 2r_{Be}$.

The Book Under Review

The comparison of these two regulators is given in the final chapter of this book, where the definition of Beilinson's regulator is given. This follows the definition of Borel's (renormalized) regulator in the previous chapter. The preceeding chapters are aimed at providing the necessary background to understand the proof. In the words of the author, "One of the difficulties a beginner may have in studying this topic is the maze of cohomology theories used and the different results from algebraic topology and Lie group theory needed". To this end, the author provides a breezy introduction to several topics, such as simplicial sheaves, Hopf algebras, Chern-Weil theory, Lie algebra cohomology and continuous group cohomology. Chapters 7 to 10 contain the heart of the work, beginning in chapter 7 with theory of cosimplicial algebras and small differential graded algebras, as introduced by Beilinson. This chapter follows [Ra] rather closely. One of the main ingredients for the comparison is the van Est isomorphism in chapter 8. As mentioned above, chapters 9 and 10 define the main ingredients (the two regulators), and the proof that they coincide. In summary, this book is a nice piece of work that provides the first complete detailed proof that these two regulators coincide. It is reasonably self-contained, and should be regarded as recommended reading for anyone willing to learn this subject.

References

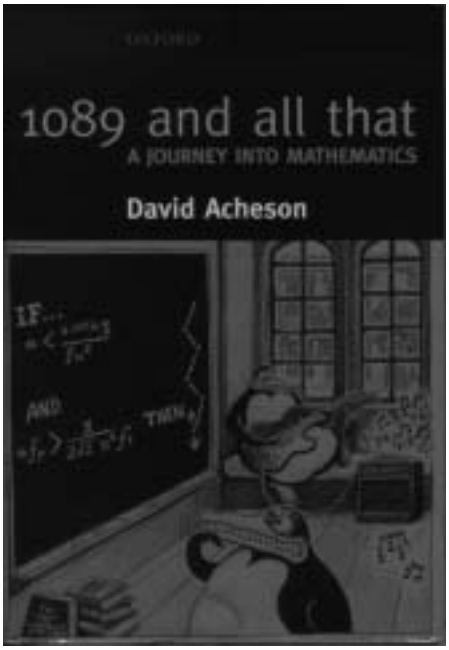
[Be] A. A. Beilinson, *Higher regulators and values of L-functions*, J. Soviet Math. 30 (1985), pp. 2036-2070.

[D-H-Z] J. Dupont, R. Hain, and S. Zucker, *Regulators and chararcteristic classes of flat bundles, The Arithmetic and Geometry of Algebraic Cycles*, Proceedings of te CRM Summer School, June 7-19, 1988, Banff, Alberta, Canada, (B. B. Gordon, J. D. Lewis, S. Müller-Stach, S. Saito, N. Yui, eds.), CRM Proceedings and Lecture Notes, Vol. 24, 2000, pp. 47-92.

[Ra] M. Rapoport, *Comparison of the regulators of Beilinson and Borel, Beilinson's Conjectures on Special Values of L-Functions* (M. Rapoport, N. Schappacher, and P. Schneider, eds.), Perspectives in Math., Vol. 4, Academic Press, Boston, MA, 1988, pp. 169-192.

BRIEF BOOK REVIEWS

By Peter Fillmore, Dalhousie University



1089 and All That: A Journey Into Mathematics

by David Acheson
Oxford University Press 2002, v + 178 pages.

"This extraordinary book makes mathematics accessible to everyone. It provides an entertaining and witty overview of the subject, with fascinating puzzles and numerous illustrations, including sketches by world famous cartoonists. It is, quite simply, one of the most readable explanations of mathematics available." This jacket blurb does not exaggerate, at least not by much. Beginning with the "1089 trick" and concluding by proving that $e^{i\pi} = -1$, the reader is led on a wonderful tour of such topics as the Pythagoras theorem, infinite series, proof by contradiction, algebra (including explaining the 1089 trick), Kepler and Newton on planetary motion, the derivative, networks, induction, the area of a circle, differential equations, the number e, chaos, and multiple pendulums. The text includes amusing anecdotes, well-chosen quotations and many good examples, accompanied by illustrations on virtually every page. Acheson tells us that mathematics consists of wonderful theorems, beautiful proofs, and great applications, and he gives us plenty of all three. The book is suitable for young and old, for those in school or at university, and, it must be added, for mathematicians too.

Dynamical Systems and Their Applications in Biology

Shigui Ruan, Gail S.K. Wolkowicz and Jianhong Wu, eds.
Fields Institute Communications 36
AMS 2003, viii + 268 pages.

From the preface: This volume contains the proceedings of the International Workshop on Dynamical Systems and Their Applications in Biology that was held at the Canadian Coast Guard College, August 2-6, 2001, on Cape Breton Island, Nova Scotia. The aim of the workshop was to bring together a very focussed group of international experts to present their latest results in a setting that would also encourage informal discussion of promising research directions in dynamical systems and mathematical biology and promote future research collaborations.

The proceedings contains 19 papers by 35 authors and includes articles on the qualitative and/or numerical analysis of models involving ordinary, partial, functional and stochastic differential equations as well as difference equations. Applications include epidemiology, population dynamics, and physiology. The workshop was supported by the National Program Committee of the three Institutes, AARMS (the Atlantic Association for Research in Mathematical Sciences), and Dalhousie University.

Chirurgie des Grassmanniennes

by L. Laforgue
CRM Monograph Series 19
AMS 2003, xx + 170 pages.

This monograph is based on lectures given by the author in May 2002, during his tenure as the Aisenstadt Chair at the CRM in Montréal. The book is divided into an extensive introduction and five chapters, entitled "Cellules de Schubert minces et espaces de configurations de matroïdes", "Compactifications: Pavages de convexes entiers et recollement des cellules de Schubert minces", "Étude de quelques familles simples de compactifications", "Le fibré équivariant universel sur la variété torique des facettes des pavages", and "Variations de variétés projectives rationnelles avec structures logarithmiques". From the cover: The various compactifications of moduli spaces are an important recurrent theme of modern mathematics, and they have a large number of applications. This book treats the case of thin Schubert varieties, which are natural subvarieties of Grassmannians. The author was led to these questions by a particular case linked to his work on the Langlands program. In this monograph, he develops the theory in a more systematic way, which exhibits strong similarities with the case of moduli of stable curves.

MESSAGE FROM THE VICE-PRESIDENT

(*Continued from page 1*)

One important concern recognized at the 2003 ICIAM congress in Sydney was "pure applied mathematics." The "I" (i.e., industrial) component in the ICIAM was underrepresented. Currently, many outstanding applied mathematicians in academic institutions are conducting differential-equation- and numerical-analysis-oriented researches. However, many challenging and exciting problems in industries and governmental missions involve observed data, observational designs, and strategic plans. Discrete mathematics, statistics, data processing, and computing are in great demand when making the governmental and industrial consultation. Ample resources are available to mathematicians since the development of modern technologies, governmental management, and financial operation all require advanced mathematics skills. The opportunities and resources require applied mathematicians to change from method-oriented research to problem-oriented research, from deductive thinking to inductive thinking, from logic formality to original creativity, and from single-disciplinary investigation to cross-disciplinary exploration. The changes are creating a situation similar to that of the earlier development of mathematics when Newton and Gauss invented many basic theories of mathematics that were motivated from observations and experiments. Moreover, these changes will prompt the reform of applied mathematics teaching: an applied mathematics student will learn skills of data analysis, basic statistics and computing. The new applied mathematics research will not only provide solutions to practical problems but also invent new theories of mathematics. This process will inevitably involve interaction and collaboration between pure and applied mathematicians.

Arvind Gupta, Director of MITACS (Mathematics of Information and Complex Systems), gave three talks at the 2003 ICIAM conference. One of his talks was entitled "Establishing industry-academic projects in the mathematical sciences: a Canadian perspective." He showed that MITACS is an excellent example of a successful collaboration among pure mathematicians, applied mathematicians, statisticians, engineers, and scientists in other disciplines. The audience was deeply impressed by the excellent Canadian resources that both the federal government and industries provide for mathematicians.

The next ICIAM congress will be held in Zurich, Switzerland, 2007.

PURE MATHEMATICS DEPARTMENT

Tenure-Track Position - University of Waterloo

The Department of Pure Mathematics at the University of Waterloo invites applications for one or more anticipated tenure-track positions starting July 1, 2004. The Department is particularly interested in candidates with research interests in algebra, geometry or topology, though outstanding candidates in all areas of Pure Mathematics will be considered.

In order to be considered a candidate must either have a Ph.D. or expect to complete the degree prior to the beginning of the appointment. Postdoctoral experience is preferred but not required. An appointment will be offered only to someone with very strong research and teaching qualifications. The closing date for receipt for applications is November 14, 2003. Applicants should submit their curriculum vitae, together with the names of at least three referees, and should arrange for letters of reference to be sent directly from the referees.

All qualified candidates are encouraged to apply; however Canadians and permanent residents will be given priority. The University of Waterloo encourages applications from all qualified individuals, including women, members of visible minorities, native people, and persons with disabilities. This appointment is subject to the availability of funds.

