CHASE REPORT

NEWSLETTER OF THE DEPARTMENT OF MATHEMATICS AND STATISTICS

2004

DALHOUSIE UNIVERSITY HALIFAX, N.S.

CONGRATULATIONS TO OUR AWARDS WINNERS

Sir William Young Gold Medal in Math

Jana F. Archibald

University Medal in Statistics

Kevin J. Topley

Ralph & Frances Lewis Jeffery Scholarship

Jana F. Archibald and Hannah W. McKenzie

Barry Ward Fawcett Memorial Prize

Timothy S. Caley

Ken Dunn Memorial Prize

Shannon Ezzat

Katherine M. Buttenshaw Prize

Steven H. Noble and Kathryn E. Duffy

Bernoulli Prize

Sarah E. Cole

Waverly Prize

Bretton MacDonald

Emil and Stella Blum Award in Mathematics

Lili Zhu

Ellen McCaughin McFarlane Prize

Micah McCurdy

KILLAM PDF AWARD WINNER

Sigbjorn Hervik
Gabor Lukacs

GRADUATING HONOURS STUDENTS

Honours - Mathematics

Jana Archibald, BSc	First Class Honours
Kathryn Duffy, BSc	First Class Honours (Math/CSCI)
Ehab Eshtaya, BSc	First Class Honours (Math/Bioc)
Hannah McKenzie,BSc	First Class Honours (Math/Biol)
Steven Noble, BSc	First Class Honours
Gillman Payette, BSc	Honours

Honours – Statistics

Stephen Shore, BSc	First Class Honours (Econ/Stats)
Kevin Topley, BSc	First Class Honours

GRADUATE STUDENTS

Recent Graduates:

October 2003 Convocation:

Mathematics	**Statistics**
Sarah McCurdy, MSc	*David Campbell*, MSc
Stephen Quinlan, MSc	
Paul Ottaway, MSc	

May 2004 Convocation:

Statistics
Simon Lung, BSc
Sara Young, BSc
Eric O'Neill, MSc
Caren Rose, MSc

WELCOME TO OUR UNDERGRADUATE SUMMER RESEARCH STUDENTS

NSERC Undergraduate Student Research Awards:
Shannon Ezzat (supervisor: Dorette Pronk)

Faculty Summer Students:

Xiaohu Li	(Jason Brown)
Rachael Manion	(Andrea Fraser)
Kathryn Duffy	(Dorette Pronk)
Pin-Hung Kao	(Dorette Pronk)
Garrett MacLean	(John Clements)
Marc Humber (Coop)	(John Clements)
Chris Jones	(Michael Dowd)
Cathy Wamboldt	(Chris Field)

NOTE FROM THE DEPARTMENT CHAIR

This has been an exciting year for the Department of Mathematics and Statistics, as the contents of this year's Chase Report show. The year seems to have raced by, at a breathtaking pace and, although it feels as if I have just begun my term as Chair, I am now one-third of the way through. There have been many changes in the Department in the past few years, and many more to come in the near future as several members of the Department retire, and new young people come in. The Department's profile is strong nationally and internationally. During this spring and summer we will be hosting no less than 4 national conferences, with several hundred participants from many countries. I am sure that you will find much to interest you in our newsletter.

AWARDS DAY SPEAKER

Denis M. Falvey MA MD FRCSC CD

In May, Nova Scotia eye surgeon Dr. Denis Falvey will undertake an interdisciplinary PhD program in mathematics, ophthalmology, electrophysiology and computational neuroscience. Dr. Falvey completed his M.Sc. in Functional Analysis (1972) here with Professor Tony Thompson before going on to complete his years of medical training. Dr. Falvey now proposes to explore the problem of identifying retinal iscemia using three highly sophisticated mathematical approaches to analyse ERG (electroretinogram) data: (i) the spectral properties of infinite dimensional Hilbert matrices, wavelet theory and optimal control theory, (ii) nonlinear dynamics, Poincaré maps, differential geometry and related theories, as well as (iii) computational neuroscience techniques. This is just another example of the growing trend to apply the most modern advanced mathematical tools to the study and understanding of complex phenomena in medicine, science and engineering.

ALUMNI

Jalal Karam, who finished a M.Sc. in our department with Karl Dilcher in 1995 and later received his Ph.D. in Engineering Mathematics at TUNS, now holds an Assistant Professor position at the Arab Open University in Beirut, Lebanon. He teaches in the Faculty of Information Technology and Computing of this university, which has affiliation with the Open University in Britain. Jalal returned to Lebanon in 2001, and he recently got married.

MATHEMATICS COMPETITIONS

Students of our department were very successful in two undergraduate competitions this past year. In the APICS Mathematics Competition, which was held at UPEI in October, our two teams won both first and second prize. The teams consisted of Jana Archibald & Micah McCurdy and Michael Lawrence & Steven Noble, respectively.

The very challenging Putnam competition was held in early December, and nine of our students took part. Steven Noble ranked among the top 5% of the 3615 contestants in the US and Canada. Jana Archibald, Timothy Caley, and Micah McCurdy also did very well. Most of the students who took part in the competitions attended weekly training sessions led by Richard Hoshino and Karl Dilcher.

FACULTY NEWS AND AWARDS

The following appointees joined the department on July 1, 2003.

(1) *Joe Bielawski,* Assistant Professor, probationary tenure track appointment in Biology (75%) and Statistics (25%).

(2) *Michael Dowd,* Assistant Professor, probationary tenure track appointment in Statistics.

(3) *Roman Smirnov,* Assistant Professor, probationary tenure track appointment in Mathematics.

David Iron has been appointed to a probationary tenure track appointment in Mathematics at the rank of Assistant Professor effective July 1, 2004.*Sigbjorn Hervik* and *Gabor Lukacs*, have been appointed Killam Post-Doctoral Fellows in the Department.
Hervik joined the department January 1, 2004.
Lukacs will arrive in January 2005.

Mitja Mastnak has just been awarded an NSERC postdoctoral fellowship for the next two years.

Jeannette Janssen was promoted to the rank of Associate Professor, with tenure effective July 1, 2003.

Ed Susko was promoted to the rank of Associate Professor, with tenure effective July 1, 2003.

Ray Spiteri was promoted to the rank of Associate Professor, with tenure effective July 1, 2004.

Robert Milson was promoted to the rank of Associate Professor, with tenure effective July 1, 2004.

Paul Hines has been reappointed as Adjunct Professor for the period July 1, 2004 - June 30, 2009.

Retiring from the Faculty this year is *Luzius Grünenfelder* (Mathematics and Statistics). We wish him all the best and hope he will be a permanent visitor to the department.

Congratulations to *Karl Dilcher*, for winning the "Srini" Award for excellence in teaching and for dedication to students in Computer Science 2003.

Congratulations to *Ray Spiteri* and *Lisa Kalynchuk* on the birth of their daughter Sophia, during the big blizzard.

HIGH SCHOOL SCIENCE AND ENGINEERING WEEK

High School Science and Engineering Week (HSSEW) is a program hosted by the Faculties of Science and Engineering and is held each summer during the month of August. This summer's program will be held from August 23-27. Forty grade eleven students from various Nova Scotia high schools are invited to participate. The aim of the program is to introduce students to some aspects of Science and Engineering at Dalhousie University. The program is meant to be more fun than it is demanding and, as such, students require no prior preparation or study. Participants get a sampling of Dalhousie University's offerings, and it is our hope that these students will later choose to study at Dalhousie.

SABBATICAL LEAVE 2004-2005

Richard Wood - sabbatical leave 01 Jan 05 - 3 Jun 05.

John Clements - sabbatical leave 1 Jan 05 to 31 Dec 05.

