DEPARTMENT OF MATHEMATICS AND STATISTICS

FACULTY OF SCIENCE, YORK UNIVERSITY

C oN ne x Io

The Chair's Perspective

Juris Steprāns

On December 7 of every year, my Google Calendar notifies me about an important event that happened on that date. No, my calendar is not set up to jog my memory to celebrate International Civil Aviation Day, nor to remember the attack on Pearl Harbor, nor even to note the day Jack Fingleton became the first player to score centuries in four consecutive Test innings. I do however, like to be reminded that on December 7, 1873 Cantor wrote a letter to Dedekind proving that the reals form an uncountable set, thereby establishing a branch of mathematics in which I have dabbled for all of my professional life.

At the time Cantor wrote his letter, it is likely that the only people on the planet aware of his discovery, other than Cantor himself, were Dedekind and a handful of Cantor's colleagues at the University of Halle. Mathematical news could travel only as fast as the post and only one letter at a time. Today, of course, important mathematical advances, such as Yitang Zhang's proof that there are infinitely many pairs of primes whose difference is less than 70,000,000, spread through the internet within minutes. Indeed, the past decade has witnessed profound changes in the way that mathematics is disseminated.

For example, were Cantor to have made his discovery today he would likely have posted it on arXiv.net, an electronic archive of freshly written research papers in mathematics and other scientific disciplines. Rather than sending a letter to Dedekind, Cantor would simply point to him the appropriate URL. But is it possible that the genesis of Cantor's research today would be different than it was at the end of the 19th century? For example, is it possible that his work might have been a response to a question he saw posed on a website such as mathoverflow.net. This website is the hub of a lively interchange of mathematical research problems, a place researchers pose questions to which they do not know the answers.

Some of these are quickly solved, while others result in lengthy correspondence that everyone is welcome to follow and that often leads to significant new research directions.

A companion website, math.stackexchange.com, serves a similar purpose for students of mathematics, rather than researchers. Here students are encouraged to pose questions (yes, even homework problems) that are answered by dedicated faculty members and other students throughout the world. Paradoxically, it is the very openness and connectedness of the internet that prevents this site from being exploited and abused by potential cheaters; with instructors aware of its existence and able to follow all questions posed and answered on math.stackexchange.com cheating is quickly detected.

While Cantor worked on his mathematics alone and rarely collaborated with others, it is interesting to speculate whether, were he alive today, he might have been prompted to join mathoverflow.net or even to participate in a collaborative effort such as the Polymath Project. This is a project that began on a blog maintained by Fields laureate Tim Gowers when he posted a problem and asked his readers to post partial ideas and partial progress toward the solution. This experiment eventually resulted in a collaborative answer to a difficult problem and provided a paradigm for a new mode of mathematical research. Since then, other experiments with the idea have shown how remarkably powerful a tool it can be.

While our departmental newsletter does not have goals quite so lofty, I like to think that it still plays some role in the evolving landscape of mathematical communication on the web. In it you will find news of people associated with our department as well as of the ideas and projects on which they are working. But I also invite newsletter readers to browse our departmental website from time to time, since it will keep you informed of news from the department in a more timely fashion. As well, you will find there links to mathematical websites that will provide a starting point to exploring the mathematical world wide web, an exploration that might introduce you to Cantor and Dedekind, if you do not tarry to long on Jack Fingleton's cricket career.

Departmentpedia

New Member

Professor Tina Rapke is the newest member of our department and has a full-time joint appointment in the Faculty of Education and the Faculty of Science. She received a PhD in 2012 from the University of Calgary under the supervision of Professors Karen Seyffarth and Jo Towers. Her PhD was the first of its kind at the University of Calgary because it is a fully joint degree. Portions of her dissertation have been published in both mathematics and education journals. Her research focuses on combining and complementing mathematics and mathematics education research. Her research interests are in graph theory, more specifically in oriented and injective oriented graph colourings. Her two animated children, under three, keep her laughing every day.

Honours and Awards

The International Congress of Mathematicians (ICM) is the largest international congress in the mathematics community. It is held only once every four years and features the awarding of the Fields Medals, the Nevanlinna Prize, the Gauss Prize, and the Chern Medal. The department is very proud of the fact that

Professor Ilijas Farah has been selected as an invited speaker to the upcoming ICM to be held in Seoul, Korea.

