

OP-SF NET – Volume 27, Number 5 – September 15, 2020

The Electronic News Net of the
SIAM Activity Group on Orthogonal Polynomials and Special Functions

<http://math.nist.gov/opsf>

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Topics:

1. Message from the Chair
2. Announcement: **Gábor Szegő** Prize Nomination
3. Announcement: MCA 2021: Buenos Aires, Argentina
4. Announcement: Fundraising for *Celebratio Mathematica* Publication for **Richard A. Askey**
5. Tribute & Excerpt for **Peter Duren** (1935–2020)
6. Obituary for **Ranjan Roy** (1947–2020)
7. Eight remembrances and communications to **Ranjan Roy**
 - 7.1. **George Andrews**
 - 7.2. **Mourad E. H. Ismail**
 - 7.3. **Warren Johnson**
 - 7.4. **Eric Boynton**
 - 7.5. **Rama Viswanathan**
 - 7.6. **Philip D. Straffin Jr.**
 - 7.7. **Bruce T. Atwood**
 - 7.8. **Paul Campbell**
8. Preprints in arXiv.org
9. Submitting contributions to OP-SF NET and SIAM-OPSF (OP-SF Talk)
10. Thought of the Month by **Karl Weierstrass**

Calendar of Events:

June 7–11, 2021—New date due to COVID-19 outbreak.

33rd International Colloquium on Group Theoretical Methods in Physics (Group33)

Cotonou, Benin

<http://www.cipma.net/group33-cotonou-benin>

June 20–26, 2021—New date due to COVID-19 outbreak.

8th European Congress of Mathematics (8ECM)

Mini-symposium on Orthogonal Polynomials and Special Functions

Organized by Paco Marcellán, Juan J. Moreno-Balcázar and Galina Filipuk,
Portorož, Slovenia

<https://www.8ecm.si/minisymposia>

July 6–9, 2021—New date due to COVID-19 outbreak.

Functional Analysis, Approximation Theory and Numerical Analysis (FAATNA)

Matera, Italy

<http://web.unibas.it/faatna20/>

July 12–16, 2021

9th International Conference on Computational Methods and Function Theory (CMFT 2021)

Federico Santa María Technical University, Valparaíso, Chile

<http://cmft2021.inf.utfsm.cl/>

July 19–24, 2021

Mathematical Congress of the Americas (MCA 2021)

Special Session on *Special Functions and Orthogonal Polynomials*

Organized by Diego Dominici, Luis E. Garza, Jan Felipe van Diejen
Buenos Aires, Argentina

<http://www.mca2021.org/en>

August 9–13, 2021—New date due to COVID-19 outbreak.

OPSFA Summer School 2021

Radboud University, Nijmegen, The Netherlands

<https://www.ru.nl/radboudsummerschool/courses/2021/opsfa-summer-school/>

Topic #1 ——— OP – SF Net 27.5 ——— September 15, 2020

From: Peter Clarkson (P.A.Clarkson@kent.ac.uk)

Subject: Message from the Chair

The past few months have been a challenge to many of us with lockdown, working from home, online and the cancellation or postponement of traditional conferences and workshops. Many have been rescheduled for 2021 and hopefully will take place at the new time.

It was pleasing that our SIAG was able to make a significant contribution to this year's SIAM annual meeting, which was held virtually. Andrei Martínez-Finkelshtein gave an invited lecture on "[Multi-Applications of Multi-Orthogonality](#)" which was preceded by a mini-symposium on "Orthogonal Polynomials, Random Matrices and Asymptotic Methods" organised by Andrei and Walter Van Assche.

I'm pleased to inform you that the application for the renewal of our SIAG's charter has been approved by SIAM for another two years. I would like to thank the SIAG other officers, Andrei, Luc and Teresa, for their assistance in the writing of the application. There remain issues with our particular SIAG regarding the number of members as it is the second smallest SIAG in SIAM. I believe that there has been much done in the past few years by members of our SIAG to promote Orthogonal Polynomials and Special Functions.

A development as a consequence of the strange times we find ourselves in at present has been the proliferation of virtual seminars. Whilst these are different to usual seminars, and it can feel

strange not to see the audience, they do give an opportunity for a wider audience spread across countries and continents. An example is the virtual seminar series on “Orthogonal Polynomials, Special Functions, Operator Theory and Applications”, organised by Ana Loureiro, Thomas Bothner, Adri Olde Daalhuis, Walter Van Assche and Jani Virtanen. This is hosted by the ICMS in Edinburgh and takes place on [Thursdays](#).

For further information, see <https://www.icms.org.uk/OPSFOTA.php>

Keep well and keep safe.