Please send applications to:
Dr. F. Zorzitto, Chair
Department of Pure Mathematics
University of Waterloo
Waterloo, Ontario, Canada N2L 3G1

The department's Web page is at *http://math.uwaterloo.ca/PM_Dept/*

CALL FOR SESSIONS / PROPOSITIONS DE SÉANCES

CMS Winter Meeting December 2004 / Réunion d'hiver de la SMC 2004

Additional self-supported sessions play an important role in the success of our meetings. The CMS welcomes and invites proposals for self-supported sessions for this joint meeting (December 11 - 13, 2004) at McGill University. Proposals should include a brief description of the focus and purpose of the session, the number and expected length of the talks, as well as the organizer's name, complete address, telephone number, e-mail address, etcetera. These additional sessions will be incorporated with the other sessions in time blocks allocated by the Meeting Directors. All sessions will be advertised in the CMS Notes, on the web sites and, if possible, in the Notices of the AMS and in publications of other societies. Speakers in these additional sessions will be requested to submit abstracts which will be published in the meeting programme. The following provides information on the sessions confirmed to date.

Those wishing to organize a session should send a proposal to the Meeting Director by the deadline below.

Les séances complémentaires autonomes jouent un rôle important dans le succès de nos Réunions. La SMC vous invitent à proposer des séances autonomes pour son congrès conjoint qui se tiendra à l'Université McGill (du 11 décembre au 13 décembre 2004). Toute proposition comprendra une brève description de l'orientation et des objectifs de la séance, le nombre de communications prévues et leur durée ainsi que le nom, l'adresse complète, le numéro de téléphone, le courriel et autres coordonnées de l'organisateur. Ces séances complémentaires seront intégrées aux autres séances au programme, dans des cases horaires prévues à cet effet par les directeurs de la Réunion. Toutes les séances seront annoncées dans les Notes de la SMC, sur les sites Web des deux sociétés et, si possible, dans le bulletin de l'AMS et les publications d'autres sociétés. Les conférenciers de ces séances complémentaires devront présenter un résumé qui sera publié dans le programme de la Réunion. Vous trouverez ci-dessous de l'information sur les séances déjà confirmées.

Toute personne qui souhaiterait organiser une séance est priée de faire parvenir une proposition à l'un des directeurs de la Réunion avant la date limite ci-dessous.

Deadline: January 15, 2004 / Date limite : 15 janvier, 2004

Meeting director / directeur de la réunion :

Olga Kharlampovich
CMS Winter Meeting 2004 / Réunion d'hiver 2004 de la SMC
Department of Mathematics & Statistics
McGill University
805 Sherbrooke Street West, Montréal, Québec - Canada H3A 2K6
Tel: 514-398-3808 Fax: 514 398-3899
olga@math.mcgill.ca

Number Theory: Andrew Granville
Combinatorial and Geometric Group Theory: Dani Wise
Arithmetic Geometry: E. Goren and Adrian Iovita
Applications of Computer Science in Algebra:
Alexei Miasnikov, and Vladimir Shpilrain
Harmonic Analysis: Galia Dafni
Mathematical Methods in Statistics: David Woldfson,
Alain Vandal, and Russell Steele
Regularization Problems in Statistics: Jack Ramsay
Mathematics Education: organizer to be confirmed
Contributed Papers: William Brown

AWARDS / PRIZES

The 8th Adrien-Pouliot Award

Dr. Andy Liu

In 1980 Andy Liu joined the Department of Mathematical and Statistical Sciences at the University of Alberta. Since that time he has had a profound effect on mathematics education at the University, in the Secondary Schools, in the City and in the province. His passionate commitment to the study of mathematics and to innovative techniques allows him to share his knowledge with students of all ages; and his unique ability to present difficult concepts in a clear and logical manner helps his students to learn and understand rather than to simply memorize. Without a doubt, Dr. Liu, with his remarkable talent and devotion has made truly significant and sustained contributions to mathematics education in Canada and around the world for over a quarter of a century.

If there is a mathematical activity taking place in Edmonton, you can be sure that Andy is somewhere nearby. He is a regular speaker at schools of all levels as well as at conferences on mathematics education; and he has served as a resource person for the Edmonton Association for Bright Children. He is a devoted supporter of mathematics competitions using them as a way to motivate and promote interest in mathematics at the local, provincial, national and international levels. Andy has founded and edited six issues per year of a newsletter, *Postulate*, for high school students and their teachers; he has prepared teaching materials for a number of Mathematics Olympiad courses; and he has conducted training sessions for the International Mathematics Olympiad (IMO) teams from several nations, including Canada. In August 2000 he led the Canadian IMO to South Korea where they placed 17th out of 82, with one gold, two silver, one bronze, and an honourable mention. His impact is indeed felt around the world and in 1995 he received the IMO Certificate of Appreciation and the David Hilbert International Award for the promotion of Mathematics Competitions.

Andy's expertise extends to the publishing world well beyond *Postulate*. He is on the editorial boards of several international journals, including *CRUX Mathematicorum*, the problem-solving journal of the Canadian Mathematical Society; and he is a contributor to international journals such as *Mathematics Digest*, *Function*, and *Excalibur*. Since 1992, Andy has won 11 University national and international teaching and education related awards including 3M Teaching Fellowships, the Canadian Professor of the Year Award, the 2002 Distinguished Teaching Award from the Mathematical Association of America, and now, most recently, the 2003 Adrien Pouliot Award of the Canadian Mathematical Society.

Andy Liu s'est joint à l'équipe du département de sciences mathématiques et statistiques de l'Université de l'Alberta en 1980. Depuis, il a exercé une influence marquante sur l'éducation mathématique dans son université, les écoles secondaires, la ville et la province. Animé d'une grande passion pour l'étude des mathématiques et les techniques novatrices, il transmet aisément ses connaissances à des étudiants de tout âge. En outre, son extraordinaire faculté de présenter des concepts difficiles d'une façon claire et logique facilite l'acquisition des connaissances et la compréhension, plutôt que la simple mémorisation. À n'en pas douter, le professeur Liu, grâce à son talent et à son dévouement remarquables, contribue de façon marquée et soutenue à l'éducation mathématique au Canada et dans le reste du monde depuis plus de 25 années.

S'il s'organise une activité mathématique à Edmonton, Andy y est sans doute mêlé de près ou de loin. Il va souvent rencontrer les élèves dans les écoles, il donne des conférences sur l'éducation mathématique et il sert de personne-ressource auprès de l'Association for Bright Children d'Edmonton. Il est un partisan inconditionnel des concours mathématiques, dont il se sert pour susciter l'intérêt envers les mathématiques tant sur la scène locale que provinciale, nationale et internationale. Andy a fondé le bulletin *Postulate*, publié six fois l'an et destiné aux élèves et aux enseignants du secondaire; il a conçu du matériel pédagogique pour des cours de préparation aux olympiades mathématiques; il a animé des séances de formation pour les équipes participant à l'Olympiade

internationale de mathématiques (OIM) de plusieurs pays, dont le Canada. En juillet dernier, il a dirigé l'équipe canadienne à l'OIM 2003, tenue au Japon. L'équipe s'est classée ex aequo au 12e rang sur 83 pays, avec deux médaillés d'or (dont le plus jeune participant canadien à ce jour à remporter l'or et la première Canadienne) et trois de bronze. Son influence se fait sentir partout dans le monde, si bien qu'il a reçu, en 1995, le certificat d'appréciation de l'OIM et le prix international David-Hilbert pour la promotion des concours mathématiques.

Le dossier de publications d'Andy Liu dépasse largement le bulletin *Postulate*. Andy fait partie du comité de lecture de plusieurs revues internationales, dont *CRUX Mathematicorum*, la revue de résolution de problèmes de la SMC, et il contribue régulièrement à d'autres revues internationales comme *Mathematics Digest*, *Function* et *Excalibur*. Depuis 1992, Andy s'est vu décerner onze prix universitaires nationaux et internationaux d'excellence en enseignement ou en éducation, dont des prix d'enseignement 3M, le prix du professeur canadien de l'année, le Distinguished Teaching Award 2002 de la Mathematical Association of America, et maintenant le prix Adrien-Pouliot 2003 de la SMC.

The G. de B. Robinson Prize

Dr. James Greig Arthur

The 2003 G. de B. Robinson Prize is awarded to Professor James Arthur of the University of Toronto for the paper, "A Note on the Automorphic Langlands Group" Canad. Math. Bull. 45, 2002, pp. 466-482. The paper addresses an explicit conjecture of Langlands on the existence of an extension of the absolute Galois group that would serve as a universal group in the theory of automorphic forms. The author presents a possible candidate for this universal group and a possible candidate for the complexification of Grothendieck's motivic Galois group. Besides making a fundamental contribution to a central area, this paper is exceptionally lucid and inspiring in its presentation. As such, it represents the ideal that G. de B. Robinson Prize was designed to acknowledge.