Rory Lucyshyn-Wright, a PhD student under the supervisor of Professor Walter Tholen, who finished his PhD this past summer, received an NSERC Postdoctoral Fellowship in 2013 (two-year postdoctoral fellowship $80,000). He was ranked 8th in the pool of PhD's in mathematical sciences. Rory is now a Postdoctoral Fellow at the University of Ottawa.

Three department members were awarded Faculty of Science Excellence in Teaching Awards: Georges Monette in the senior faculty category, Hanna Jankowski in the junior faculty category, and Iouldouz Raguimov in the contract faculty category.

Francisco Kibedi, PhD student under the supervision of Professor Juris Steprâns, has won the TA graduate award for excellence.

Man Wah Wong was awarded the Doctor Honoris Causa of the University Politehnica of Bucharest on November 25, 2013.

Transitions

Hanna Jankowski, effective July 1, 2013, was promoted to Associate Professor.

Professors Rick Ganong and Eli Brettler retired from the department, effective July 1, 2013. Both are dedicated teachers (not to mention long-distance cyclists). Many students will remember the honours calculus sequence MATH 1000/1010, which Rick developed and delivered for many years. In these courses, Rick famously insisted not only on rigorous proofs, but also on rigorous punctuation! He has coached many York teams in the Putnam mathematics competition, and retires as Associate Professor Emeritus. Eli has held a "special renewable contract" in recent years, won through being among our very best teachers. He developed and delivered the "Problems, Conjectures and Proofs" course (MATH 1200), which is taken by almost all of our current majors. He has also contributed countless hours to student advising. Thank you, Rick and Eli, for the impact you have had on the education of our students. Your colleagues wish you well, and hope you enjoy retirement.

Alumni News

Felipe Posada, who had won the Alice Turner Award in 2012, returned to his native Colombia to do a Master's degree at the Universidad Nacional.

Another alumnus is Ernest Kwan. Ernest is a professor at Carleton University, having received tenure there.

Isabel Hubard, former PhD student of Professor Asia Weiss, received the L'Oreal Award for Women in Science for Mexico.

Other News

Two possible future mathematicians were born to department members: Yasmine (to Professor Youness Lamzouri and his wife in April 2013) and Morgan (to Professor Michael Chen and his wife in February 2014). Congratulations to all!

New Alumni

At convocations in 2013, 79 students received undergraduate degrees in Mathematics and Statistics departmental programs. In addition, the following graduate degrees were awarded:

PhD in Mathematics and Statistics: Carolina Benedetti, Maureen Shannon Collinson Niestrawski, Rory Benjamin Berry Lucyshyn-Wright, Natasha Marion May, Babak Pourziaei, Yongxiu She, Serdar Sozubek, Xiaotian Wu

MA in Mathematics and Statistics: Adrian Manfred Fonseca, Yubin Hou, Wei-Hao Hwang, Naveed Mehdi Islam, Joon-Young Kwak, Jina Lee, Xuan Li, Justin Ng, Branislav Nikolic, Darshanaben Patel, Yuchen Qian, Gilbert Twagirumukiza, Nanwei Wang, Yiyuan Wang

MSc in Applied and Industrial Mathematics: Ping Huang

THE PUTNAM

The William Lowell Putnam Competition is a North American mathematical contest for undergraduate students. It is organized by the Mathematical Association of America and is taken by over 4,000 participants at more than 500 colleges and universities. It is considered by many to be the most prestigious university-level mathematics examination in the world. It is also fiendishly hard; a large fraction of contestants end up with a score of 0 out of 120. Occasionally this is even the median score!

Each year the Putnam competition is held on the first Saturday of December, consisting of a morning session and an afternoon session of three hours each. Each contestant attempts to solve twelve problems, which are notoriously difficult and require a lot of ingenuity but only a little in the way of university-level mathematics courses. In addition to the individual competition, there is also a team competition among participating universities. A university's team consists of three individuals who are chosen in advance, and its rank is determined by the scores of its three team members. The 25 highest-scoring individuals, the top female contestant and the five highest-scoring teams receive monetary prizes.