Peter Clarkson

Chair SIAG/OPSF

Topic #2 ——— OP – SF Net 27.5 ——— September 15, 2020

From: SIAM Prize Program (prizeadmin@siam.org)

Subject: Announcement: **Gábor Szegő** Prize Nomination

Gábor Szegő Prize

Nominate a colleague now for the 2021 [Gábor Szegő Prize](#).

Click on the [link](#) to access the SIAM Prize Portal and create your nomination.

Nomination Deadline: **October 15, 2020**

The SIAM Activity Group on Orthogonal Polynomials and Special Functions (SIAG/OSPF) awards the Gábor Szegő Prize every two years to one individual in their early career for outstanding research contributions in the area of orthogonal polynomials and special functions.

Eligibility Criteria: The candidate must have not more than 10 years (full time equivalent) of involvement in mathematics since receiving their Ph.D. at the award date, allowing for breaks in continuity. The prize committee can make exceptions, if in their opinion the candidate is at an equivalent stage in their career.

The candidate’s work must contain significant research contributions in the area of orthogonal polynomials and special functions. One key paper must be cited as evidencing the contribution though a body of papers may be discussed in the nomination. The qualifying paper must have been published in English in a peer-reviewed journal.

For the 2021 award, the candidate must have received their Ph.D. no earlier than January 1, 2011.

Required Materials:

- Letter of nomination signed by two current members of the SIAG/OPSF;
- Candidate’s CV;
- Bibliographic citation for candidate’s key contributing paper.

Learn more about our prize program and view all prizes with open calls.

Contact prizeadmin@siam.org with questions regarding the nomination procedure.

Prize Program

3600 Market Street – 6th Floor

Philadelphia, PA 19104

prizeadmin@siam.org

See <http://www.siam.org/Prizes-Recognition> for more information.

Topic #3 ——— OP – SF Net 27.5 ——— September 15, 2020

From: Diego Dominici (dominicd@newpaltz.edu)
Subject: Announcement: MCA 2021: Buenos Aires, Argentina

Organizers: Jan Felipe van Diejen, Diego Dominici, and Luis Garza
Conference: Mathematical Congress of the Americas 2021 (MCA 2021)
Mini-symposium: Special Functions and Orthogonal Polynomials
Dates: July 19–24, 2021.
Location: Buenos Aires, Argentina

A preliminary list of speakers includes:

- Cleonice Fátima Bracciali, Universidade Estadual Paulista (UNESP), Brazil
- María José Cantero, Universidad de Zaragoza, Spain
- Francisco Alberto Grünbaum, University of California, Berkeley, USA
- Manuel Domínguez de la Iglesia, Universidad Nacional Autónoma de México, Mexico
- Mourad Ismail, University of Central Florida, USA
- Francisco Marcellán Español, Universidad Carlos III de Madrid, Spain
- Ines Pacharoni, Universidad Nacional de Córdoba, Argentina
- Yamilet Quintana, Universidad Simon Bolivar, Venezuela
- Mirta María Castro Smirnova, Universidad de Sevilla, Spain
- Luis Verde-Star, Universidad Autónoma Metropolitana, México
- Luc Vinet, Université de Montréal, Canada
- Ignacio Nahuel Zurrián, Universidad Nacional de Córdoba, Argentina

For more information see the following website:
<http://www.mca2021.org/en>.

Topic #4 ——— OP – SF Net 27.5 ——— September 15, 2020

From: Howard Cohl (howard.cohl@nist.gov) and Mourad Ismail (mourad.eh.ismail@gmail.com)
Subject: Announcement: Fundraising for *Celebratio Mathematica* Publication for **Richard A. Askey**

At the suggestion Shaun Cooper (one of Dick's Ph.D. students), Mourad and I have communicated with *Celebratio Mathematica* about the possibility of their publishing the *Liber Amicorum, a Friendship Book, for Dick Askey* (see OPSF–Net 27.1). We heard back from Sheila Newbery, Managing Editor and Rob Kirby, Chief Editor on August 19, 2020 with a positive response. They indicated that they would be honored to publish our collection of 84 warm contributions to Dick contained in the second edition of the *Liber Amicorum* for Dick Askey. The first edition of the *Liber* was presented to Dick and his family on September 15, 2019, just in advance of his passing away on October 9, 2019.

Celebratio Mathematica is an open-access scholarly web publication that celebrates mathematics, related fields, and their people. It is structured as a series of collected-works volumes or, rather, enhanced guides to the collected works of selected scientists, with the added advantages

of electronic media. They organize, display and preserve biographic and bibliographic information, indexing all documents deemed worthy of inclusion in a collected-works volume. These can include unpublished documents, letters, and interviews. They attempt to host those works for which republishing rights can be secured. Celebratio Mathematica will also include commentaries on the scientists' work, photographs, letter and other correspondances, testimonials, varied memorabilia, and information on his or her graduate students. Celebratio Mathematica is supported by [Mathematical Science Publishers](#) and [public generosity](#).