Dr. Arthur obtained his B.Sc. and M.Sc. at the University of Toronto and went on to Yale University, under the supervision of Professor R.P. Langlands, for his Ph.D. He was instructor at Princeton, Assistant Professor at Yale as well as Professor at Duke University in the 1970s. In 1978, he joined the University of Toronto as a Professor in the department of Mathematics.

Among the honours Dr. Arthur has received are: Elected Fellow of American Academy of Arts and Science (2003); Honorary Doctorate, University of Ottawa (2002); Whittemore Lectures, Yale University (2001); Guggenheim Fellowship (2000); Wilbur Lucius Cross Medal, Graduate School, Yale University (2000); Canada Gold Medal for Science and Engineering, NSERC (1999); Faculty Award of Excellence, University of Toronto (1999); Henry Marshall Tory Medal, Royal Society of Canada (1997); CRM/Fields Institute Prize (1997); Jeffery-Williams Lecturer, Canadian Mathematical Society (1993); Aisenstadt Chair, CRM, University of Montreal (1992); Elected Fellow of the Royal Society of London (1992); Synge Award - Royal Society of Canada (1987); E.W.R. Steacie Memorial Fellowship (1982); Elected Fellow of the Royal Society of Canada (1980); Sloan Fellowship - Institute for Advanced Study, Princeton (1975-77).

Le prix G. de B. Robinson rend hommage aux mathématiciens qui se sont distingués par l'excellence de leurs articles parus dans le Journal canadien de mathématiques et le Bulletin canadien de mathématiques, et vise à encourager la présentation d'articles de première qualité pour ces revues. Il a été décerné pour la première fois pour des articles publiés dans le Journal canadien de mathématiques en 1994-1995.

Le prix G. de B. Robinson 2003 est décerné au professeur James Arthur de l'Université de Toronto pour son article qui traite une conjecture explicite de Langlands vu l'existence d'une extension du groupe de Galois absolu qui peut servir comme un groupe universel dans la théorie des formes automorphes. L'auteur présente un candidat possible pour le groupe universel et un cadidat possible pour la complexification du groupe de Galois motivique de Grothendieck's. Outre sa contribution fondamentale à un domaine clé, cet article est présenté d'une manière exceptionnellement lucide et captivante, ce qui en fait le candidat idéal au prix G. de B. Robinson.

James Arthur a obtenu un baccalauréat et une maîtrise en sciences de l'Université de Toronto avant de poursuivre au doctorat à Yale, sous la direction de R.P. Langlands. Il a enseigné à Princeton, été professeur adjoint à Yale et professeur titulaire à l'Université Duke dans les années 1970. Il s'est joint au département de mathématiques de l'Université de Toronto en 1978.

Parmi les nombreux honneurs qu'a remportés le professeur Arthur, mentionnons ceux-ci : membre de l'American

Academy of Arts and Science (2003); docteur honoris causa de l'Université d'Ottawa (2002); conférencier Whittemore, Université Yale (2001); boursier Guggenheim (2000); médaille Wilbur Lucius Cross, école des études supérieures de l'Université Yale (2000); Médaille d'or en sciences et en génie du Canada, CRSNG (1999); prix d'excellence de l'Université de Toronto (1999); médaille Henry Marshall Tory de la Société royale du Canada (1997); Prix CRM/Institut Fields (1997); prix Jeffery-Williams de la Société mathématique du Canada (1993); chaire Aisenstadt du CRM, Université de Montréal (1992); membre de la Royal Society of London (1992); prix Synge - Société royale du Canada (1987); bourse commémorative E.W.R. Steacie (1982); membre de la Société royale du Canada (1980); boursier Sloan, Institute for Advanced Study, Princeton (1975-1977).

NEWS FROM DEPARTMENTS

Concordia University, Montreal, QC

Resignations: Vincent Goulet
(Actuarial Mathematics, July 2003)

Award: Yogendra P. Chaubey (American Statistical Association's 2003 Chapter Service Recognition Award)

Death: Professor Emeritus Stanley H. Erlwanger passed away on June 18, 2003, in Harare, Zimbabwe.

Visitors: Mirza Iftekhar Beg (Visiting Associate Professor, Jan-Dec 2004, Exponential and Related Distributions; Pete Clark (Research Assistant Professor, Jan-May 2004, Algebraic Number Theory); Alexandru Ghitza (Research Assistant Professor, Jan-May 2004, Arithmetic Algebraic Geometry); Christine Knipping (Research Assistant Professor, Sept-Dec 2003, Mathematics Education); Pusztai, Gabor Pusztai (Research Assistant Professor, Sept 2003-Aug 2004,Theoretical Physics); Rasmussen, Jorgen Rasmussen (Research Assistant Professor, Sept 2003-May 2004, Algebra); Mak Trifkovic (Research Assistant Professor, Jan-May 2004, Conic Bundles over Elliptic Curves).

University of Toronto at Missisauga Toronto, ON

Visitors for 2003-2004: Anne-Laure Biolley (France, symplectic geometry); Denis Gaidashev (USA, dynamical systems); Dmitri Khmelev (dynamical systems); Satya Mohit (cryptography); Pramath Sastry (cryptography); Keith Shum (cryptography); Nikolai Volkovs (cryptography); Greg Xu (cryptography).

Other News:
As a result of an administrative reorganization at the suburban campuses of the University of Toronto, the Department of Mathematical and Computational Sciences was formed at the University of Toronto at Mississauga (formerly Erindale College) on July 1, 2003. The Department includes faculty in Mathematics, Computer Science, and Statistics, each of whom is also appointed to the graduate department in his/her subject on the main campus. The Department includes a cryptography lab which is one of the largest labs at UTM in terms of personnel. It is directed by Kumar Murty who will become Chair of the new department on January 1, 2004. Other recent appointments include Michael Yampolsky in dynamical systems (2000), and Yael Karshon in symplectic geometry (2002). Ian Graham(Interim Chair).

University of Victoria, Victoria, BC

Appointments: Margaret Wyeth (Senior Instructor, July 2003);Boualem Khouider (Assistant Professor, July 2003, Numerical and Stochastic Modelling).

Promotions: Marcelo Laca (Associate Professor, July 2003); Gary MacGillivray (Professor, July 2003).

Retirements: Walter Kotorynski
(Associate Professor, July 2003)

Visitors: Ernesto Perez (Mexico, Hamiltonian Systems, Sept 2003-May 1 2004).

Other News: Gary MacGillivray succeeded John Phillips as Chair.

York University, North York, ON

Appointments: Xin Gao (Assistant Professor, July 2003, Statistics); Hyejin Ku (Assistant Professor, July 2003, Financial Mathematics).

Retirement: Silviu Guiasu (Professor, July 2003)

Resignation: Allison Gibbs.

Université de Montréal, Montréal, QC

Michel Delfour, professeur au Départment de Mathématiques et de Statistique et membre du Centre de recherches mathématiques, a été nommé Fellow de la John Simon Guggenheim Memorial foundation pour l'année 2003-2004.

University of Lethbridge, Lethbridge, AB

Appointment: Dave (Witte) Morris, (Professor, July 2003, Lie Algebra.)

EDUCATION NOTES

Ed Barbeau

A call for participation

Readers are earnestly invited to contribute to this column. There are many ways in which you can do so.

(1) Please send us news of any teaching or educational honours received by members of your department.

(2) Please let us know of any interesting initiatives in the teaching mandate of your department.

(3) If you have been involved in any committees or reports on educational matters at any level, primary, secondary or tertiary, tell us about it.

(4) Send in reviews of articles, books, websites or software that might interest the readers.

(5) Let us have your opinions on the issues of the day. It would be nice to get a dialogue going.

(6) Comment on pieces of mathematics which have pedagogical sidelights.

All contributions can be sent to Ed Barbeau at the Department of Mathematics, University of Toronto, Toronto, ON M5S 3G3 or electronically to *barbeau@math.toronto.edu.*

Prowling the web

Over the years, I have been slowly collecting the names of various websites, and now have begun to investigate some of them. Since the Putnam season is almost upon us, let me begin with some preparation resources for this contest. Harvard University publishes from its collection of 274 old Putnam and Olympiad problems, a Putnam Problem of the Day. Visit the website at *http://www.math.harvard.edu/putnam/index.html*, where you will also find the last two Putnam papers. If you want to go further back, you can visit *http://math.ucsd.edu/~pfitz/pastputnam.html* where you will find Putnam problems going back to 1980 in Postscript, Adobe and dvi. Another site for old papers and some solutions in various formats is *http://www.unl.edu/amc/a-activities/a7-problems/putnam/*. If you want to cast a wider net, and get questions from various national and international olympiads, as well as the Putnam competition, the International Mathematics Competition for University Students, the Vietnamese Mathematical Olympiad for College Students, and problems from Donald J. Newman's book *A problems seminar* , go to *http://www.kalva.demon.co.uk/*.

The younger set are also well-served for websites to hone up their skills, often in an engaging way. Some of them require plug-ins, but two that I found readily accessible from my department's computers are *www.aplusmath.com/* and *www.aaamath.com*. The first drills students in basic arithmetic facts using games of bingo, concentration and revealing a picture by uncovering various parts of it. The second covers a wide variety of elementary school topics, providing definitions, examples and exercises.