Every fall, York faculty organize weekly training sessions to help prepare our students to compete in the Putnam. In the fall of 2013, around ten students participated actively in these sessions. Each session consists of several problems which are organized according to a particular theme. The weekly themes range from basic concepts such as the pigeonhole principle and mathematical induction to more advanced topics including abstract algebra, geometry, and inequalities. Another important objective of these training sessions is to provide students with a fun environment to develop their problem-solving skills, and to learn new strategies and mathematical concepts that will also benefit them in their further mathematical studies.

Many of our faculty wrote the Putnam themselves, as students. For example, one notable result for McGill was a team “honourable mention” (top 10 finish) back in 1978, when Professors Madras and Salisbury were undergraduates there. Madras in fact earned a personal honourable mention on two occasions (putting him among roughly the top 40 competitors), while Salisbury's best finish was about 75th.

York's recent teams have been coached by one (or more) of Professors Youness Lamzouri, Rick Ganong, and Yun Gao. We don't yet know our students' results from the latest competition, but over the preceding decade, our highest individual score was 30 out of 120, achieved by Andrey Pak in a year when York's team ranked 78th in North America. In the 1990s we reached a team ranking of 32nd place (coached by Prof. Yuri Medvedev), and saw at least one student score in the 30s (Ilya Shapiro - now a professor at the Univ. of Windsor). In the 1980s one of our teams managed 27th place (coached by Prof. Alfred Pietrowski), with two scores in the 40s (David Ng, and Jason Levy - now a professor at the Univ. of Ottawa). Alas, it is not always easy to anticipate the best choice for the 3-person team. One year, two of our students earned scores in the 40s and 50s (Dan Beamish, and Franco Saliola - now a professor at UQAM), which would probably have led us to a top 20 finish, if only we'd selected our team optimally. Of course, we are not alone in this respect. In the last decade, MIT has only won the competition 3 times, compared to 5 wins for Harvard, despite MIT having double Harvard’s count of top-five students over that period!

2013 SAMPLE PUTNAM PROBLEM (see www.artofproblemsolving.com for solutions and additional problems): *Recall that a regular icosahedron is a convex polyhedron having 12 vertices and 20 faces; the faces are congruent equilateral triangles. On each face of a regular icosahedron is written a nonnegative integer such that the sum of all 20 integers is 39. Show that there are two faces that share a vertex and have the same integer written on them*.

2012–2013 Undergraduate Student Awards

Our annual award ceremony was held on November 27, 2013 in the Senate Chamber. Opening Remarks were delivered by Professor Juris Steprāns and Dean Donald Hastie, Faculty of Science. This year awardees are:

Chair's Honour Roll

Mihai Alboiu
Syed Asghar
Alexander Ashbourne
Javad Ayati
Yosef Bisk
John Campbell
Tin Cheung
Kosal Chhin
Keegan Dasilva Barbosa
Jennifer Do
Zhenan Fan
Karen Feldman
Michael Gimelfarb
Tayla Ginzburg
Nathan Gold
Kevin Gomes
Gabriela Gonzalez Martinez
Fei Guo
Bolong He
Wenbo Hu
Karen Huynh Wong
Yoanna Ivanova
Dongsoo Kang
Jeffrey Kay
Justin Kim
Andy Koh
Yehoshua Komarovsky
Enghuot Leang
Xuewei Li
Stephen Lidderdale
Stefan Miller
Syed Minhal
Meng Ni
Iain Page
Dongwon Park
Varsha Parthasarathy
Shahab Pirnia
Matthew Pittana
Gajendra Ravindran
Jagdish Saggu
Stefana Sandu
Seyed Shervin Shams Shoaaee
David Sheinkman
Yanwen Shi
Affan Shoukat
Pavel Shuldiner
Anton Sitkovets
Lu Sun
Anton Sylchenko
Matheepan Umamakeswaran
Jing Wang
Zihan Wang
Yan Xu
Yan Ye
Zhiheng Zeng
Luqi Zhang
Andrea Zubac

Mathematical Modelling Contest

Lorianne Donato
Aditi Tandon
Alireza Taghavi

Actuarial Examination

Syed Asghar
Michael Gimelfarb
Syed Hasan
Haein Lee
Tsitsi Bliss Mutandiro
Iain Page
Luis Penaflor
Gregory Szucs
Sokol Tafmizi
Aditi Tandon

Putnam Competition

Mihai Alboiu
John Campbell
Nathan Gold
Nikitha Poddatur
Li Zhang
Yan Xu

International Year of Statistics 2013

Many researchers at York use statistical methods in their research. 2013 was the International Year of Statistics, and to celebrate this, an interdisciplinary team of faculty organized Statistics Day at York in the Senate Chambers on Friday, April 5th 2013. The presenters came from many disciplines across the university.