Karl Dilcher - sabbatical leave 1 July 04 to 31 Dec. 04

Bruce Smith - sabbatical leave 1 Jan 05 to 30 June 05

Ed Susko - sabbatical leave 1 July 04 - 31 Dec. 04

Dick Sutherland - sabbatical leave 1 Jan 05 - 30 June 05

Kok-Keong Tan - sabbatical leave 1 Jan 05 - 31 Dec. 05

FACULTY REPORTS

I. **Heydar Radjavi** was Visiting Professor at the University of Waterloo from January to April 2004. He writes:

It has been a very nice visit at Waterloo except for the weather; we arrived here with winter, and I think we'll leave here, in a few days, with winter. One of my most significant accomplishments here at the University of Waterloo during this term was instituting the Tuesday lunch tradition. It started on the second day of the term, and a lucky coincidence has helped its continuous observance so far, and will do so, it seems, for the foreseeable future: that day we went to a restaurant called "Johnny's Fiasco's!" which advertised Tuesday specials, including hamburgers and beer for $2 each. This unbeatable bargain was so attractive that we haven't gone anywhere else for Tuesday lunch since. (This is a deviation from the unwritten Dalhousie Tuesday Lunch rules, I know, but it should be kept in mind that these are novices we are dealing with.)

In addition to Tuesday lunches, I have enjoyed teaching a topics course with a few extremely good students and talking mathematics to Ken Davidson, Laurent Marcoux, and others. My visitors, Matjaz Omladic and Leo Livshits had to change their flight destinations from Halifax to Waterloo and deal with some coldest winter days on record here. I visited one of our distinguished alumni, Masoud Khalkhali, at the University of Western Ontario. He also gave a lecture at Waterloo on non-commutative geometry.

II. **A. C. Thompson** made two trips overseas in the early part of this year. The first to Oberwolfach in early January and the second to Nanjing in April. He writes:

Oberwolfach refers to the Mathematical Research Institute located just outside the village of that name in the Black Forest region of Germany. The Institute has a programme of
"Research in Pairs" which affords a wonderful opportunity for mathematical writing. Juan Carlos Alvarez Paiva (from New York) and I were lucky enough to be able to participate in this programme for a second time. Last year we worked on a lengthy survey article (now completed); this year we started on a book (still in the early stages). The Institute provides all that one needs: one of the best mathematical libraries in the world; excellent computing facilities in a room set aside for the researchers in pairs; and a small apartment with a work room with a large blackboard. The Institute is situated in most beautiful surroundings and the Black Forest with its endless hiking trails begin right at the door. In January, however, the weather is not so conducive to hiking up the hills. During the two weeks we were there there were two regular conferences taking place, combinatorics the first week and financial statisticians the second. The food is excellent including tea with cake in mid-afternoon, there is good coffee (a necessity for mathematics) and an ample supply of wine and beer (it is Germany after all). One couldn't ask for a better place to work.

I spent the academic year 1979-80 in Nanjing working at Nanjing University. I taught a course in Functional Analysis, ran a seminar on the Geometry of Banach Spaces and tried to direct the research of some of the advanced students. It was hard work but immensely stimulating and rewarding. I returned in April for the first time and gave a lecture there once more. What changes in 25 years! Construction everywhere, a subway being built, high-rises throughout the city, more traffic, glitzy shops, lots of stuff in the shops. Then it was a relatively quiet city with few amenities, rationed rice and cotton goods. Now it is a modern metropolis with all the excitement and problems that that implies.

However, the University campus is not so different. Certainly the buildings are now modern, much bigger and better equipped but the layout is the same. The campus is much greener with trees grown large, more flower beds and lawns. There are the same playing fields and many of the same student residences. The big change is that the campus is now home only to graduate students and some senior undergraduates. The rest have moved to a brand new location across the river. There are new bridges and a shuttle service to get there.

The mathematics department always had a first rate library (in the department) and a research oriented faculty. Both have grown and there is an impressive graduate programme. My audience was largely composed of graduate students. It was wonderful to meet old friends after so long and to see the University prospering so well. I have mixed feelings, though, about some of the other changes to the city.

III. **Jonathan Borwein** FRSC returned to Dalhousie University and joined the Faculty of Computing Science as Research Chair with a cross-appointment in Mathematics.

(a) Jonathan M. Borwein was Shrum Professor of Science (1993- 2004) and a Canada Research Chair in Information Technology (2001-04) at Simon Fraser University, where he was founding Director of the Centre for Experimental and Constructive Mathematics. In 2004, he (re-) joined the Faculty of Computer Science at Dalhousie as a Research Chair in Distributed and Collaborative Research, with a cross-appointment in Mathematics, while preserving an adjunct appointment at Simon Fraser. He is delighted to be back. He was born in St Andrews in 1951, and received his DPhil from Oxford in 1974, as a Rhodes Scholar. Prior to joining SFU in 1993, he worked at Dalhousie (1974-91), Carnegie-Mellon (1980-82) and Waterloo (1991-93). He has received various awards including the Chauvenet Prize (93), Fellowship in the Royal Society of Canada (94), Fellowship in the American Association for the Advancement of Science (02), an honorary degree from Limoges (99), and foreign membership in the Bulgarian Academy of Sciences (03). John is a past President of the Canadian Mathematical Society (2000-02) and past Chair of (the National Science Library) NRC-CISTI's Advisory Board. He chairs the International Math Union's committee on electronic information and communications (www.ceic.math.ca, 2002-2006). His interests span pure (analysis), applied (optimization), computational (numerical and computational analysis) mathematics, and high performance computing. He has authored ten books (most recently two on Experimental Mathematics www.expmath.info) and over 250 journal articles, and is co-founder (1994) of a Halifax software company, MathResources (www.mathresources.com), producing interactive CD and Web tools for school and university mathematics.

(b) He describes his new lab as follows:

Dalhousie Drive Based on experience gained within the Simon Fraser CoLab, and in conjunction with a wide variety of academic and corporate partners, this project is to develop a laboratory, the Dalhousie Distributed Research Institute and Virtual Environment (D-DRIVE, www.cs.dal.ca/ddrive), to support an "advanced collaborative environment" where display technologies, next generation input technologies, and wireless networking combine to enable highly collaborative and distributed real-time interactions to take place. The use of such technologies also permits the easy meshing of high-performance computing into research interactions.

It is intended that the core use of the space will be on highly mathematical and scientific tasks, for example, research collaborations between university faculty, research collaborations between universities and industry, and

research analysis of mentoring and teaching interactions within and between universities and schools. Necessary mathematical OCR tools and software will be acquired. One central feature of the laboratory will be large (greater than 50 inch diagonal size) tiled multi-touch sensitive, high resolution display panels that permit users and researchers to interact directly with the panels rather than through the usual keyboard or mouse. In addition, there will be a variety of
stereo visualization devices and multicast AccessGrid capacity for computing and grid collaboration. A proportion of the budget is earmarked for a refresh of equipment in this rapidly changing period. An Apple G5 computer cluster and a file server will be installed to explore cost effective computation and to serve visualizations to remote sites.

Wireless will be installed to permit laptops and other devices to be integrated dynamically into the room so that those devices become an integral part of the environment.

Corresponding networking components will be installed to permit additional devices such as cell phones, pagers, and hand-held organizers to be integrated into the environment, or used remotely.

Various other input and output devices will be installed. Additionally, the laboratory will contain various pieces of video equipment so that the use of the facility may be captured and studied. This will also allow for production of video output to aid dissemination of research findings and to enhance distance collaboration and distributed visualization D-DRIVE will be housed at Dalhousie University within the Computer Science Building-initially in roughly 625 square feet. Since there are no commercial, off-the-shelf, options for most such highly collaborative software, a certain amount of the software will have to be written to enable the level of integration required of the infrastructure.

IV. Keith Taylor joined as the Dean of the Faculty of Science and Professor of Mathematics in July 2003. He writes:

Twenty years ago I spent a sabbatical year at Dalhousie University visiting the research group in operator theory headed up by Professors Fillmore and Radjavi. It was a year that had a major impact on the rest of my career as I was able to initiate two new lines of enquiry that both turned out to be fruitful. Moreover, my wife, Julia, and I established some lifelong friendships here in Halifax. This fondness we had for Dalhousie and the city made us susceptible when the search consultants contacted me in Saskatoon in late 2002 to encourage me to apply for the position of Dean of Science at Dalhousie University. To be truthful, it was an extremely hard decision to leave the University of Saskatchewan where I had spent 26 enjoyable years and Dalhousie was pretty much the only place I would have moved to. So I let my name stand and, to my astonishment, I was selected.