A Passacaglia on an odd theme[1]

An important issue in school mathematics is the appropriate time to engage proof, a rigorous and convincing justification for mathematical statements. A naive perspective on the curriculum sees it as consisting, at the elementary level and early secondary level, just of a lot of facts and procedures that one might apply in situations, with the idea of formal proof reserved to the study of Euclidean geometry. But, the prominence of Euclidean geometry has been severely curtailed in recent years; does this mean that one cannot really talk about proof then until the very final years of high school?

The traditional Euclidean proof is a formidable beast, with lots of notation and sometimes quite elaborate chains of implications. But proofs need not necessarily present themselves in such formal guise. Surely, it is desirable early in the mathematical career of pupils to imbue in them a sense of the logical web of propositions that is mathematics and of the flow that leads from simple notions to more complex ones. And to do this is in a respectable and reasonably rigorous way.

By way of example, let me pursue such a web of ideas and ask the reader for advice on the level at which this might be intelligible to pupils at schools. Let us compose a small passacaglia[1] on the "ground bass" that the sum of the first n odd numbers is equal to n^2, so that, in particular, the sum of the first million odd numbers is the square of one million.

How might pupils become convinced of this? One could, for example, place on a paper an $n \times n$ square array of dots, for some small value of n, and show how this can be partitioned by gnomons with 1, 3, 5, $\cdots$, $2n - 1$ dots. Or one can illustrate it using the following device for the sum of the first twelve odd numbers:

$$1 + 3 + 5 + \cdots + 19 + 21 + 23 \ .$$

1 A Passacaglia is a Baroque composition, in a slow triple time, in which a theme is continuously varied over a chromatic ground bass.[Ed.]

The largest odd number is one less than twice the number of summands; the second largest three less, and so on. Put another way, adding 1 and 23 gives the same result as adding two 12s; adding 3 and 21 gives the same result as adding two more 12s, and so on. So if we took the twelve numbers of the sum above and replaced them all by 12s, we would not change the sum of the lot, which is now clearly $12 \times 12 = 122$. Although we have pursued the argument for a particular case, could pupils not see that one could perform the same scheme for any other case?

This fact about the sum of odd numbers can be generalized. I am indebted to Jim Tattersall of Providence College in Rhode Island for putting me onto this. We can think of our result as writing down all the integers in order, striking out every second one, and then performing a running total of the remaining to get the squares. Let us again write down the positive integers in order, in a column, but now have one more integer in each row than there was in its predecessor:

1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
16 17 18 19 20 21
22 23 24 25 26 27 28
· · ·

Strike out every second row, and form the sums of the remaining (odd-positioned) rows: $1 = 1$, $4 + 5 + 6 = 15$, $11 + 12 + 13 + 14 + 15 = 65$, $22 + 23 + \cdots + 27 + 28 = 175$. (These sums are easy to effect mentally; by "rebalancing" the terms, I have been able to persuade pupils that each odd row sum is the middle term multiplied by the number of terms.) Finally, make a running total of the sum of these sums: $1 = 1$, $1 + 15 = 16$, $1 + 15 + 65 = 81$, $1 + 15 + 65 + 175 = 216$. Remarkably, we find that these are the fourth powers of the successive integers.

A suitably-prepared grade 12 student could probably cobble together a general statement and produce a proof of it, using a generous amount of algebra. But if we are willing to forego the use of algebraic notation, we might be able to make this result accessible to younger students by making an appeal to the underlying structure.

Consider the rows being summed. We got $4 + 5 + 6 = 15$ by thinking of the left side as equivalent to $5 + 5 + 5 = 15$. But we can rebalance in another way: $4 + 5 + 6 = 3 + 5 + 7$. Similarly, we can rebalance later rows: $11 + 12 + 13 + 14 + 15 = 9 + 11 + 13 + 15 + 17$, $22 + \cdots + 28 = 19 + \cdots + 31$, and so on. So basically, we wish to make a running total up to the slashes of the numbers in the following sequence:

1 / 3 5 7 / 9 11 13 15 17 / 19 · · · 31 /· · · .

To do this, we find the sums of the first odd number, yielding 1; of the first $1 + 3 = 22$ odd numbers, yielding $(22)2$; of the first $1 + 3 + 5 = 32$ odd numbers, yielding $(32)2$, and so on. This can be further generalized. At the next step, we have two more numbers in each row, to get the array

1
2 3 4
5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25
· · ·

This time we take running totals of the sums of the even rows, as well as running totals of the sums of the odd rows. That is, we sum up to the slashes, the terms of the following sequences:

1 / 5 6 7 8 9 / 17 18 19 20 21 22 23 24 25 / 37 · · ·

2 3 4 / 10 11 12 13 14 15 16 / 26 · · ·

and get the results:

$1 = 1^2$ $\quad 1 + 35 = 6^2$ $\quad 1 + 35 + 189 = 15^2 \cdots$

$2 + 3 + 4 = 3^2$ $\quad 9 + 91 = 10^2$ $\quad 9 + 91 + 341 = 21^2 \cdots$

which can be recognized as the squares of the triangular numbers. But this seems natural if we rebalance the terms between the slashes and consider the equivalent task of summing up to the slashes the terms of the sequences

1 / (3 5) (7 9 11) / (13 15 17 19) (21 23 25 27 29) / · · ·

1 (3 5) / (7 9 11) (13 15 17 19) / · · ·

The pattern continues with the odd-positioned rows, if we put the natural numbers in a triangular ray with 1 as the sole entry of the first row and each subsequent row having k more numbers than its predecessor for each positive integer k.

A slightly different intervention of the sum of the first n odd numbers occurs in satisfying ourselves that the following sequence of numerical equations continues indefinitely, where the two numbers straddling the equals signs are squares of successive integers that sum to the square of the number of terms in the equation:

$$3^2 + 4^2 = 5^2$$

$$10^2 + 11^2 + 12^2 = 13^2 + 14^2$$

$$21^2 + 22^2 + 23^2 + 24^2 = 25^2 + 26^2 + 27^2$$

and so on. In particular, in the third equation $24 + 25 = 7^2$

and 7 is the number of terms occurring in the equation. Rather then presenting a completely general argument using algebraic sybolism, we can use the third equation as a paradigm for how we might proceed in general. Observe that, from factoring differences of squares,

$$(25^2 - 24^2) + (26^2 - 23^2) + (27^2 - 22^2) = 49\,(1 + 3 + 5) = 7^2 \times 3^2 = 21^2.$$

Such arguments raise questions as to their applicability in the classroom or lecture hall. Despite their lack of formality, are they convincing? And if they are, does this lend them some legitimacy? Do they actually deliver more than a more traditional proof, in that they somehow allow students to apprehend the underlying structure? Would they be accessible to students younger than those to whom one might present more standard rigorous arguments? This does not seem to be an easy question to answer, because they may require an extra level of sophistication and ability to "get above" the situation. Is there being presented something important about the nature of mathematics, and if so what? Are they appealing?

Troisième compétition pour la bourse CRSNG-SMC « Math à Moscou »

La troisième compétition a eu lieu en septembre 2003. Sébastien Labbé, étudiant au baccalauréat à l'université de Sherbrooke en est le gagnant. Il se mérite une bourse de 10,000 $ pour passer le trimestre d'hiver 2004 à l'Université Indépendante de Moscou.

Nous lui souhaitons un trimestre intéressant et excitant.

Bourses CRSNG-SMC Math à Moscou

Le Conseil de Recherches en Sciences Naturelles et en Génie du Canada (CRSNG) et la Société mathématique du Canada (SMC) sont fiers d'annoncer que trois bourses de 10,000 $ chacune seront attribuées. Les étudiantes ou étudiants du Canada inscrit(e)s à un programme de mathématiques ou d'informatique sont éligibles.

Les bourses servent à financer un trimestre d'études à la petite université d'élite *Moscow Independent University*.

Programme Math à Moscou
www.mccme.ru/mathinmoscow/

Détails de soumission
www.cms.math.ca/bulletins/Moscou_web/

Pour plus de renseignements veuillez communiquer avec votre département
ou la SMC au 613-562-5702.

Deux bourses
seront attribuées
au concours du printemps

Date limite
15 avril 2004
pour le trimestre d'automne 2004

Une bourse
sera attribuée au
concours d'automne

Date limite
30 septembre 2004
pour le trimestre d'hiver 2005

MESSAGE DU VICE-PRÉSIDENT

Samuel Shen, vice-président - provinces de l'Ouest

International Council for Industrial and Applied Mathematics

L'*International Council for Industrial and Applied Mathematics* (ICIAM) (conseil international de mathématiques industrielles et appliquées) est l'équivalent « appliqué » de l'Union mathématique internationale (UMI). À l'assemblée du conseil de l'ICIAM de 2003, tenue à Sydney, en Australie, la SMC est devenue membre associé de l'ICIAM.