The talks were intended to be accessible to a broad audience. The goal was to raise the profile of statistical methods and the role they play in research in many field. This one-day conference was aimed to foster fruitful future interdisciplinary collaborations. The organizing committee included Hanna Jankowski, Hugh McCague, Georges Monette, Michael Rotondi, Mina Singh and Steven Wang. The conference attracted a large number of audiences from campus and it was a great success.

Our faculty members have been actively engaged in the celebration of the International Year of Statistics. Helene Massam, Hanna Jankowski and Georges Monette gave talks at the internal York Statistics day. Our faculty members have lots of achievements to celebrate. Helene Massam is in residence at the prestigious SAMSI institute for the "Low-dimensional Structure in High-dimensional Systems" program and she directed a working group on high-dimensional graphical models at Fields Institute. Georges Monette and Hanna Jankowski were selected to receive the Faculty Excellence in Teaching award.

A PhD student, Mahdis Azadbakhsh, received the Queen Elizabeth II scholarship, and Mahdis and Amanda Tian received the OGS for 2013. An undergraduate student, Gabriela Gonzales, won first prize for best undergraduate student talk at the last SSC meeting. Our statistics group also collaborated with Southern SORA and colleagues in Buffalo-Niagara chapters in organizing an annual workshop hosted in the School of Public Health at University of Toronto on May 21, 2013. The topic of this year's workshop is on data mining and this workshop is one of the series of traveling courses sponsored by ASA. The workship centered around an ASA Traveling Course by Dr. Dick De Veaux entitled "Successful Data Mining in Practice". There were about 100 participants attending this year's workshop. It was a very successful event. Georges Monette and Xin Gao were in the organizing committee of the workshop.

CDM Summer School on the "Mathematics of Infectious Diseases"

From May 19 to 27, the Centre for Disease Modelling (CDM) held a summer school on the mathematical modelling of diseases at York University. It was organized as one of the initiatives of the Mathematics of Planet Earth 2013 (http://mpe2013.org/) with a goal to encourage more developing scientists to consider entering the emerging field of disease modelling. The CDM welcomed 80 students and 17 instructors from around the world and from a variety of scientific backgrounds. Students heard lectures on public health topics, with a focus on issues such as the global spread of diseases like SARS, HIV and influenza; the health of indigenous populations; vector-borne diseases

From left to right: Pauline van den Driessche (University of Victoria) with winning team: Josie Hughes (University of Toronto), Trisha Westers (University of Guelph), Mustafa Hirji (University of Toronto), and Dan Munther (York University)

such as the West Nile virus; and the integration of surveillance, statistical data analysis and dynamic modelling; and simulations of disease outbreaks.

Students were also split into small groups and assigned topics to investigate over the 9-day course, culminating in group presentations. Professor Neal Madras commented that "students [will] work in truly interdisciplinary teams so that they get a 'taste' of what it is like to do research at the frontiers of disease modelling." The results were extremely impressive. Unable to decide between two teams, the organizers announced two wining presentations for their projects on diabetes and tuberculosis in Northern Canada and the risk of disease spread during the 2016 Rio Olympics.

From left to right: Stephanie Portet (University of Manitoba) with winning team: Xiaotian Wu (Western University), Juanjuan Man (York University), Ruili Li (York University), Sonja Saksida (BC Centre for Aquatic Health Sciences), and Laura Tupper-Ring (Simon Fraser University)

We are making our department greener by developing a "Mathematical Biology" program

Have you ever asked the questions: How do tumors grow? Why do some infectious diseases persist even though there are effective vaccines against them? How do proteins fold into their correct biologically active shape? How are certain animal species affected by climate change? Can we provide sustainable environments for animals living in areas of industrial growth? How do plants spread? Why do fireflies blink in sync? Can we better understand migration and movement of birds and animals? Can we model how different animals get their spots or stripes?