During my first year in the new job, I have gotten to know the younger people in the Department of Mathematics and Statistics – I knew most of the old people already – and the other members of the Faculty of Science. It is a fabulous Faculty with an attitude towards high quality teaching and scholarship that is hard to match anywhere.

The intellectually stimulating atmosphere I found in the Department in 1983 has not changed. There has been the natural renewal with some wonderful young mathematicians and statisticians being added to the faculty and the computer scientists, a nice enough bunch, have split off and formed their own Faculty; but the core spirit of the Department of Mathematics and Statistics remains as it was in the early eighties.

One thing that has changed dramatically is the location. In 1983, the Department was stuck in some upper floors of the Killam Library. The air was so bad in the office space they provided to me then that, within four weeks, I had to ask Gretchen if she could find me a place outside of the library. I
ended up in an old house with the graduate students and lots of fresh air blowing in through the gaps in the walls. Now the Department is occupying what is, arguably, the finest building on campus.

Not only does the Chase Building have a classic exterior, but the interior contains wonderful workspace. The colloquium room is especially pleasant for visiting speakers or for teaching upper level courses. It also serves the outreach programmes of the Department well. This spring I had the pleasure of working with a group of bright high school students and some of their teachers in the “Math Circles” programme. My title that evening was “Cardinal Sins of the Infinite”. Infinite processes can often result in paradoxical results and consideration of one of these resulted in a rather
lively debate among the students – great fun. There is no question that the atmosphere created by the colloquium room and the Chase Building, generally, adds to the impact of Math Circles and other outreach activities of the Department.

I am grateful to the Department for welcoming me this year. I have a small research office where I can hide out when I want to do “real” work. Moreover, they kindly permitted me to teach a special topics course and I have been able to make it to a few of the famous Tuesday lunches. I am now confident that my new mathematical home will provide the spiritual support I need to play the role of dean.

I end with a short version of the problem that generated the debate that evening at Math Circles. An ape and a monkey come across a big pile of coconuts that are numbered in order, using all the positive integers. The ape wants all the

coconuts and scoops up the first 10, those numbered from 1 to 10, in his arms and carries them back to his cave. This takes him ½ a minute. He goes back to the pile to pick up his next load. While the ape is at the pile, the monkey sneaks into the ape's cave, grabs coconut number 1 and takes it to hide in his own cave. The ape picks up the next hundred coconuts, those numbered from 11 to 110, and carries them back to his cave, taking only ¼ of a minute for the second trip. He continues to improve his performance. Each trip he picks up 10 times as many coconuts as the last trip (always the next ones numbered in order) and takes only half the time of the previous trip. Meanwhile, each time the ape goes back to the original pile for a load, the monkey quickly moves the lowest numbered coconut from the ape's cave to his own. What is the situation at the end of the first minute?

DEPARTMENT NEWS

Alan Welsh from the University of Southampton visited for 10 days at the end of September 2003 to work with Chris Field.

Ed Susko, Chris Field and **Hong Gu** of the Statistics Division are very active members of an interdisciplinary research group funded by Genome Atlantic. The group is focused on molecular evolution, phylogenetics and genomics. They are working with the molecular biologist, Andrew Roger and computer scientist, Christian Blouin along with their research teams on important questions in early eukaryote evolution with particular interest in lateral gene transfer and protein evolution. In their research, they build appropriate statistical models for molecular evolution and develop computational methods for maximum likelihood estimation and inference. The methods are computationally intensive and require carefully constructed algorithms for realistic data sets. Joe Bielawski, who is cross-appointed between Biology and Statistics, joined the team this August as part of the Genome Atlantic project. Three statistics graduate students, Xiaofei Shi, Krista Collins and Liwen Zou are all funded by Genome Atlantic.

They are currently in the process of developing a graduate programme in computational biology and bioinformatics involving researchers from Statistics, Biology, Biochemistry and Molecular Biology and Computer Science.

In December 2003 **Jin Yue** began working under Roman Smirnov's supervision on his PhD thesis. In February 2004 he won a Killam Scholarship (it was renewed). He is currently working on two papers "Covariants, joint invariants and the equivalence problem in the invariant theory of Killing tensors" (a joint work with R. Smirnov) and "The 1856 lemma of Cayley revisited".

David Lever wrote:
Keep an eye on the newspaper to see my hole in one today (July 9, 2003), a beautiful 5 iron fade into a 150-yard par 3 hole at River Oaks.

CHEBUCTO COMMUNITY NET

In the ten years since Chebucto Community Net's founding in June 1994, thousands of people and hundreds of community groups and other organizations have gone online with Chebucto. The internet itself has grown and changed, not always for the best.

Back in 1994, most people were becoming aware of the internet but weren't entirely sure what it was or what it could offer them. Internet access was rare and the general lack of knowledge about it threatened to leave most people unable to take advantage of the many opportunities it offered. A visionary group of individuals pulled from the public library system and the then Department of Mathematics, Statistics and Computing Science decided that something needed to be done about this. Their efforts led to the forming of a group from which would come both the Chebucto Community Net Society and the N.S. Provincial Community Access Program.

Both groups shared - and still share today - the goal of promoting community involvement in the online community and the utilizing of online resources to serve community purposes. Chebucto hosted the first Halifax Municipality web site, the first Halifax Public Library site, the first Halifax Metro United Way site, and many more. As these groups became more familiar with the internet, they began running their own servers and sites but they all started here with Chebucto first.

With the support of the Mathematics, Statistics and Computing Science Department, Chebucto Community Net developed the Chebucto Suite, or CSuite, community net software which has been used across Canada, the United States, and as far away as the Ukraine, winning the 1995 Canadian Internet Award.

Barriers to community involvement are frequently economic in nature. Chebucto Community Net has been a registered charitable organization since 1999 and gives out no cost accounts and access to hundreds of individuals and non-profit groups and organizations each year.

User training has been a big feature of the Chebucto Community Net. Courses for individuals and for webmasters were offered for many years and to this day there are volunteers helping users with their problems. Thousands of metro residents have benefited from their time with Chebucto and the fact that Halifax was rated fourth in Canada for internet access (each of the other three top cities also having a strong community net) can be attributed at least in part to these efforts.

Many Dalhousie university students have profited from their

experiences working and volunteering with Chebucto. In ten years there have been dozens of students who have helped build the Chebucto Community Net and gone on to work professionally using the experience they acquired here. In the words of one, "I've had a chance to work on pretty much whatever I feel like, from stats to Lynx to ftpd to zmailer, PHP, SQL, RCS, CVS, security and that's just off the top of my head. I don't know anywhere else around here that I could get all this."

At the end of the day, what the Chebucto Community Net is about is supporting our community. For a decade, Chebucto has formed partnerships with every level of government and with many local community organizations and initiatives. The ripple effect from all of Chebucto Community Net's activities continues to spread and fan out across the world.

From Chebucto Chair Marilyn MacDonald's 2003 annual report:

In his tenth anniversary message, Chebucto's first Chair, David Trueman, congratulates "the entire Chebucto community for the success you have built together." On the brink of entering our second decade, we will need to continue to work together in service to our community.

Happy Birthday. Carry it on.

MATH AND STATS SOCIETY

Gillman Payette, President, CUMC/CCEM, reports:
The year started out with a great deal of work to prepare for our first aftermath of the year. Taking a suggestion from the final aftermath last year, we decided to make kebabs, not only chicken ones but beef and veggie as well. This was not a great idea. We made a lot of these things and the preparation of them in the honors room left a serious funk in there for quite a few months, I don't think it has really ever gone away. Although we were offering free beer, few first-year students came to the event, which makes sense, seeing as frosh week had just ended and their livers were undoubtedly trying to recover.