L'ICIAM est dirigé par un président, un président sortant, un président élu, un secrétaire, un trésorier et deux membres hors cadre. Le président actuel est l'Australien Ian Sloan, et le site de l'organisme se trouve au www.iciam.org. L'ICIAM a pour mission de promouvoir les mathématiques industrielles et appliquées à l'échelle mondiale, de favoriser les échanges entre les sociétés membres, soutenir les objectifs des sociétés membres et de coordonner les rencontres internationales en mathématiques industrielles et appliquées. La Société canadienne de mathématiques appliquées et industrielles (SCMAI) est membre à part entière de l'ICIAM à titre de petit organisme et a droit à un représentant votant aux réunions du conseil. Par comparaison, la *Society of Industrial and Applied Mathematics* (SIAM) est membre à part entière à titre de grand organisme et envoie au conseil deux représentants avec droit de vote. En tant que membre associé, la SMC a droit à un représentant votant. L'ICIAM compte quatre membres associés : la Société Mathématique Européenne, la London Mathematical Society, la Société Mathématique Suisse et la SMC. Les membres associés ont évidemment moins de droits que les membres à part entière.

À l'instar de l'UMI, l'ICIAM tient un congrès scientifique aux quatre ans. Les derniers congrès se sont tenus à Paris (1986), à Washington (1991), à Hambourg (1995), à Édinbourg (1999) et à Sydney (2003). La formule des congrès de l'ICIAM s'apparente à celle des rencontres du Congrès international des mathématiciens et de la SIAM. Le programme type d'un congrès de l'ICIAM offre quelque 27 séances plénières et conférences parallèles d'invités; des mini-symposiums; des séances de communications libres; des séances de présentation par affiches. D'une durée d'environ deux heures, les mini-symposiums accueillent quatre conférenciers, et il est possible d'en organiser plus d'un sur un même sujet de recherche. Quant aux séances de communications libres, elles regroupent des communications d'une quinzaine de minutes chacune.

Les participants au congrès de l'ICIAM 2003 de Sydney ont soulevé des préoccupations importantes en ce qui concerne les « mathématiques pures appliquées » et la sous-représentation de l'élément « I » (pour « industrielles ») de l'ICIAM. En ce moment, un grand nombre de sommités des mathématiques appliquées mènent des recherches, dans les établissements d'enseignement, sur les équations différentielles et l'analyse numérique. Or, dans les milieux industriel et gouvernemental, de nombreux problèmes intéressants font appel à des données et des modèles d'observation, ainsi qu'à la planification stratégique. Les experts en mathématiques discrètes, en statistique, en traitement de données et en calcul sont en grande demande dans ces milieux. Les mathématiciens ont accès à une foule de ressources puisqu'il faut posséder des connaissances mathématiques poussées pour travailler dans certains domaines liés au développement technologique, à la gestion publique et aux opérations financières. Ces possibilités et ressources doivent amener les mathématiciens appliqués à opérer un virage : de la recherche centrée sur les méthodes à la recherche axée sur un problème; de la déduction à l'induction; de la formalité logique à la créativité; de l'étude unidisciplinaire à l'exploration interdisciplinaire. Ces changements créent une situation semblable à celle qui a vu les premiers développements mathématiques, à l'époque où Newton et Gauss ont inventé de nombreuses théories mathématiques de base à partir d'observations et d'expériences. Ces bouleversements entraîneront en outre une réforme de l'enseignement dans ce domaine : on enseignera des notions d'analyse de données, de statistiques de base et de calcul dans les cours de mathématiques appliquées. Les nouvelles recherches en mathématiques appliquées apporteront non seulement des solutions à des problèmes pratiques, mais elles favoriseront également l'émergence de nouvelles théories mathématiques. Inévitablement, de tels changements ne se feront pas sans de nombreux échanges et la collaboration entre les spécialistes des mathématiques pures et ceux des mathématiques appliquées.

Arvind Gupta, directeur scientifique du réseau MITACS (mathématiques des technologies de l'information et des systèmes complexes), a prononcé trois conférences au congrès de l'ICIAM 2003, dont l'une sur l'élaboration de projets de collaboration industries-universités en mathématiques au Canada. Il y montrait entre autres que le réseau MITACS était un excellent exemple de collaboration réussie entre les domaines des mathématiques pures, des mathématiques appliquées, de la statistique, du génie et d'autres disciplines scientifiques. L'excellence des ressources canadiennes mises à la disposition des mathématiciens par le gouvernement fédéral et l'industrie a vivement impressionné l'auditoire.

Le prochain congrès de l'ICIAM aura lieu à Zurich, en Suisse, en 2007.

ÉDITORIAL

Robert J. MacG. Dawson

Nos nombres complexes indispensables

Le 29 septembre 2003, à la pointe du jour, l'ouragan Juan frappe Halifax (Nouvelle-Écosse) de plein fouet. Les vents soufflent en rafale à 175 km/h, et des ondes de tempêtes accompagnées de vagues gigantesques saccagent la côte. Des milliers d'arbres s'écroulent, faisant deux morts, modifiant à jamais le parc Point Pleasant et les jardins publics, et ravageant le réseau électrique de la ville.

Les citoyens (dont vos deux rédacteurs en chef) s'éveillent dans une ville privée d'électricité. C'est le début d'une panne qui durera, dans certains quartiers, plus d'une semaine. Universités, commerces et services non essentiels ferment leurs portes. Les gens cuisinent sur des barbecues et des réchauds Coleman. Les soirées s'éclairent à la chandelle ou à la lampe à l'huile. Un millier de réfrigérateurs se réchauffent petit à petit. Et la génératrice surpasse le yacht et la piscine comme objet de convoitise.

Au cours des dernières années, l'Ontario et le Québec ont vécu des histoires semblables. Le grand verglas de 1998, sans mesure avec l'ouragan Juan, a privé certaines régions de courant pendant plus d'un mois. Le 14 août dernier, une autre panne généralisée s'abattait sur une partie du pays, cette fois-ci non pas suite à une catastrophe naturelle, mais à une succession de défaillances techniques. Chaque fois, les victimes en ressortent avec un sentiment renouvelé d'appréciation d'une commodité essentielle à notre société : le courant alternatif.

C'est Thomas Edison qui a le premier eu l'idée d'amener l'électricité générée par des centrales jusqu'aux maisons et aux commerces. C'est toutefois du courant continu qu'il acheminait par le réseau électrique, ce qui n'était sans inconvénients, notamment la difficulté d'obtenir un voltage autre que celui de la ligne électrique à moins d'utiliser d'énormes résistances brûlantes. Il était aussi difficile d'éviter les pertes en cours de transmission, de sorte que le voltage variait d'une demeure à l'autre.

George Westinghouse et Nikola Tesla ont été les premiers à employer le courant alternatif. Les avantages étaient nombreux. D'abord, un moteur alimenté au courant alternatif pouvait être beaucoup plus simple qu'un moteur à courant continu parce que les variations constantes de voltage fournissaient le déséquilibre nécessaire pour assurer le fonctionnement continu du moteur. (Certains moteurs à courant alternatif — ceux des horloges électriques, par exemple – ont pour seule pièce mobile un axe central et n'ont aucun mécanisme de commutation!) Ensuite, il est possible de convertir le courant alternatif en n'importe quel voltage (avec changement de courant correspondant) à l'aide d'un transformateur. Ce dispositif a l'élégante simplicité des moteurs à courant alternatif les plus simples : aucune pièce mobile et généralement rien d'autre que deux bobines de cuivres reliées par une pièce de fer. Pourtant, si mystérieux que cela puisse paraître, si l'on fait passer du courant alternatif par une bobine, on obtient sur l'autre bobine du courant de la même fréquence, mais d'un voltage différent.

On doit le développement de transformateurs efficaces – tout comme de nombreuses autres inventions relatives au courant alternatif – à Charles Proteus Steinmetz. M. Steinmetz, immigrant européen qui a travaillé pour Westinghouse à son arrivée aux États-Unis, croyait fermement à la théorie de l'électricité. Son approche était diamétralement opposée à celle d'Edison, qui était reconnu pour ses recherches appuyées par des expériences rigoureuses et de multiples essais. On raconte que Steinmetz, embauché comme consultant par General Electric pour diagnostiquer un problème de générateur, avait marqué la machine d'un X après avoir étudié le problème pendant un certain temps. Il aurait laissé des instructions précisant de découper le boîtier à l'endroit marqué et d'enlever quelques tours de fil. L'histoire raconte que l'opération a réussi et que Steinmetz aurait soumis à son client une facture comportant les éléments suivants :

Mettre un X sur le côté du générateur :	1 $
Savoir où mettre le X :	999 $

La principale contribution de Steinmetz aura sans doute été de montrer que le courant alternatif se mesurait naturellement non pas à l'aide de nombres réels positifs (comme le charbon, le pétrole ou le gaz) ou de nombres réels (comme le courant continu), mais à l'aide de nombres complexes. Cette constatation marque le début du génie électrique moderne, ainsi que la base de la théorie des circuits électroniques de filtrage. Au lieu de considérer un réseau de filtres passifs comme un amalgame de résistances, de condensateurs et de bobines, ayant tous un rôle différent à jouer et décrits par un système d'équations différentielles complexes, un électrotechnicien peut considérer toutes ces pièces comme des résistances, où les « résistances » des condensateurs et des bobines sont des nombres imaginaires et des fonctions de la fréquence. L'analyse complexe et les transformées de Fourier jouent aussi un rôle dans le processus, car elles permettent de prévoir avec précision l'effet d'un filtre sur des signaux complexes.