The combination of mathematics and biology has become an essential discipline in the understanding of life processes such as these. Also, with recent advances in computer power, the availability of large datasets, and the development of robust mathematical tools that can be used to understand complex real world systems, graduates with skills in mathematics, mathematical modelling, and biology are in demand. To meet this demand the Department of Mathematics and Statistics is proposing a new undergraduate program in Mathematical Biology.

York University has great strengths in mathematical biology, so it is natural that we propose such a new program. The proposed program will provide students with knowledge and skills in the fields of biology, health, chemistry, mathematics, statistics, and computation. Specific skills include data analysis, mathematical modelling, computer programming using advanced software applications, and the ability to apply mathematics to address biological questions. Mathematical Biology students will also have opportunities to conduct research with our faculty members in, for example, disease modelling, image processing, mathematical ecology, climate change, bird migration, bioinformatics, and geometric structures and rigidity. We are excited about this proposed new program and we will keep everyone informed when this program becomes a reality in our department.

My Internship at Algo

I am currently an MA student in mathematics and statistics at York. Starting in Fall 2012, I enrolled concurrently in York's Financial Engineering Diploma program, which combines graduate courses at the Schulich School of Business with courses in the mathematics and statistics graduate program. As part of the diploma requirements, I spent four months in the summer of 2013 as an intern at Algorithmics (referred to casually as Algo), an IBM company. My role was as an Associate Risk Consultant as part of the Algo Risk Services team.

To apply for this position, I created an online profile on IBM's site, and was then contacted for a phone interview followed by a face-to-face interview. In hindsight, I am sure the advice given at an IBM workshop held on campus probably aided in making my resume stand out. The workshop provided very specific details on what IBM looks for in a resume and in an applicant. In preparation for the interview I also read Heard on the Street by Timothy Crack, which served as a useful tool to practice both mathematical and general interview questions.

My experience at Algo was interesting and challenging. I was placed in a team that serviced three large clients in risk analysis and management. Our main project at the time was supporting those clients through the upgrade of their Algo Risk Service (ARS) on Cloud platform environment. My role was to run risk metric calculations on client investment portfolios and to ensure they were performed accurately through the upgrade. A particular area of interest was calculating VaR (Value at Risk) using Monte Carlo simulations, but I also performed stress testing of historical and custom scenarios.

I was also responsible for financial validation of models as implemented in the ARS on Cloud in an attempt to explain the pricing of financial instruments, such as inflation-linked bonds, variance swaps, Eurodollar futures, or European equity index options. I was required to build and explain the pricing procedure via Excel to the clients they were designed for. This required the ability to convey our procedures and results in a manner that a non-mathematician could understand and utilize.

My takeaway from this internship was that not only do math students need to be technically competent and knowledgeable, but we also need to learn how to communicate complex mathematical models and analysis to others. Strong knowledge and understanding of asset pricing models and a familiarity with options and derivatives were a must, but skills like communication, team collaboration and prioritizing tasks were also essential for day-to-day interactions.

Following my internship, my return to York brought a real appreciation of how important the material we learn in the classroom is to the bottom line of a corporation like Algorithmics. I felt the financial engineering graduate courses I have taken since were extremely relevant and useful, particularly Stochastic Calculus (MATH 6910), Fixed Income Securities (FNEN 6850) and Derivative Securities (FNEN 6810). Overall my internship was a valuable experience in the field of financial engineering, a reminder of how important soft skills are to an individual's workplace performance, and a great opportunity to build connections in the finance industry.

by
Nancy Temraz

The Canadian Crisis in Mathematics Education

The following is a version of a presentation given by Professor Donna Kotsopoulos on Wednesday, November 27, 2013, at York's annual Department of Mathematics and Statistics Undergraduate Awards Ceremony. Prof. Kotsopoulos is an alumna of our department, having received a B.A. in Mathematics from York (together with a B.Ed.). She went on to earn an M.Ed. and a Ph.D. in Educational Studies from the University of Western Ontario. Her research examines mathematics learning across the lifespan.