The next big event that we had was the wine and cheese. This year I decided to try and get some good wine from an outside source. Bar services are great and all but their selection is lacking. So we did. The budget for such an event is quite large so giving away free wine, and cheese gets quite expensive. The evening was great and we ended by playing pictionary on the main board of 319. As always the end of the year tutorials were a success and by that I mean that we broke even for the Christmas exams.

The Garrison Brewery tour is really a good deal. If one can round up 12 people then it only costs 10 dollars for two hours of unlimited drinking. This is quite a bit if you are so inclined. After the brewery we all went to Bearly's to take in some blues, among other things.

As an alternative to the oppressive regime of Dalhousie Bar services one can use society funds to host off-campus parties of a calm nature. This was a great idea spearheaded by Josh MacDonald and held at his house. Everyone that came was to bring a bottle of wine, and all were to be shared so that everyone could get a taste of a variety of wines. The party went on into the night and it was a great time.

The AGM as always was good and this year we had a great turn out that dwarfed last year's considerably. We elected a new council, consisting of Sarah Chisholm (President), Shanon Eazzat (Vice- President), Grant "bort" Pardy (Treasurer), and Sarah Young (Secretary). This was all accomplished before the power went out, and we sat around in the twilight drinking and discussing ideas for next year before Dal security kicked us out.

This semester the tutorials were a great fundraiser and will contribute to the final aftermath and the CUMC, this summer. As a final note I would like to thank the general public aka Leon McQuaid for attending all of our society's events and being a barrel of laughs, although he was not a math student at all but rather a lost puppy from the Philosophy department that stayed on my couch a great deal. Leon we salute you.

GRADUATE STUDENT SOCIETY

Math/Stats Grad Society Report for 2003-2004

The Dalhousie Math/Stats Grad Society has had a wonderful year. The main focus of the society has been to organize social events both for the entire math/stats department and also for students. We have also continued the Graduate Student Seminar.

The fall term started with a bang, we hosted a martini party to welcome graduate students and honours students, both new and returning. There was a thanksgiving potluck dinner for grad students. Halloween was celebrated with the traditional pizza lunch for the whole department. The festive season began with another cocktail party for graduate and honours students, which was a good excuse for everyone to get dressed up. The entire department celebrated the coming of the holiday season with a special lunch. This year we tried something new, Indian food instead of pizza, and it was immensely enjoyed.

The first social event of the New Year was a dinner at a Chinese Restaurant to celebrate Chinese New Year. Quite a few students turned up to ring in the year of the Monkey. There was a Casino night and a Pool Tournament to provide

a much-needed diversion from the stresses of being a grad student. The end of classes was celebrated with another pizza lunch.

Throughout the year, we have hosted the Graduate Student Seminar. We were lucky to have a number of interesting speakers, both faculty and graduate students. The aim of this seminar is to present material that is at a graduate student level, and to also provide a forum for graduate students to present their own work or something of interest. We hope the seminar can continue in the coming years.

The main goal of the math/stats grad society is to promote the interests of the graduate students and to act as a social institution. We have endeavoured to achieve this over the past year. We try to bring the graduate students together as a community, and as part of the larger departmental community of students and faculty. As the winter term is ending, we look forward to planning more events and we wish everyone a wonderful summer.

Tara Taylor (President)
Paul Ottaway (Vice President)
Krista Collins (Secretary/Treasurer)
Margaret-Ellen Messinger (Department liaison)
Adrian Tang (DAGS rep)

GRADUATE REPORT - STATISTICS

This year we welcomed five new students to our graduate programme in Statistics. Krista Collins, Leah Gerber and Qing Liu all came from undergraduate programmes at Dal while Liwen Zou joined us after completing a Master's degree in Computer Science at Dal. Goldis Radjabalipour did her undergraduate degree in Iran and a year of Statistics at Toronto before joining us at Dal. We currently have 10 MSc and 4 PhD students in Statistics.

David Campbell graduated with an MSc in October and is continuing his PhD at McGill. Caren Rose and Eric O'Neill will graduate with their MSc this May. To date, we have admitted seven new graduate students for 2004/05.

GRADUATE REPORT - MATHEMATICS

Recent Graduates

McCurdy, Sarah (supervisor: R. Nowakowski) M.Sc.
Quinlan, Stephen (supervisor: A. Coley) M.Sc.
Ottaway, Paul (Supervisor: R. Nowakowski) M.Sc.

Five students are expected to complete their programs this summer.

Klapstein, John (supervisor: K. Dilcher) M.Sc.
Messinger, Margaret (supervisor: R. Nowakowski) M.Sc.
Peterson, Joel (supervisor: R. Spiteri) M.Sc.
Tang, Adrian (supervisor: R. Nowakowski) M.Sc.
Taylor, Tara (supervisor: D. Pronk) Ph.D.

There will be seven students continuing in the Ph.D. program, and one continuing in the M.Sc. program.

Two students have completed a qualifying year program and will enter the M.Sc. program.

Seven new students have been admitted to the M.Sc. program, one to a qualifying year program and one has transferred into the M.Sc. program.

OUTREACH INITIATIVES
by *Richard Hoshino*

The Nova Scotia High School Math League

The Nova Scotia High School Math League was created last year by Sarah McCurdy and myself (Sarah is now a B.Ed student at UNB). We had a very successful first season, with three games that attracted eight schools and over one hundred students throughout the Halifax region. This year we expanded the league to two other regions (Truro and Sydney), and enjoyed incredible success. Upwards of 250 students participated in our three games, from over twenty-five schools in Halifax, Truro, and Sydney.

The purpose of the Math League is to provide a fun environment for students to get together and engage in cooperative problem-solving. The problems are recreational yet challenging, and so students are engaged throughout the event, and learn a great deal of new mathematics. In addition, the Math League provides a friendly forum for teachers and university faculty to get together and interact. It is our goal to expand the Math League to every region in Nova Scotia within the next few years.

We will hold a provincial championship on May 15th, which will be held at Halifax West High School. Thirteen of the top teams have been invited for this special event, and we hope to bring in local media to cover the event, as well as a visit by Jamie Muir, the Minister of Education for the province of Nova Scotia.

For more information on the Nova Scotia High School Math League, please see

http://www.mscs.dal.ca/~hoshino/mathleague.html

Math Circles at Dalhousie

The Math Circles is a new outreach program that began in March 2004. This is a mathematics enrichment program for high school students in the Halifax community. The purpose of the Math Circles program is to foster interest in mathematics among talented high school students and expose them to mathematics beyond the high school curriculum. This enrichment program is modeled after the highly successful Math Circles program at the University of Waterloo.

The Math Circles take place on Wednesday evenings from 6 to 8 PM, and pizza is provided for all participants. There were five scheduled meetings in the winter term, with the following speakers:

Richard Nowakowski and Paul Ottaway, "Combinatorial Games".

Keith Taylor, "Cardinal Sins of the Infinite".

Dorette Pronk, "A Journey to Fractal Land".

Richard Hoshino, "The 2004 Euclid Contest".

John Clements, "What Mathematicians do in Science and Industry".

We would like to continue the Math Circles, and we hope that this will become a permanent part of our department's outreach initiatives. We hope that next year there will be more speakers from our faculty volunteering to give talks.

For more information on the Math Circles, please visit http://www.mscs.dal.ca/~hoshino/mathcircles.html

Combinatorics Institutes for Secondary School Teachers

John Grant McLoughlin (Faculty of Education, UNB) and Richard Hoshino won a $10,000 grant from the Canadian Mathematical Society to run a series of Combinatorics workshops in Atlantic Canada for high school teachers over a two-year period. In the past 18 months, we have run a total of six workshops in the following cities: Sackville, Halifax, Corner Brook, Charlottetown, and two in Fredericton. Later this summer, we will be holding two-day institutes in Moncton and Truro. Through these institutes, we have had the opportunity to work with hundreds of mathematics teachers and create a successful professional development program that builds bridges between high school teachers and university faculty in Atlantic Canada.