De nos jours, même si l'on enseigne la base des nombres complexes au secondaire, l'expression «la racine carrée de moins un» demeure quelque peu irréelle, sans doute en partie à cause de l'expression très mal choisie « nombre imaginaire ». Quoi qu'il en soit, une panne d'électricité généralisée illustre à quel point les nombres complexes sont bel et bien réels.

MINUTES OF THE ANNUAL GENERAL MEETING

Room V 120, University of Alberta
Edmonton, Alberta – June 15, 2003

The meeting opened at 12:15 p.m. with 35 members in attendance.

1. Adoption of the agenda
The agenda was accepted as circulated.

2. Minutes of the previous meeting
That the minutes of the previous Annual General Meeting, held on June 16, 2002 be accepted.

3. Matters Arising
There were no matters arising which would not be covered in the Committee Reports.

4. President's Report
Rousseau reported on the 2003 Forum, held May 13-15 in Montreal. Of note was the very interesting working group on the aboriginal community. The Saskatchewan and Manitoba community is very young, so will become even more important in the coming years.

All Forum participants agreed on the need for increased communication. The CMS might contribute by facilitating contact between associations. Eric Muller is developing a web-site to this end.

Preparations for the 2005 Forum are underway. It is hoped that participation by secondary school teachers will increase.

The CMS has been approached to adopt Mathematical Reports/Comptes Rendus as a joint publication with the Royal Society. Discussions are underway with Ram Murty, Editor-in-Chief, as well as with Niky Kamran and Ken Davidson of RSC and Cameron Stewart, Director of the Division.

A number of other initiatives have been brought forth, necessitating a review of the resources available at the CMS Executive Office. An ad-hoc committee of the Executive will be examining current resources and necessary changes needed in order to allow for growth.

5. Tellers' Report
The Tellers' Report was circulated.

That the CMS Tellers' Report of the 2003 Election be adopted as amended.

Rousseau welcomed the new Board members and expressed her thanks to Anthony Lau, Chair of the Nominating Committee, for the smooth election.

6. Treasurer's Report
Sherk presented the Audited Statement and the Treasurers' Report. The report on the investments was not encouraging. He noted that, although the restricted funds are being used for some purposes, the goal is to show considerable restraint until the investments begin to grow again.

The Operations Fund showed a $61,000 surplus. This favorable result was the result of receiving some foreign exchange a little earlier than usual. This may affect the 2003 revenue. Sherk expressed his thanks to the committee chairs, editors and supporting offices across the country who came in overall a little under budget.

6.1. Audited Statement
That the Audited Statement for the period ending December 31, 2002 be accepted.

6.2. Treasurer's Financial Report
That the Treasurer's Report for the period ending December 31, 2002 be accepted.

6.3. Appointment of auditors
That the firm of Raymond Chabot Grant Thornton be reappointed as auditor of the Canadian Mathematical Society for the period ending December 31, 2003.

7. Executive Director and Secretary's Report
Wright thanked the outgoing Executive for their service.

Wright also expressed his thanks to the office staff and the local department for the CMS Summer Meeting. Meetings are now twice the size they used to be, so the work needed to stage them has increased accordingly.

Other activities have also grown in number and scope. These increases are the result of success and thanks went out to all the offices, staff and volunteers.

Wright reported on the recent staff changes at the Executive Office.

8. 2002 Annual Report to the Members
That the 2002 Annual Report to the Members be accepted.

9. Reports from Committees
Advancement of Mathematics: Rousseau reported that Daryl Tingley has accepted to serve as the first Math Camps Coordinator and Richard Kane has agreed to serve as the first Awards Officer.

The first recipient of the Math in Moscow grant has completed his visit and a report is awaited. An NSERC grant renewal application has been completed, but without the necessary report from the student. NSERC has agreed to accept the application, pending receipt of the report, and a response is anticipated by July.

The Statistical Society of Canada is planning a special session at the Winter 2004 meeting.

The CMS, together with other scientific societies, is considering making a proposal to NSERC, for the establishment of a Science Awareness Week.

The Math with a Human Face and Math Camps applications will also be submitted, and will hopefully be renewed by NSERC-PromoScience.

Education: Richard Caron reported on upcoming education sessions and the Canada Wide Science Fair. There will be an Adrien-Pouliot Award presented at the Winter 2003 meeting in Vancouver.

The Committee is considering ideas for next year's math awareness project. It is also considering scenarios within which the CMS could serve as an umbrella organization for mathematics education in Canada. Judy MacDonald is working with Eric Muller to create a portal on the CMS web site which could be used by provincial associations.

Electronic Services: David Rodgers noted that a spam filter is now in place. The Committee is exploring alternate sources of revenue for the web site. Also on its agenda is finding ways to support to the digitization project of the IMU Committee on Electronic Communication and Information.

Endowment Grants: Christiane Rousseau reported that the Endowment Fund is now below the threshold of $1.5 set by the Board of Directors for the issuance of Endowment Fund Grants. The last meeting of the Executive had asked that the 2003 Endowment Grant Competition be cancelled. The Endowment Grants Committee had then asked for it to go ahead. The Board voted to make $30,000 available.

Finance: Wright reported for Michael Lamoureux. The Committee monitors the budget, reviews monthly and yearly financial statements, reviews the audited statement, monitors the state of the Society's investments, and allocates funds to Endowment Grants Competition.

Considering recent investment performance, the Committee analyzed the situation and chose to stay the course, not changing the investment mix.

International Affairs: The Committee works mainly on presenting candidates to be lecturers at IMU and speakers at ICM. Rousseau reported on relations to IMU. The CMS has applied to be associate member to ICIAM, and Jonathan Borwein will represent CMS as an observer at their Board meeting.

Mathematical Competitions: Peter Cass reported that the 2001 and 2002 APMO were nullified due to security problems. Measures were introduced for the 2003 exam, changing the exam schedule on each side of the international date line. The 2004 competition will likely be the CMS' last year as chief coordinating country.

Regional math camps continue to grow. As previously reported, Daryl Tingley has been named Math Camps Coordinator.

Cass announced the CMO results. The IMO team members will be attending the Summer IMO Training Camp, hosted at BIRS, before departing for Japan. Good press coverage is expected.

Nominating: Rousseau reported that a new Chair will be needed in January 2003. Other Committee members are also coming to the end of their mandate.

Publications: Dana Schlomiuk reported that Comptes Rendus (Mathematical Reports) may become a joint venture of the CMS and the Royal Society of Canada.

She also announced that the terms of 3 of the CJM Associate Editors finish on December 31, 2003. She announced the three new Associate Editors who are being nominated.

Research: Ragnar Buchweitz reported on upcoming prizes and meetings, including the Doctoral Prize. The Committee is seeking more depth of nominations for all CMS prizes. They feel that all Ph.D. granting departments should nominate their best doctoral thesis.

The Board has approved a motion streamlining and making uniform the wording for Research prizes. Winners must now be a member of the Canadian Mathematical Community.

The Committee is considering organizing a meeting with Graduate Students, possibly alternate with the Connecting Women conference.

Buchweitz announced the confirmed sites for future CMS meetings:

Winter 2003, Vancouver

Summer 2004, Halifax

Winter 2004, Montreal

Summer 2005, Waterloo

Winter 2005, Victoria

Summer 2006, Calgary

Winter 2006, CRM

Students: Robert Woodrow reported that an anonymous gift from a Board member made it possible for Krista Galway to attend the 2003 Forum.

The 2003 CUMC was held at York University with 70 students in attendance. The 2004 CUMC will be held at Dalhousie.

The Committee activities include sponsoring events to bring students together, publication of the Student Communicator, and running the student web site.

A key issue being addressed at the moment is finding new Committee members. Many of the Committee's members are now from Ontario but they are looking for better geographic representation.

Women in Mathematics: Malgorzata Dubiel reported on the Connecting Women in Mathematics Across Canada conference held concurrently with this meeting. Participants included 30 students and approximately 10 organizers/speakers. Approximately two-thirds of attendees also participated in the CMS meeting.

The programme included plenaries by Christiane Rousseau and Priscilla Greenwood, panel discussions, and other talks. It is hoped that this event will be repeated in 2005, possibly at BIRS.

10. Other Business
Hodgson reported on plans to form a new Canadian Subcommission for ICMI.

Thanks were again expressed to the outgoing Executive members, Directors and Committee Chairs.

Williams/Doob That the Society express its thanks to Jonathan Borwein for his four years of service on the Executive Committee , and to Christiane Rousseau for her service during her first year as President.

Best wishes were expressed for George Bluman for a speedy recovery.