Canadians should be very concerned about the current level of mathematical literacy of its citizens. Recent results from the Organization for Economic Co-operation and Development's (OECD) Programme for the International Assessment of Adult Competencies (PIAAC) test suggest that Canadians between the age of 16 and 65 have below average numeracy skills (1). The results also show that "the proportion of Canadians at the lower level is greater than the OECD average" (1). When we consider change over time using data from the 2003 International Adult Literacy and Skills Survey (IALSS), more Canadians are doing poorly in numeracy compared to a decade ago (1,2).

The lack luster performance on PIAAC is Canada-wide. Participants from all provinces scored either the same or below the overall Canadian score (1). The numeracy component of PIAAC focused on mathematics of everyday life. Questions were designed to measure respondents' understanding of "mathematical content and ideas (e.g., quantities, numbers, dimensions, relationships), and the representation of that content (e.g., objects, pictures, diagrams, graphs)" (1). For example, one of the questions that were used in the assessment asks participants to look at a graph and determine the years in which there was a decline in births. This is a relatively simple question. Yet, it seems that many Canadians had challenges with questions such as these.

Since 2008 there has been an increase in the numbers of student enrolling in undergraduate mathematics programs (3). However, simultaneously there has been a decrease in the number of students completing undergraduate mathematics degrees. Similar trends can be seen at the graduate level as well. While women outnumber men in all fields of study Canada, this does not hold true for mathematics. Fewer women study mathematics. Across all the 24 participating countries of PIAAC, men did better than women (1). Challenges in mathematics worldwide seem to also be gendered.

A crude estimate of attrition in undergraduate mathematics degrees can be taken by considering enrolments at a point in time and then fast-forwarding four years later to graduation data. For example, in 2006 there were 26,985 undergraduates enrolled in mathematics programs (and computer and information sciences) in universities. In 2009, there were 4,761 undergraduate students who graduated. This represents more than an 82% attrition rate. If the attrition rates in mathematics were the attrition rates in the post-secondary sector more generally, a national crisis would be indisputable. Recent research suggests that 75% of students are at least two or more levels behind in terms of their readiness to study post-secondary mathematics (4), and so the attrition rates may not be altogether surprising – especially when we also consider the PIAAC evidence.

Donna Kotsopoulos

Associate Professor of Educational Studies

Wilfrid Laurier University

Shifting the current trends in Ontario is not looking probable in the near future when we consider standardized testing scores from the elementary sector. Last year's results suggest that there is a decline in scores amongst grade 3 and grade 6 students, and this decline has been persistent for a number of years (5).

Taking the below-average levels of numeracy amongst Canadians and the relatively few that succeed in post-secondary mathematics, Canada is left with a number of pressing questions. Is the demand for more mathematically literate individuals in Canada expected to increase, decrease, or stay the same in the future? Is the demand for more mathematically advanced individuals expected to increase or decline? Is there an attrition problem? How do we foster learning environments that encourage and support increased success and participation in mathematics for all Canadians, and women in particular?

I would suggest that Canada will need more and not less mathematically literate citizens, and particularly more mathematically advanced citizens, to be able to address increasingly complex economic, social, environment, health, and so forth, challenges. Given the relatively few that make it through a post-secondary undergraduate mathematics degree, a crisis in Canada may already be unfolding. The industry and business sectors are already making the case that Canada has some serious concerns (6).

So, what can be done to potentially shift these trends? The most significant impact on long-term implications for future success occurs in early childhood (7,8). The basic skills learned prior to formal schooling are showing to be very important throughout the mathematical learning lifespan. For example, recent brain imaging research is showing the importance of basic counting skills which include an understanding of one-to-one correspondence (no repeat counting), cardinality (total of the set), stable order of numbers, order irrelevance (same cardinality regardless of where in the set one starts to count (9). Researchers looking at the brains of senior high school students found that the brain regions responsible for basic mathematical concepts, such as counting, are the very same ones responsible more complex mathematics skills involved in algebra, complex geometry, or complex arithmetic (10). Moreover, Matejko and colleagues (2013) found that these regions were shown to be related to success in standardized post-secondary tests of mathematical achievement. This research provides strong anatomical evidence for the links between early basic number and mathematics knowledge and later achievement.