The material for the institutes are taken from a book entitled "Combinatorial Explorations", co-written by John and Richard, which has been submitted to the Canadian Mathematical Society's ATOM Series. We are expecting a summer publication.

For more information on this program, please see http://www.mscs.dal.ca/~hoshino/institute.html

The Math/Stats Education Study Group
by *Richard Hoshino*

From January 2002 to March 2004, the Math/Stats Education Study Group met once every two weeks to discuss innovative and fresh ways of teaching mathematics to undergraduate students. In over two years, we met approximately forty times and had speakers from four different Dalhousie departments, and had guest speakers from five universities.

We have compiled two large binders which contain every handout and reading that has been used at the Study Group since our formation in January 2002. In these binders, there are many interesting journal articles, as well as specific teaching tips and helpful strategies to enhance student learning. We had speakers from five different Dalhousie departments and invited speakers from six universities. So we've generated a wealth of new ideas and new resource materials. Hopefully you will find them helpful.

I want to let you all know that these two binders are now in the Mail Room (aka Printing Room) on the second floor of Chase. You will be able to see the green and blue binders when you walk in the door, just above the printer. I'd encourage you to flip through those binders and if you find anything interesting, to freely photocopy any articles that are
of interest. We hope that these Study Group binders will be a valuable resource for many of you in this department. If you'd like more information on any particular handout/topic, please speak to me and I'd be happy to locate additional resources for you.

I'd especially like to thank Paul Muir for all of his commitment and enthusiasm over the past two years. He has been an incredible resource for the Study Group and I thank him for all of his support.

Reflections on the Action Canada Fellowship
by *Richard Hoshino*

This year, I have the privilege of being one of the "Action Canada Fellows", a group of twenty young people selected across Canada to participate in an intensive program in

public policy analysis and leadership development. The fellowship is funded by a five-year, $9.2 million dollar investment from the private sector and the federal government. The leadership development program includes three intensive working conferences, investigation of public policy issues, ongoing interaction among Action Canada Fellows, as well as mentoring by current leaders in government and business.

The Action Canada interview process in May 2003 was quite nerve-wracking, where they flew the 31 finalists to Ottawa for an intensive two days of meetings and interviews. I have never met such an eclectic group of inspiring and ambitious people in my life. We are all so different in our personalities, experiences, and our political leanings, but one thing we all share is an incredible love and passion for Canada. I was so privileged to be a part of this group, and was stunned when I saw the star-studded biographies of the other candidates. Most of them made my jaw drop. During the first night, my only thought was, "what on earth am I doing here?"

Despite that lovely first impression, I was miraculously chosen to be one of the twenty Fellows selected for the first year of the Action Canada Fellowship program. As a member of this fellowship cohort, I have attended two week-long conferences in Vancouver and Ottawa, and will be
attending a third conference in Happy Valley, Labrador, at the end of May. During our conferences, we have had the opportunity and the privilege of meeting many distinguished Canadian leaders, in government, academia, industry, and the public sector. We have had photo-ops and conversations with famous Canadians such as Pamela Wallin, Ed Broadbent and John Ralston Saul. In my office is an autographed picture of the twenty Fellows with Jean and Aline Chretien.

During these conferences, we have had intensive crash-courses on major public policy issues such as Aboriginal self-government, Quebec separatism, Canada-USA relations, poverty, immigration, and multiculturalism. Speaking of the last issue, we met the pollster Angus Reid who shared with us some of his research on multiculturalism. Reid finds that when it comes to embracing our multicultural mosaic,
Canadians tend to be far less inclusive than Americans once you get outside of the three major cities in Canada (namely Vancouver, Toronto, and Montreal). In addition to this, most minority groups perceive Canada to be more of a melting pot than the USA. Even in a city as large as Halifax, I have been approached at least twenty times by Haligonians, who ask me what part of the world I am from. Others have commented on how strong my English is, and how I don't have a noticeable accent. As someone who has spent his whole life in Canada, I find remarks like that tremendously ignorant and insulting. I never heard comments like that in Toronto. My personal experience is that when I visit more homogeneous communities in this province, I see a greater amount of ignorance about intercultural communication and embracing diversity. As a non-Caucasian, I have often felt very uncomfortable when I travel to rural communities in Nova Scotia, even when I am visiting high schools and doing math workshops for students. The Action Canada Fellowship gives me the perfect platform and the opportunity to study this issue, and make proactive change to educate people, especially the youth who will be the future leaders of our country.

In addition to the intensive conferences, all of the Action Canada Fellows are involved in a major year-long project as part of the fellowship. We have broken into several different groups, and are working on projects involving foreign policy, poverty, and youth voting. Due to my passion and interest in the issues of intercultural communication and embracing our diversity, I am part of a trio of Fellows that is working on a project involving running conferences on intercultural communication for youth. My two partners are a Toronto lawyer with the Department of Justice, and a Cornell Ph.D Science and Technology student, who is originally from Vancouver. Our project involves the organization and coordination of two conferences in intercultural communication for high school students. Due to a great partnership with the Multicultural Association of Nova Scotia, we have decided to host these two workshops in this province, and have chosen Bridgewater and Halifax as the conference sites. The conferences aim to empower students to work together constructively and creatively with students from all backgrounds and experiences. After these conferences, the students will apply what they've learned and go back to their schools and communities and make constructive steps to raise awareness and bring about proactive change. The hope is to present these workshops as a model for other schools in the rest of Canada, through a creative media dissemination strategy (CBC radio, internet, and newsprint) to advocate how these workshops can be held nationally. We have already run a successful conference in Bridgewater which brought together 135 students from eleven different high schools in the South Shore District School Board, and featured outstanding speakers talking about African Nova Scotian Culture, Aboriginal Culture, Understanding Islam, Homophobia, Bullying, Human Rights, and Internet Safety. The Halifax conference will take place at the end of April, and we will discuss the intricacies of effective intercultural communication, conflict resolution, and having a critical awareness of media. While different in scope, the model conferences have the same goal: to bring students into contact with the people, ideas, tools, and skills they need to build a better Canada.

Overall, the Action Canada Fellowship has been an exhilarating and empowering learning experience. Coordinating and running these youth conferences is a

special privilege, and I never would have dreamed of being involved in such a project, if it were not for Action Canada. I am honoured to be a part of this special fellowship, and have learned so much about public policy, and about leadership. I have made friendships with incredible young Canadians that with last a lifetime. I might even help campaign for the Fellows someday, if any of them choose to run for Prime Minister. (It wouldn't surprise me).

Although my Action Canada work takes a great deal of time and energy from my projects at Dalhousie, I am convinced that this Fellowship is much more important (in the bigger picture) than my thesis and my own mathematical research. Striving for an effective balance has been the biggest challenge of this year, but I strangely find that working on the Action Canada project gives me more determination and focus to complete my research, and vice-versa. Being involved in a program like this helps me broaden my horizons and perspectives, and makes me more aware that as a proud Canadian citizen, my contributions to Canada need to be more than just researching and teaching mathematics. Professionally and personally, winning this Fellowship has been one of the greatest blessings that I have ever received, and I am so thankful for this opportunity.

For more information on Action Canada (the program, the biographies of this year's fellowship cohort, and information on nominating a candidate for future fellowships), please see www.actioncanada.ca

THE CMS/CAIMS Summer 2004 Meeting

The Department of Mathematics and Statistics is glad to announce that the joint Summer 2004 Meeting of the Canadian Mathematical Society (CMS) and the Canadian Applied and Industrial Mathematics Society (CAIMS), with participation from the Canadian Society for History and Philosophy of Mathematics (CSHPM) and the Canadian Symposium on Fluid Dynamics (CSFD) will be held at Dalhousie University, June 13-15, 2004.

We look forward to welcoming mathematicians and other participants to Halifax and sharing the pleasures of summertime here. The CMS meeting was held last at Dalhousie in 1990 and the CAIMS meeting was held last in Halifax in 1990 (at the Technical University of Nova Scotia which has since joined Dalhousie). Following the usual formats of both societies, the meetings will include a wide variety of symposia, a session of contributed papers, plenary speakers, prize lecturers, a graduate student poster session, and a Public Lecture.