11. Adjournment
The meeting adjourned at 1:20 p.m.

Christiane Rousseau, President
Graham P. Wright , Secretary
Monique Bouchard, Recording Secretary

YSF - CMS AWARD WINNERS 2003

Senior Category: Adrian Maler, Ontario
We Got Rhythm

The project's goal was to simulate the brain's "time-keeper" (circadian clock) using mathematical equations. The model accurately replicated circadian behaviour and made predictions of the effects of certain drugs on the clock. This has many applications in medicine and industry, especially concerning shift work, jet lag, and tranquilizer drugs.

Intermediate Category: Wanda Boyer, British Columbia
Prime Suspect

This project combines mathematical proof techniques with advanced web browser programming to establish the correctness of and analyze the efficiency of five methods for distinguishing prime and composite numbers. The study of primes has many applications, including their use in computer security applications that help prevent fraudulent Internet transactions.

Junior Category: Malcom Stagg, Alberta
Evaluation of 3D Object Recognition Methods

Computer vision is a key part of robotics, here, a microcontroller-based circuit is built to generate a 3D model of simple objects. Methods of edge detection are tested for accuracy in the generated output. This is the first stage of an object recognition robotic system.

www.ysf.ca

DON'T WASTE TIME ON WHAT WAS, ENJOY WHAT IS...

Remembering a Star

By Pamela Hagen

To spend too much time reflecting on the loss that is felt in mathematics and education with the passing earlier this year of mathematics legend Dr H.S. MacDonald Coxeter would be against the expressed wishes of his daughter, Susan Thomas. What would be very appropriate, however, would be to speak of what Donald Coxeter now means, and will continue to mean, to the learning of mathematics for a particular group of learners that would perhaps not have been expected to know who he was. These students are the 28 Grade Five elementary school students of Division One at Westwood Elementary in Port Coquitlam, British Columbia.

I had the good fortune to be introduced to Donald Coxeter in 2000 at a conference held by the Pacific Institute for the Mathematical Sciences (PIMS) in Vancouver. Prior to the conference I have to confess to not having heard of the great mathematician. However, I was intrigued to hear that the keynote for the conference was to be given by a 94-year-old mathematician whose speciality was geometry. I began some urgent research and of course had no trouble discovering much about the keynote speaker. The keynote presentation was one I shall always remember; the video, fortunately, can still be viewed on the PIMS website.

As I continued to teach students after the conference I would often tell them about the intriguing old mathematician I had met and what his studies and continued work was about. Just before the commencement of the 2002-03 school year, when I was doing my own graduate studies I decided to be bold and contact Dr. Coxeter asking for his views about the use of imagination in helping young students to learn mathematics.

In September 2002 a hand-written reply was received from Dr. Coxeter together with a letter form his daughter Susan Thomas, advising us that unfortunately her 96 year old father was in declining health, but had recently been to Budapest to open a math conference! His gracious reply and that of his daughter provided the "spark" that began our studies in geometry. Our topic now had a supreme human quality to it.

The students and I were able to gather readily available web-based biographic details about Dr. Coxeter that augmented our mathematics content. During the course of our studies I decided to have the students complete an activity of building and then explaining a geometric paper construction. Both the students and their work can be seen in the figures below.

At the time of starting to make the geometric designs they did not have a name other than a generic descriptor of paper stars. The students and I collectively decided that we should now name the paper stars Coxeter Stars in honour of the mathematician who had written to us a few months earlier. The class was so proud of their work on the now named Coxeter Stars, that they asked the principal if they could put some around the school. This then blossomed into decorating the school gym for the Parent Evening as it was the Christmas season.

Figure 1 – Geometric Paper Construction

Collectively it was decided that we should send copies of the photographs to Dr. Coxeter and his daughter Susan Thomas with a Christmas note. This was done and shortly afterwards a further piece of Christmas communication was received from our photograph recipients, together with a copy of a Toronto magazine.

Other activities in our unit included examining the work of M.C. Escher and creating manual tessellations during art lessons and as well as using computer software, Tesselmania, during lessons in the school computer lab.

Sadly, a few months later, after we had completed the formal part of our studies, we received word that Dr. Coxeter had passed away at the end of March 2003 at age 96.

There had been an obvious fascination from the students with both the life and work of Dr. Coxeter, from the smallest detail about his own life as a schoolboy to the magnitude of his work in mathematics. In addition there was an overall sense of wonder as to how he could explain mathematically the artistic work of his friend M.C. Escher.

It was a moment of great pathos for the students to receive a copy of Dr. Coxeter's photographic obituary notice from his daughter, Susan Thomas, that gave the two statements:

"Life is not meant to be endured,
it is to be celebrated"

and

"Don't waste time on what was;
enjoy what is…".

The enjoyment of the students, and the degree of their engagement in all aspects of the activities are clear examples of what can be achieved when young students are given the opportunity to learn about mathematicians and their work. And it is some of the comments from the students that are a fitting tribute to a great gentleman and mathematician who continued to give of himself so that young learners might continue their learning.

Jacob — "We named the star after him because we wanted to remember him. I wouldn't care so much if it wasn't for his personality. He worked until the last days of his life! That's amazing! He also took the time to write back to a bunch of kids while he was sick. Most important people just think of it as scrap mail".

Emily — "We named our decoration the 'Coxeter star' because we wanted to remember him. Now whenever I look at the star, I could feel the feeling of math."

Courtney — "We sent a letter to the professor, and I think it is good that we name a shape after him because what famous person would actually take the time to write back to kids. He was such a great person."

Figure 2 – Students of Division One

TRIVIA

1) How did Star Trek's Mr. Spock describe π?
a) A universal constant, even in parallel universes.
b) The ratio of a circle's circumference to its diameter.
c) A transcendental figure without resolution.
d) As irrational as a Vulcan during Pon Farr.

2) Which of the following mathematical impossibilities is commonly used as a metaphor for any impossible act?
a) Circling the square
b) Squaring the circle
c) Circle takes the square
d) Circling the wagons

3) Who invented and built the Difference Engine, the first mechanical computer?
a) Charles Babbage
b) Blaise Pascal
c) Rene Descartes
d) Charles Barrow

4) How did Mark Kac word the problem of whether the harmonics of the wave equation are determined by the boundary conditions?
a) Can you hear the shape of a drum?
b) Can you smell what the Kac is cookin'?
c) Have you heard the wind?
d) You can't touch this!

5) The surface of a satellite dish is part of what?
a) Sphere
b) Paraboloid
c) Hyperboloid
d) Tesseract

Readers are invited to send their favorite mathematical trivia to Gordon MacDonald – *gmacdonald@upei.ca* – for possible inclusion.

Answers on back page

MEMORIAL UNIVERSITY OF NEWFOUNDLAND
DEPARTMENT OF MATHEMATICS AND STATISTICS

St. John's, Newfoundland, Canada A1C 5S7 ***www.math.mun.ca***

The Department of Mathematics and Statistics at Memorial University of Newfoundland invites applications for:

MS-AMAT-03: one tenure-track position at the Assistant Professor level in Applied Mathematics. A PhD in Mathematics or Mathematical Physics is required at the time of appointment. Outstanding applications from all areas of applied mathematics including general relativity will be considered.

MS-ANAL-03: one tenure-track position at the Assistant Professor level in Analysis. A PhD in Mathematics is required at the time of appointment. Outstanding applications from all areas of analysis will be considered.

Both appointments are subject to budgetary approval, starting September 1, 2004. The possibility of collaboration with current department members will be a strong asset. All applicants are expected to demonstrate the potential to be excellent undergraduate and graduate teachers, and possess a strong research record with outstanding promise for future research.

Review of applications will begin December 1, 2003 and continue until suitable candidates have been identified. Candidates should submit a Curriculum Vitae, a description of research interests and academic goals, a description of their teaching interests, experience and philosophy, and selected (pre)reprints of publications. They should also arrange for three confidential letters of recommendation, at least one of which deals with teaching, to be sent to: (Please state competition #)

Dr. Bruce Watson, Interim Head of Department
Department of Mathematics & Statistics
Memorial University of Newfoundland
St. John's, Newfoundland, Canada A1C 5S7
head@math.mun.ca

Memorial University is the largest university in Atlantic Canada. As the province's only university, Memorial plays an integral role in the educational and cultural life of Newfoundland and Labrador. Offering diverse undergraduate and graduate programs to almost 17,000 students, Memorial provides a distinctive and stimulating environment for learning in St. John's, a very safe, friendly city with great historic charm, a vibrant cultural life, and easy access to a wide range of outdoor activities.

Memorial University is committed to employment equity and encourages applications from qualified women and men, visible minorities, aboriginal people and persons with disabilities. In accordance with Canadian Immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. Partners of candidates for positions are invited to include their resume for possible matching with other job opportunities.

NEWS FROM THE DEPARTMENTS - CMS NOTES

This is a request for news items to appear in the next issue of the NOTES.

REPLY to notes-editors@cms.math.ca by the deadline of December 1, 2003.

Our intention is to circulate this reminder at least once per term, but this column will appear in all 8 issues (Sept, Oct, Nov, Dec, Feb, Mar, Apr, May) and your news will always be welcome. We hope that departments will submit news at least once per term.

Thanks for your cooperation.