The undeniable evidence about the importance of early childhood on subsequent mathematical knowledge does not minimize the necessity to provide all children during their formal schooling with (a) exceptionally prepared teachers ready to teach mathematics, and (b) mathematical curriculum that adequately prepares them for subsequent learning. For those remarkable students who come to post-secondary wanting to learn mathematics, the attrition rates are very alarming and should be of great concern to administrators, departments of mathematics, and Canadians more generally. A greater commitment to promoting success at the post-secondary level is necessary and this may mean rethinking how to provide a mathematics education to today's post-secondary students who make through the front door of a mathematics department.

The current international and national standardized test scores, coupled with trends in enrolment and graduation, should cause all Canadians to pause and reflect about our mathematical futures and our readiness as a country to engage in an increasingly complex, competitive, and evolving society without such individuals.

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A Profile of Lee Lorch

Professor Emeritus Lee Lorch passed away February 28, 2014, at the age of 98. Despite retiring from York's Department of Mathematics and Statistics in 1985, Lee had continued as a familiar presence in the department until very recently. In addition to being a distinguished mathematician (a Fellow of the Royal Society of Canada) in the field of classical analysis and special functions, Lee (together with his late wife Grace Lorch) was a fearless civil rights activist. The Lorches played a significant role in attempts to de-segregate both the Stuyvesant Town development in New York City and schools in Little Rock, Arkansas. Lee was at one point called to testify before the U.S. House Un-American Activities Committee. He took refuge in Canada in 1959 (first at the University of Alberta, and then at York), after being dismissed from multiple U.S. universities during the McCarthy era, as a direct result of his advocacy on behalf of minorities. He would later receive honorary degrees from two of the universities that had earlier terminated him: City University of New York, and Fisk University. His work has been recognized in numerous ways, including an honorary degree from York, a distinguished service award from the Mathematical Association of America (MAA), and by citations from the Association for Women in Mathematics (AWM) and the National Association of Mathematicians (NAM). He was among the inaugural cohort of Fellows of the American Mathematical Society (AMS). Numerous articles giving further details about Lee's accomplishments have appeared over the years. Some can be found through the Wikipedia page about Lee, as can a link to a recent film by Rachel Deutsch titled "Conversations with Lee Lorch."

Several months before Lee's death, Connexio interviewed Professor Emeritus Martin Muldoon about Lee's impact on York. Prof. Muldoon is not only a member of our department, but was a former Ph.D. student of Lee's at the University of Alberta.

Connexio: *How would you characterize Lee and his influence on our department?*

Muldoon: Lee was never afraid to speak out, or to challenge injustice. His courage and integrity led him to advocate on behalf of those he felt had been ill-treated, though he sometimes paid a high price for doing so. He was in many ways the conscience of the department, reminding us that the right way forward was often not the most convenient way.

Connexio: *Please tell us how Lee joined our department, and what the department was like then.*

Muldoon: Lee came to York in 1968, recruited by Professor Dennis Russell, at the same time as Professors Solitar and Karrass. This was two years after I arrived. Lee had been quite happy in Edmonton, but moving to York brought him and his wife closer to family. Our department was still quite small, but that meant there was greater interaction between colleagues. Lee was someone with wide connections throughout mathematics. He attracted many visitors, which enriched the life of the department. Visits come to mind by Paul Erdös, and also a number of well-known Eastern European mathematicians.

Connexio: *Lee's civil rights activities prior coming to Canada have been well documented. Did those continue after coming here?*

Muldoon: Definitely. Lee advocated through the mathematics societies, including periods on the council of the AMS and the Board of the Canadian Mathematical Society (CMS).

He was one of the people that attempted to convince the CMS to move its annual meeting, in a year it was scheduled to be held at a university that was under censure by the Canadian Association of University Teachers (CAUT). He remained heavily involved in advocacy for women and minority mathematicians, through groups such as AWM and NAM. He also kept up his purely mathematical activities. For example, at one point he chaired the mathematics grant selection committee at the National Research Council (which evolved into NSERC).