Celebratio Mathematica has considered the production costs of publishing the *Liber Amicorum, a Friendship Book, for Dick Askey* and have estimated that a cost of \$3,400 would cover their editorial work, their bibliographer's work, their editorial spade-work of seeking permissions from individual authors, and the installation of the volume's various elements on their site. The remittance would also contribute to the ongoing costs of site hosting and maintenance.

Due to some sincerely gracious donations from a few of Dick's close friends, colleagues, students, and postdocs, we have already raised a substantial amount towards this purpose. We need another **\$500** in order to be able to pay for this wonderful service.

Would you be willing to donate a small amount of money so that we could take advantage of Celebratio Mathematica's generous offer? They are not able to take credit card payments, but they can receive checks at their UC Berkeley "home" office:

798 Evans Hall #3840
c/o Department of Mathematics
University of California
Berkeley, CA 94720-3840
USA

Phone: +1 (510) 643-8638
Fax: +1 (510) 295-2608

We ask that those who are interested in contributing to this volume, should make their checks payable to "**Mathematical Sciences Publishers**" and, in the note field to indicate "**Celebratio Mathematica: Richard Askey**". This latter detail is important since it helps them get an acknowledgment letter prepared and sent promptly to each donor. (These letters are relevant for tax purposes and they like to have them sent as quickly as possible upon receipt of a check.)

They will also let Mourad and I know of any incoming checks as they receive them. So it will be helpful to them if we provide them a list of donors (or pledges). That way we know what to expect and from whom.

You should perhaps be aware that at present Celebratio Mathematica is only able to pick up mail on a bi-weekly basis since the UC Berkeley campus is still officially closed. This means that there is sometimes a delay in receiving incoming donations. This is not something they have control over.

If any of you would like to know more about Celebratio Mathematica and how they use donations, we encourage you to visit this link:

<https://msp.org/publications/helpcelebratio/>.

If you are not located in the U.S. and would like to donate, please contact either Mourad or myself and we will consider other options for donation in terms of possible personal favors.

Thank you for your consideration.

From: Kathy Driver (kathy.driver@uct.ac.za)

Subject: Tribute & Excerpt for **Peter Duren** (1935–2020)

Peter Duren was a great friend and an outstanding mathematician with a gift for writing mathematics papers with elegance, clarity and depth. It was a privilege and a pleasure to collaborate with him. His talks at conferences were rich, captivating and motivating.

The following [tribute](#) appeared online.

* * *

Peter Larkin Duren (1935–2020), professor emeritus of mathematics at the University of Michigan in Ann Arbor, died on July 10, 2020 in Superior Township, MI after a long and courageous struggle with Parkinson’s disease. He was born and raised in New Orleans, the eldest child of William L. Duren Jr. and Mary Hardesty Duren. Following his father into mathematics, he graduated cum laude from Harvard University in 1956. He and his future wife, Grace “*Gay*” Adkins, met in college singing together in Gilbert and Sullivan operettas. They were married in 1957. Three years later Peter earned his Ph.D. from the Massachusetts Institute of Technology. From 1962 until his retirement in 2010, he taught mathematics at the University of Michigan, with one year at the Institute for Advanced Study in Princeton in 1968–69 and visiting stints at Stanford and Maryland.

He supervised the Ph.D. theses of more than two dozen students at the University of Michigan. Teaching and mentoring motivated students was his special joy. He often said that he felt truly fortunate for having figured out a way to make a living doing what he loved. Peter was a prolific mathematical writer, publishing several books and scores of research papers advancing the frontiers of his field, complex analysis. Always gregarious, Peter stood out for his zest for professional collaboration. Many of his works were co-authored with his former students or other colleagues.

An avid traveler, Peter served as a visiting professor or scholar in many parts of the world during his University of Michigan tenure, including Israel, China, South Africa, Chile, and numerous European countries. Peter and Gay often traveled together for enjoyment as well. Their favorite destinations included France, the Swiss Alps, Norway, and New Zealand. Ever a collector and keeper of lists, his wide range of interests and hobbies included reading, listening to classical music, birding, gardening, photography, stamp collecting, carpentry, and astronomy.