Most activities and all scientific talks will be held on the Dalhousie campus, with the main hub of activity being at the Marion McCain Arts and Social Sciences Building.

Visit the meeting website:
http://www.cms.math.ca/Events/summer04/
for the most up-to-date information.

Prior to the joint CMS/CAIMS meeting, MITACS (the Mathematics of Information Technology and Complex Systems) will hold its 5th annual conference, from June 9 to June 12. This will bring together the top people in the Mathematical Community to discuss research into the Environment and Sustainable Resources.

CONFERENCES

Chris Field was the local arrangements chair for the 31st Annual Meeting of the Statistical Society of Canada, which was held at Dalhousie University from June 8-11, 2003. The meeting attracted more than 450 registrants.

Workshop: Singular Integrals and Analysis on CRManifolds was held May 3-8, 2004 – Funded by CRM and AARMS ($22,500) and organized by Galia Dafni (CRM) and Andrea Fraser (Dalhousie)

The theory of singular integral operators in the context of analysis on CR submanifolds of C^n, in particular the Heisenberg group, has been studied and proven fruitful over the last 30 years. In recent years, the emphasis has shifted to singular integral operators which do not fall under the standard Calderon-Zygmund theory. These include operators arising from product kernels on nilpotent Lie groups, which in turn lead to the study of flag kernels. This is an in-depth workshop, bringing together from around the world, specialists in harmonic analysis, several complex variables, and symmetric spaces. The workshop featured a short-course by Alexander Nagel (Wisconsin). Visit
http://www.crm.umontreal.ca/Singular
for details.

Roman Smirnov gave talks at the following universities/conferences:

1. November 24, 2003: Geometry and Topology Seminar, University of Waterloo, Pure Math. Department. Method of moving frames and algebraic invariants in pseudo-Riemannian geometry.

2. March 27, 2004: AMS Sectional Meeting, Ohio State University, Athens. Invariant theory of Killing tensors and integrable Hamiltonian systems.

3. May 27, 2004: University of Turin (Italy), Department of

Mathematics. The 1856 lemma of Cayley revisited.(a talk about a result by Jin Yue, PhD student).

4. May 30-June 6, 2004: Conference "Symmetry and perturbation theory-2004", Gala Gonone, Sardinia, Italy. Covariants, joint invariants and the equivalence problem in the invariant theory of Killing tensors (tentative) (a joint work with Jin Yue).

5. June 13-15, 2004: CMS Annual Meeting, Dalhousie: Applications of Invariant theory in Differential geometry. A new invariant theory: invariants, covariants and joint invariants of Killing tensors.

6. August 30 - September 3, 2004: 9th International Conference on Differential Geometry and its Applications, Prague, Czech Republic. Moving frames and the invariant theory of Killing tensors (tentative).

Peter Guttorp (U. Washington) and *Bruce Smith* organized a conference entitled "Point Processes - theory and applications" at the Banff International Research Station, June 21-26, 2003.

Bo Lin presented a talk entitled "Analysis of Quantitative Traits in Outbred Populations, with Applications to Forestry" at the Mitacs Biomedical Theme Meeting held at The Banff International Research Station, October 22-23, 2003.

S. Swaminathan participated in the first Joint AMS-India Meeting held at the Institute of Science, Bangalore, December 17-21, 2003. His lecture was on 'The Alexandrov Problem on unit-distance preserving maps on metric spaces'. He was invited to give talks at the University of Madras, Ramanujan Institute, University of Pondicherry, and Chennai I.I.T.

SUMMER CAMPS

Academic Camp at Shad Valley

Report by Sarah McCurdy

Fifty high schoolers enthralled by lectures and projects? In the summer? For a month-long academic camp? That's Shad Valley. The program runs at ten university campuses in Canada and accepts top high school students for a month of academia, leadership, and fun. Lectures are given in science, math, engineering, and entrepreneurship, and the month also includes camping trips and cultural excursions.

At Shad Valley Dalhousie 2003, Tony Thompson and I had the privilege of sharing the role of math faculty member. Throughout the course of the month we gave six lectures, ran two week-long workshops, and participated in every aspect of Shad social life.

Last July you may have seen troupes of students in the LSC or in the Chase building. The large group of fifty students attended lectures every morning in the LSC. From the other faculty members, also Dalhousie professors and affiliates, the students learned about dolphins' social phenomena, vertebrate fossils found in Nova Scotia, developing prototypes of a product, starting a small business, and much more. Math lectures were designed to open the students to new ideas outside of those normally encountered in high school. Tony talked about Hilbert's Hotel to describe some ideas of infinity that were new to the Shads. He used examples of the days of the week and the months to introduce modular arithmetic. During another lecture, the students were encouraged to examine the Fibonacci number sequence taken modulo *k*. I spoke about the game Dots and Boxes, and we explored some elementary strategies for playing well. Tony talked a bit about non-Euclidean geometry; students found this to be confusing and engaging. I gave an overview of some surfaces studied by topologists and showed my desired winter wear: a Mobius scarf and a Klein bottle hat ("one side fits all!").

Tony and I also led two workshops, which met in the Colloquium Room for the afternoons on two weeks. The first was about creating regular polygons and polyhedra from cash register tape. Using ideas from Holton, Hilton, and Pedersen's books Mathematical Vistas and Mathematical Reflections, we folded paper strips to more and more precise angles using a quickly converging sequence. We were then able to construct many regular shapes. The students explored the five Platonic solids and constructed them with the paper strips. Our second workshop was a short introduction to some classical game theory and some combinatorial game theory. Students were fascinated to talk about the prisoners' dilemma as the conclusion to the classical game theory, and were also surprised to meet some surreal numbers such as up, down, and star during the course of the sunny afternoons.

The Shads did much more than academia while at Dalhousie, but they expressed amazement at how much they learned while here. These students are now pursuing university degrees or finishing high school. Tony and I were so glad to open the world of math to them more broadly last summer. Many were excited by math even more than before and found they had a better understanding of what mathematics is really about. I have the opportunity to work with Shad Valley again this summer. Look for me on campus with a horde of young people, laughing and learning. Expect to see us in and around the Chase building again, examining new mathematical ideas. And don't be surprised to Shad alumni in our classes and our department in the years to come.

Math Camp for Black Students

Report by R.P. Gupta

The twelfth mathematics camp for black students was held in the second week of July 2003. The camp was organized by the Department of Mathematics and Statistics and the Black Educators Association of Nova Scotia. Thirty-six students were selected to attend the camp from schools all over Nova Scotia. The aim of the camp was to generate interest in mathematics, statistics, computers and sciences so that these students can pursue further studies with enthusiasm and appreciation of these subjects. The students, generally from grades six and seven were brought to the Dalhousie campus and accommodated in Howe Hall. Mornings and early afternoons were devoted to lectures and mathematical, statistical and computer activities, while late afternoon and evenings were devoted to extra curricular activities where they could apply the talents learned in the classes and practice with them. They were taken to Dalplex for one hour each afternoon for swimming and games like basketball, tennis, etc. They also visited the Nova Scotia museum of history and science as well as the Discovery Centre. Students of the Camp also spent one evening in the Black Cultural Centre in Dartmouth where they were told about the mathematicians and scientists of black origin and a film was shown. The students were taught and cared for by six instructors (three university professors and three school teachers) and five chaperones. The Camp was organized under the directorship of R.P.Gupta of Dalhousie University and Mr. Gerry Clarke of the Black Educators Association. It was financially supported by a NSERC promo science grant, Dalhousie University and the BEA.

CMS Math Camp
July 14-18, 2003

Report by Chelluri C.A. Sastri & Suraj Sikka

The camp was held by the Department of Mathematics and Statistics, Dalhousie University, under the auspices of the Canadian Mathematical Society (CMS) and Dalhousie University, with financial support from various sources, including Dalhousie, ESSO, and NSERC/PromoScience. This was the fourth in a series of annual camps that began in 2000. The organizers, as before, were Chelluri C.A. Sastri and Suraj Sikka.