Connexio: ***What about his impact on York, outside the department?***

Muldoon: Lee was active in Senate. For example, he spoke against the acceptance of research grants from the military. He was one of a number of people who fought the university's age-65 mandatory retirement policy. His grievance at York succeeded in delaying his own retirement, but a number of other cases (here and elsewhere) actually went to court. Though the rulings went against them, some collective agreements were changed. But in a sense, these all set the stage for a later decision by the Ontario government, to eliminate mandatory retirement once and for all.

Connexio: It has been an honour for many of us, to call Lee Lorch our friend and colleague. Thank you for sharing some of his story with us.

Martin Muldoon
Professor Emeritus

Peter Allan Trojan
1940—2013

It is with sadness that we announce the passing of our friend and colleague, Professor Peter Allan Trojan. Allan obtained his undergraduate degree in mathematics from UBC before enrolling in the PhD program at MIT under a full scholarship. His dissertation, *On the Integral Extensions of Isometries of Quadratic Forms over Local Fields,* was written under the supervision of Nesmith Cornett Ankeny, and he completed his PhD in 1964 at the age of 23. Allan's first appointment was as an assistant professor at McGill University from 1965-1970 and he joined York University in 1970 as part of the Mathematics Department in Atkinson College where he taught and conducted research until his retirement in 2006.

Alan was an algebraist with an interest in finite groups, number theory and representation theory. His main collaborator, Eugene Spiegel, wrote of his work with Allan, "Allan worked on the algebraic side of quadratic forms and their underlying spaces when I told him of my interest in offshoots of the semi-simple group ring isomorphism problem. Given a field F and non-isomorphic finite groups, we can think of F as distinguishing the groups if their group algebras are non-isomorphic. Allan and I defined easily calculated invariants for a field, with the property that two fields have the same invariants precisely if they distinguish each pair of finite groups. The stumbling block to the proof was how to handle the case when the fields have different characteristics. Allan suggested the clever approach that we handle the case of characteristic zero first, with one of the fields being a p-adic field, and then jump characteristics via the residue class field."

"In the 1970's I invited Allan to spend a semester at the University of Connecticut for an algebra year. During this time he and I studied representation theory and, in particular, implications of the Brauer-Witt theorem. Brauer had shown if a prime divides the Schur index of an irreducible group representation, it divides the order of the group. Allan came up with rather delicate arguments in order for us to show that when p^k divides the Schur index, then either p^{2k} divides the exponent of the group or p^{3k} divides the order of the group. Further, several cases, in which the alternative must hold, were determined. When we showed Zassenhaus these results, we were told that Hans was likely to ask us to come to Ohio State University for next semester. As that semester was only a few months away, and neither of us could conveniently make such a visit, we thwarted the invite before it formally came."

"One final story regarding Allan's impressive insights. Some time later, when I saw Walter Feit, he informed me that he had given a talk at a conference in Europe concerning the Schur index, and asked me if I knew anything of Allan Trojan. Feit met Trojan at the conference. Walter, who knew most people working in representation theory, said that Trojan seemed to have interesting ideas. I told Feit that, yes, Trojan has very creative ideas." Colleagues and collaborators knew Allan as a gifted and creative mathematician. His final publication [1] was a joint paper with John Conway (Princeton) and John McKay (Concordia).

Allan cared deeply about teaching and his students. He prepared meticulous colour coded lecture notes even into his last years of teaching at York. One student wrote of Allan: "Peter Allan Trojan is the classic crusty Math Professor. Scratch a bit beneath the surface and you will find a brilliant and warm teacher. Show some interest and do the homework you will be fine. Anyone who has held their PhD since 1964 knows their stuff."

Allan strived for excellence in all his pursuits, be it teaching, research or his keen interest in world cultures. Alan travelled extensively and was a student of many languages. In addition to his fluency in French, German and Italian, he studied Turkish (his wife's mother tongue), Japanese and most recently Hindi -- indeed, it was while on a trip to India in the summer of 2013 that Allan unexpectedly passed away.

Allan is survived by his wife, Guljan Ozel, their son Demirhan, and a son Alexander, from a previous marriage. Allan is missed by his family, friends and colleagues.

1. Conway, John; McKay, John, Trojan, Allan. Galois groups over function fields of positive characteristic. Proc. Amer. Math. Soc. 138 (2010) no. 4, 1205-1212.

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