Robert Dawson and S. Swaminathan, Editors-in-Chief.

PLEASE USE THE FORMAT GIVEN BELOW.

Appointments (rank, date, field):
Promotions (rank, date):
Retirements (rank, date):
Resignations:
Death (rank, date):
Awards/Distinctions :
Visitors (name, country, area, dates):
Other News:

CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

NOVEMBER 2003 NOVEMBRE

14-18 Workshop on Patterns in Physics
(The Fields Institute, Toronto, ON)
www.fields.utoronto.ca/programs/scientific/03-04/pde/physics/index.htm

DECEMBER 2003 DÉCEMBRE

6 - 8 CMS Winter Meeting / Réunion d'hiver de la SMC
Simon Fraser University
(Harbour Centre, Vancouver, British Columbia)
Monique Bouchard: meetings@cms.math.ca

11-13 Workshop on Bifurcation Theory and Spatio-Temporal Pattern Formation in PDE (The Fields Institute, Toronto).
http://www.fields.utoronto.ca/programs/scientific/03-04/pde/bifurcation/index.html

11-16 Conference on Algebra and Number Theory (The University of Hyderabad, Hyderabad, India)
http://www.uohyd.ernet.in , rtsm@uohyd.ernet.in

15 - 19 28th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing
(Melbourne, Australia)
www.cm.deakin.edu.au/comb2003melbourne

17 - 20 First Joint AMS-India Mathematics Meeting
(Bangalore, India)
www.ams.org/meetings/

22 - 25 International Conference on Analysis and Applications (BHU, Varanasi, India)
rspathak@banaras.ernet.in

JANUARY 2004 JANVIER

5-9 Workshop on Large N limits of U(N) Gauge Theory in Physics and Mathematics
(CRM, U. de Montreal, Montreal, QC)
crm@ere.umontreal.ca

20 400 Years of British Mathematics Meeting, (Open University, Milton Keynes, UK)
r.j.wilson@open.ac.uk , l.scarna@open.ac.uk

21 - 30 Advanced Course on Ramsey Methods in Analysis
(Bellaterra, Barcelona, Spain)
Joan Bagaria: www.crm.es/RamseyMethods

FEBRUARY 2004 FÉVRIER

2 - 13 Advanced Course on Contemporary Cryptology
(Bellaterra, Barcelona, Spain)
Paz Morillo: www.crm.es/ContemporaryCryptology

9-13 Session on Geometric Aspects of Functional Analysis (GAFA) of the Joint Meeting of the New Zealand Mathematical Society and Israeli Mathematical Union
www.mcs.vuw.ac.nz/~mathmeet/vic2004/index.shtml

MARCH 2004 MARS

4-6 Workshop on Spectral Geometry
(CRM, U. de Montreal, Montreal, QC)
crm@ere.umontreal.ca

15-19 Workshop on Nonlinear Wave Equations (The Fields Institute, Toronto, ON)
http://www.fields.utoronto.ca/programs/scientific/03-04/pde/nonlinear_wave/index.htm

29-April 2 Workshop on Kinetic Theory (The Fields Institute, Toronto, ON)
http://www.fields.utoronto.ca/programs/scientific/03-04/kinetic_theory/index.htm

APRIL 2004 AVRIL

4 -7 Fractal 2004, Complexity and Fractals in Nature, 8th International Multidisciplinary Conference
(Vancouver, BC)
www.kingston.ac.uk/fractal/

5-8 Joint Meeting of the 56th British Mathematical Colloquium and the 17th Annual Meeting of the Irish Mathematical Society (BMC 2004) (Queen's University, Belfast, Northern Ireland)
http://www.qub.ac.uk/bmc2004

MAY 2004 MAI

3-8 AARMS-CRM Workshop on Singular Integrals and Analysis on CR Manifolds
(Dalhousie University, Halifax, NS)
http://math.mun.ca/aarms

4-7 Workshop on Spectral Theory and Automorphic Forms (CRM, U. de Montreal, Montreal, QC)
crm@ere.umontreal.ca

MAY 2004 MAI

24-28 Workshop on Hamiltonian Dynamical Systems (jointly with the Fields Institute) (CRM, U. de Montreal, Montreal, QC) *crm@ere.umontreal.ca*

28 - 31 International Conference on Mathematics and its Applications (Hong Kong) *http://www.cityu.edu.hk/rcms/icma2004*

JUNE 2004 JUIN

1-11 Workshop on Semi-classical Theory of Eigenfunctions and PDEs (CRM, U. de Montreal, Montreal, QC) *crm@ere.umontreal.ca*

10-14 CCWEST 2004, National Conference for the Advancement of Women in Engineering, Science and Technology (Brock University, St. Catharines, ON) *http://www.brocku.ca/fms/ccwest2004*

13 - 15 CMS Summer Meeting / Réunion d'été de la SMC (Dalhousie University, Halifax, Nova Scotia) Monique *Bouchard: meetings@cms.math.ca*

18-23 Mathematical Foundations of Learning Theory (Barcelona, Spain) *Gábor Lugosi: www.crm.es/MathematicalFoundations*

20 - 27 42nd International Symposium on Functional Equations Opava, Czech Republic) *isfe42@math.slu.cz*

27 - July 2 European Congress of Mathematics (Stockholm, Sweden) *Ari Laptev: laptev@math.kth.se*

30-July 7 Fourth World Congress of Nonlinear Analysis(WCNA 2004) (Hyatt Orlando, Florida) *http://kermani.math.fit.edu/ — wcna2004@yahoo.com*

JULY 2004 JUILLET

4 - 11 The 10th International Congress on Mathematical Education (Copenhagen, Denmark) *www.ICME-10.dk*

5-9 19th "Summer" Conference on Topology and its Applications (University of Cape Town, South Africa) *http://www.mth.uct.ac.za/Conferences/Topology*

5 - 16 Advanced Course on Automata Groups (Bellaterra, Barcelona, Spain) *Warren Dicks: www.crm.es/AutomataGroups*

12 - 15 First Joint Canada-France meeting of the mathematical sciences / Premier congrès Canada-France des sciences mathématiques, (Toulouse, France) *www.cms.math.ca/Events/Toulouse2004/ www.smc.math.ca/Reunions/Toulouse2004/*

18-24 International Conference on General Relativity and Gravitation (Dublin, Ireland) *m.a.h.maccallum@qmul.ac.uk*

26-30 Workshop on Spectral Theory of Schrödinger Operators (CRM, U. de Montreal, Montreal, QC) *crm@ere.umontreal.ca.*

AUGUST 2004 AOÛT

2-6 Workshop on Dynamics in Statistical Mechanics(CRM, U. de Montreal, Montreal, QC) *crm@ere.umontreal.ca*

6-7 New Directions in Probability Theory (Fields Institute, Toronto,ON) *http://www.imstat.org/meetings/NDPT/default.htm*

22-30 International Congress of Mathematicians 2006 (Madrid, Spain)

DECEMBER 2004 DÉCEMBRE

11 - 13 CMS Winter Meeting / Réunion d'hiver de la SMC, (McGill University, Montréal, Québec) *Monique Bouchard: meetings@cms.math.ca*

RATES AND DEADLINES 2003 / TARIFS ET ÉCHÉANCES 2003

Net rates / Tarifs nets	Institutional Members Membres institutionels	Corporate Members Membres organisationnels	Others Autres
Full page	$ 235	$ 440	$ 585
3/4 page	$ 215	$ 400	$ 535
1/2 page	$ 145	$ 265	$ 355
1/4 page	$ 85	$ 160	$ 215
Inserts: max. 4 pages	$ 185	$ 345	$ 460

Surcharges apply for prime locations - contact notes-ads@cms.math.ca
Des suppléments sont applicables pour des places de choix - communiquer avec notes-ads@smc.math.ca

Issue/Numéro	Deadline/Date limite
February/février	December 1 décembre
March/mars	January 15 janvier
April/avril	February 15 février
May/mai	March 15 mars
September/septembre	July 1 juillet
October/octobre	August 15 août
November/novembre	September 15 septembre
December/décembre	October 15 octobre

Maximum page size / taille maximum des pages:
Back page/4e de couverture: 7.5 x 8.5 in/pouces
Inside page/page intérieure: 7.5 x 10 in/pouces

The CMS Notes is mailed in the first week of the issue month. Subscription to the Notes is included with the CMS membership. For non-CMS members, the subscription rate is $50 (CDN) for subscribers with Canadian addresses and $50 (US) for subscribers with non-Canadian addresses.

Les Notes de la SMC sont postées la première semaine du mois de parution. L'adhésion à la SMC compred l'abonnement aux Notes de la SMC. Le tarif d'abonnement pour les non-membres est de 50 $ CAN si l'adresse de l'abonné est au Canada et de 50 $ US autrement.

TRIVIA ANSWERS

1.C **2.B** **3.A** **4.A** **5.B**

If undelivered, please return to:
si NON-LIVRÉ, prière de retourner à:

CMS Notes de la SMC
577 King Edward, C.P. 450, Succ. A
Ottawa, Ontario, K1N 6N5, Canada