The camp was aimed at students in Nova Scotia. Accordingly, letters calling for nominations were sent out in late March to all the high schools, private as well as public, in the province. The stipulation, again as before, was that a school could make no more than two nominations and that the nominees were to have finished either Grade 10 or Grade 11. The response from the public schools in Nova Scotia was about the same as last year but down from the previous years. However, it was sufficient to provide a good pool of students from which to make the selection. The response from the private schools was poor, as before. Altogether, there were 36 applicants.

In the selection process, we again encountered a problem we had faced before: One of the criteria we have used for acceptance into the camp is performance on the Cayley/Fermat contests held by the University of Waterloo. However, it is becoming increasingly difficult to do so since many schools are not participating in these contests for financial reasons. This makes the task of selection harder, for the contests provide a uniform measure of excellence. The other criteria we use, such as grades and letters of reference, **are** useful but have the disadvantage of considerable variability. Suggestions for tackling the problem are welcome.

Equity of distribution in terms of gender as well as geographical location was also an important consideration. In the end, eleven boys and ten girls representing almost all the regions were selected.

The format of the camp was essentially the same as in previous years. The instructors were faculty members at Dalhousie, with three exceptions: Professors Robert Dawson and Bert Hartnell are from St. Mary's University, and Mr. Paul Ottaway is a graduate student at Dalhousie. Paul has had experience with math camps, having attended and conducted camps at Waterloo. He doubled as a chaperone.

Nobody, among the instructors, organizers or helpers, of whom there were many, received any payment for services rendered. However, all of them will be invited to a thank-you dinner.

The students arrived, and registered, on Sunday, July 13, between 1:00 and 2:30 pm. They were received by the organizers and two chaperones, Sunita Gupta and Paul Ottaway. Sunita is a young high school mathematics teacher. Just prior to the CMS camp, she had taught in another math camp, directed toward Black junior high students, held here at Dalhousie. The students and the chaperones all stayed at Shirreff Hall, a student residence. They got along quite well—the students described, in their comments after the camp, their interaction with the chaperones in very positive terms.

Following registration, a reception was held for the students and their parents.

Computers were an integral part of the camp. The computer lab belonging to the Faculty of Engineering and located in the Dunn Building was placed at our disposal for the entire duration of the camp. For this we are grateful to the Engineering Faculty and, in particular, to Reg Peters, who is in charge of the lab. It was used to teach Maple, geometry, and statistical simulation. In addition, one of the instructors, Dorette Pronk, taught the students how to print on their T-shirts some of the work they had done. For this purpose, each of the students was given a T-shirt. They thoroughly enjoyed this activity, and the individualized T-shirts look beautiful. Each day of the camp was divided into a morning session (9:00 to 12:00, with a twenty-minute snack break) and an afternoon one (1:30 to 3:30, with a ten-minute break). Each session consisted of a lesson. The lessons were not just lectures; there was plenty of interaction, problem solving and hands-on work. Since this format had worked well in previous years, we decided to follow it this year also. The consensus was that the camp went very well.

We are grateful to Ron Fitzgerald of Math Resources Inc. for donating packages of their Math Dictionary. We believe the students were pleased to get them.

There were several extra-curricular activities—bowling, chess, a pizza party, etc. A scheduled visit to Shakespeare by the Sea had to be cancelled because of bad weather, even though a rain date had been chosen—it rained on both the days! The students went to a movie instead. Two presentations, one by Adam Clay, a recent honors graduate of our department, entitled "Choosing a University to Attend", and another by Shawn Tracey, an assistant registrar at Dalhousie, about scholarship opportunities at Dalhousie, were well-received. Every day, after the academic sessions were over, the students spent about an hour and a half playing sports or working out at Dalplex, the university's athletics and sports complex.

The students were picked up by their parents after a barbeque lunch, which was preceded by closing ceremonies, on Friday the 18th.

The camp was supported by Dalhousie and the CMS. The CMS, with support from ESSO, NSERC/PromoScience and perhaps other sources, contributed $3000.00. Dalhousie supported the camp in many ways: $3000.00 from the President's Office, $2000.00 from the Office of the Dean of Science; free use of the classrooms and the computer lab; free secretarial help, photocopying and miscellaneous items and services from the department; and free faculty time. We received enthusiastic help and support from our colleagues in organizing the camp and are grateful for it. A registration fee of $50 per student was charged except in cases of financial exigency.

In closing, it is our pleasant duty to thank all the instructors, without whose hard work and dedication the camp would not have been possible. We are also pleased to thank Gretchen Smith, the departmental administrator, and the secretaries, Maria Fe Elder, Paula Flemming, and Jackie Harnish-Grandy, for their unstinting help.

VISITORS TO DEPARTMENT

Yuri Bahturin (Memorial University of Newfoundland and Moscow State University), January 18 - 20, 2004.

Matjaz Omladic (University of Ljubljana) visited the department from January 25- February 1, 2004.

Kyoung Lee and *Won Kim* will be Visiting Professors in Mathematics in 2005. They will be working with K.K. Tan.

A. Zhalij, (NATO-NSERC PDF, CRM, Montreal and Institute of Mathematics, Kiev, National Academy of Sciences of Ukraine) visited the department on March 1, 2004. He gave a talk on "Separation of variables in (1+3)-dimensional Schroedinger equations with vector-potential" in the Mathematical Physics Seminar.

Luca Greco, PhD student from the University of Padua will be working with Chris Field from June to August.

The following mathematicians visited the department this past year to collaborate on research with K.K. Tan.

(1) *Xian Wu* (Associate Dean of Science)
Yunnan Normal University, Kunming, Yunnan, China

(2) *Shi Sheng Zhang* (formerly, Shih Sen Chang)
Sichuan University, Chengdu, Sichuan 610064, China. His wife, Zhong Hou Cao, also a professor,accompanied him.

(3) *Won Kyu Kim* Chungbuk National University
Cheongju, Korea

(4) *Kyoung Hee Lee,* Korea University of Technology and Education Chunan, Korea

Welcome to *Wannapa Ruangthanakorn* who is a visiting student from Suranaree University of Technology, Nakhon Ratchasima, Thailand. She is working with Keith Taylor.

Claudia Chanu, Department of Mathematics, University of Turin, Italy. Claudia will be visiting us during the period June 10-19, 2004. She will be also participating at the CMS Annual Meeting and giving a talk.

GRANTS

Christophe Herbinger, who has a joint appointment in Mathematics, Statistics and Biology (where he holds the StoraEnso Chair in Forest Genetics and Biotechnology) has been awarded a grant from the Atlantic Innovation Fund for a project entitled "Molecular and statistical tools to improve tree breeding". This is one of the two projects funded at Dalhousie. Chris Field and Bruce Smith from this department, and C. Thompson (U.N.B St John) are collaborators on the project, with StoraEnso Port Hawkesbury as industrial partner.

In addition, Christophe is also a collaborator on an industry-led halibut broodstock development proposal as well as two other successful AIF proposals that were put forward by the Institut de Recherche sur les Zones Cotieres, Universite de Moncton.

The genetic component of these last two projects on Arctic char and American oyster will take place at Dalhousie University.

In total, this represents about one million dollars of AIF funding over the next 5 years. Congratulations, Christophe.

Hong Gu and 6 others from Computer Science (Theodore Chiasson, Vlado Keslj, Raza Abidi, Anthony Cox, Norbert Zeh, Thomas Trappenberg) have received the largest CFI New Opportunity award in the country, which is in the amount of approximately $1.9M for research equipment and research infrastructure. The title of the grant is "Scientific visualization through data mining of electronic commerce and health informatics large scale data sets". The funding source includes $700,000 from CFI, $700,000 from NSRIT (Nova Scotia Research Infrastructure Trust), $190,000 from the Faculty of Computer Science, and close to $300,000 in kind contributions from vendors. $1M of the grant is targeted for building a 3200 sq.ft. lab on the (new) fifth floor of the Computer Science building, as well as a 300 sq.ft.

machine room. The two floor addition to the Computer Science building is scheduled to be completed by December 2004.

In February 2004 *Roman Smirnov* was awarded an NSERC research grant: 14K per year for 5 years.

Joint Research Project receives renewed funding from NSERC Collaborative Health Research Projects (CHRP).

The research project entitled "Simulation and localization of cardiac dysfunction: from mathematical models to clinical applications" is a joint collaboration between *John Clements* (mathematics), *Milan Horacek* (biophysics*), Martin Gardner* and *John Sapp* (cardiology), *John Fitz-Clarke* (emergency medicine) and graduate students and Post Doctoral Fellows in the respective departments. The objective of this research is to derive anatomically and physiologically accurate mathematical models of electrical activation in the human heart. These comprehensive simulation models will be used to (i) non-invasively locate and quantify arrhythmogenic substrate in cardiac patients, (ii) assess the potential effects of anti-arrhythmic drug interventions and (iii) predict the consequences of related cardiac therapies. This project has been granted funding for an additional three years.

PUZZLE CORNER

Edited by
S. Swaminathan

Puzzles from the book "Puzzles 101", A Puzzlemaster's Challenge, by Nobuyuki Yoshigahara, translated by Richard Weyhrauch and Yasuko Weyhrauch, A. K. Peters, Natick, MA, 2003. [A review of this book will appear in CMS NOTES, September 2004 issue]

I. What comes next?
2, 4, 6, 30, 32, 34, 36, 40, 42, 44, 46, 50, 52, 54, 56, 60, 62, 64, 66, ? , …
What comes after 66?

II. Height and Weight.
A man says, "I am the average height and average weight of a Japanese man. Thus, I am an average man." However, he is still considered to be a little overweight. Why?

After you have had a chance to think about these two puzzles, turn the page for the solutions.

GASOLINE CRISIS

There is a gasoline crisis. Assume that the gas stations are located on a long circular route and they contain together just enough gas to make one trip around. Then it can be shown that if you start at the right station with an empty tank you can make it all the way around. Here is how: First imagine that you begin at Station 1 with, say, 10 litres of gas. You go around the route emptying each gas station as you go. When you return to Station 1 you will have the same amount of gas in your tank as you started with, namely, 10 litres. Further as you proceed along the route, keep track of how much gas is left in the tank as you pull into each gas station. Suppose this quantity is minimized at a certain Station. Then, if you start at this Station with an empty tank, you will not run of gas during the entire trip.

NET PROFIT

Two Cape Cod fishermen had an argument one day as to which one was the better mathematician. Finally the captain of the fishing trawler proposed the following problem to them as a test: If a fishing crew caught five hundred pounds of salmon, brought the catch to the port and sold it at sixty cents a pound, how much would they receive for the catch? The two old fellows got to work but neither seemed to be able to arrive at an answer. After some time, one of them approached the captain and asked him to repeat the problem. The captain started off, "If a fishing crew caught five hundred pounds of salmon and…" "Wait a minute there, wait a minute please," said the fisherman, "Is it salmon they caught?" "Yep," answered the captain. "Good grief, it ain't no wonder I couldn't get the answer. I have been figuring on codfish all the time!"

MATHEMATICS SEMINARS
2003/2004

DATE	SPEAKER AND TITLE
08.09.03	*Sara Faridi* (UQAM), The Theory of Facet Ideals
16.10.03	*Peter Selinger* (Ottawa), Towards a Quantum Programming Language
20.10.03	*Vojtech Pravda* (Math. Inst. of the Acad. of Sc. of the Czech Republic), All Lorentzian Manifolds With Vanishing Curvature Invariants
27.10.03	*Roman Smirnov* (Dalhousie), Theory of algebraic invariants in pseudo-Riemannian geometry: Methods for computing the fundamental invariants.
20.11.03	*Franklin Mendivil*, (Acadia), Fractals, Graphs and Fields
08.12.03	*Ray McLenaghan* (Waterloo), The Validity of Huygens' Principle for the Scalar Wave Equation on Curved Space-time
19.01.04	*Hugh Thomas* (Fields Inst.), Triangulations of Polygons and Non-crossing Partitions
29.01.04	*Michele Titcombe* (UQAM), Two Singular Perturbation Problems in Two Dimensions
12.02.04	*Dhavide Aruliah* (UWO), Multigrid Preconditioning for Time-harmonic Maxwell's Equations in 3D
16.02.04	*David Iron* (UC Irvine), The Stability and Dynamics of Hot-Spot Solutions for Two Microwave Heating Models
01.03.04	*Irina Kogan* (North Carolina State), Cartan's Method of Moving Frames and its Applications
04.03.04	*Jon Borwein* (Dalhousie), Ramanujan's AGM Continued Fractions and Dynamical Systems
25.03.04	*Shisheng Zhang* (Sichuan and Yibin), On the Open Questions of Halperin and Suzuki
23.04.04	*David Jeffrey* (UWO), Solving Large Polynomial Systems by Homotopy or Continuation

STATISTICS SEMINARS
2003/2004

DATE	SPEAKER AND TITLE
04.09.03	*Karen Rose*, Analysis of Data from a clinical trial comparing different drug treatments for Dyspepsia using Binomial Regression and Binary Classification Trees
11.09.03	*R.P.Gupta*, The Secretary's problem and its extensions
25.09.03	*Alan Welsh* (Southhamptom), Robust Modeling
15.10.03	*Bruce Smith*, Time series methods for modeling sea level
29.10.03	*Chris Field*, Robust models for extreme oceanic winds
19.11.03	*Marc Genton* and *Yanyuan Ma* (NCState), Bivariate skew-t distributions, and applications
08.12.03	*Eric O'Neill*, Mixed model analysis of corn yield data
10.02.04	*Chris Field*, The bootstrap revisited
27.02.04	*Christophe Herbinger*, Pedigree reconstruction and quantitative genetic parameter estimation
08.04.04	*David Hamilton*, Statistical analysis of visual field progression in glaucoma

ANALYSIS SEMINARS
2003-2004
Seminar Organizer: Karl Dilcher

17.09.03 Heydar Radjavi, (Dalhousie), Complete Decomposability of Semigroups of Nonnegative Operators

8.10.03 C.C.A. Sastri, (Dalhousie), Toward a Classification of Infinite Discrete Probability Measures

22.10.03 S. Swaminathan, (Dalhousie), Hyperconvexity in Metric Spaces

5.11.03 Baoguo Jiang, (Acadia University), Uniform approximation by meromorphic functions on Riemann surfaces

3.03.03 David Borwein, (Univ. of Western Ontario), Weighted Convolution Operators on ℓ_p.

10.03.03 Jon Borwein (Dalhousie), Ramanujan's AGM continued fractions and dynamical systems. Part 2: The complex case

SOLUTIONS TO THE PUZZLES.

I. None of the numbers contain an 'e' when spelled out in English, e.g., two, four, … sixty-six. Therefore the next number is 2000 (two thousand). Nobuyuki Yoshigahara adds: I waited to use this puzzle until I sent my 1999 Christmas card and 2000 New Year's card – everybody who received it was surprised.

II. Consider a wooden cube which is 1cm on a side and weighs 1 gram. A wooden cube which is 2 cm on a side weighs 8 grams. The average length of these two wooden pieces is 1.5 cm and the average weight is (1+8)/2 = 4.5 grams. On the other hand, the weight of a wooden cube of 1.5 cm on a side would be 3.375 grams. So, if it weighs 4.5 grams, which is the average weight, it is overweight!

CHASE REPORT

Is published for alumni and friends of the Department of Mathematics & Statistics, Dalhousie University.

If, in spite of our careful compilation of this issue, any omission is noted, we would appreciate it being brought to our attention.

We welcome your suggestions and comments for future issues.

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