In all things, he carried his mathematician’s passion for accuracy and precision. But it was in some of his more unusual pursuits that his quirky sense of humor came out. With somewhat purposeful eccentricity, he collected banana stickers, performed unsolicited magic tricks, and kept pet box turtles in the back yard (he swore they wagged their tails when he fed them). He was also an athlete who relished physical challenges. In high school (Newman School in New Orleans) he played on the basketball team. As a young father he built a makeshift high jump bar and taught his children high-jumping (undeterred by their obvious lack of talent). He took up jogging in the early 1970’s before it was fashionable in Ann Arbor. Well into his 60’s he would seek out strenuous hikes on his travels. Passionate about civil liberties and academic freedom, Peter served as treasurer on the board of the University of Michigan’s Academic Freedom Lecture Fund from 2001 to 2016, helping bring illustrious speakers to campus in honor of the three professors purged by the University of Michigan in the McCarthy era for alleged Communist leanings. Peter is survived by Gay Duren, his wife of 63 years; his sister Sally Schloemann; his brother David Duren; his daughter Betsy Duren; his son Bill Duren; and his daughter-in-law Jan Wigginton.

The following [slightly edited] [excerpt](#) was originally published in February 2007 by Johnny E. Brown and Yuk J. Leung in the Preface of a Special Issue dedicated to the 70th birthday of Peter Duren in the journal *Complex Variables and Elliptic Equations*.

Peter Larkin Duren was born in New Orleans on April 30, 1935. His father, William L. Duren, Jr., was then a professor of mathematics at Tulane University. Both of his parents had received Ph.D. degrees from the University of Chicago; his mother's degree was in zoology. Peter completed his undergraduate work at Harvard in 1956 and went to the Massachusetts Institute of Technology for graduate work, intending to do applied mathematics. He was converted to pure analysis, however, after taking beautiful courses from Klaus Roth, Eli Stein, Dirk Struik, and Norman Levinson, in addition to a complex analysis course from Joseph Walsh at Harvard. He took a course on singular integrals from Alberto Calderón and became his student, but Calderón returned to Chicago in 1958 and Peter switched to Gian-Carlo Rota, a new arrival at M.I.T. from Harvard and the Dunford-Schwartz school of operator theory at Yale. At Rota's suggestion, Peter read Beurling's paper on invariant subspaces of the shift operator, a seminal article displaying the strong connection between operator theory and complex analysis. Generalizing Beurling's work, Peter wrote a thesis on spectral properties of tridiagonal operators and became Rota's first Ph.D. student.

In the fall of 1960 he took a postdoctoral position at Stanford, then a center of classical analysis with an illustrious faculty that included George Pólya, Gábor Szegő, Charles Loewner, Stefan Bergman, and Max Schiffer. There Peter attended courses taught by Szegő on orthogonal polynomials and by Schiffer on extremal problems for univalent functions. That led to joint work with Schiffer on applications of variational methods, a collaboration that was to continue for more than 30 years. Peter had the greatest admiration for Schiffer, not only for his mathematical power, but for his complete dedication to science and his kindness as a mentor to young mathematicians. He always felt privileged to know Schiffer and to work so closely with him. Together they produced ten substantial research papers. Their last paper (1993) introduced the concept of Robin capacity, which has since been developed by many authors.

In 1962, Peter moved to a position at the University of Michigan, attracted by Paul Halmos, Allen Shields, Fred Gehring, George Piranian, and other analysts. Harold Shapiro arrived soon afterwards, and Peter enjoyed a fruitful collaboration with Shapiro and Shields on topics related to H^p spaces. During this period Peter completed his book: *Theory of H^p Spaces* (Academic Press, 1970; updated Dover edition, 2000). Returning to geometric function theory, he did research with Glenn Schober, among others, and wrote the book *Univalent Functions* (Springer-Verlag, 1983). In a similar vein, he recently published: *Harmonic Mappings in the Plane* (Cambridge University Press, 2004). In collaboration with his former student Alex Schuster he also produced the book *Bergman Spaces* (American Mathematical Society, 2004), a natural continuation of his earlier work on H^p spaces. The new book includes an account of the ground-breaking 1974 thesis by Peter's student Charles Horowitz on zero-sets of functions in Bergman spaces. All of these books are considered standard reading for workers in the field.

For the Centennial of the American Mathematical Society in 1988, Peter was the lead editor [co-edited by Richard Askey, Uta Merzbach and Harold Edwards] of: *A Century of Mathematics in America*, a 3-volume set of historical articles on a variety of mathematical subjects. In the wake of this very successful project, Peter helped to establish the series of books on the history of mathematics edited jointly by the AMS and the London Mathematical Society, now a highly regarded series that includes over 30 titles.

Peter had a rich career in mathematics. He authored or coauthored more than a hundred articles in various areas of analysis. He served on editorial boards of several journals and held visiting

positions around the world, including Imperial College London, Université de Paris–Sud, Institut Mittag–Leffler, E. T. H. (Zürich), Norwegian University of Science and Technology, Institute for Advanced Study (Princeton), and Stanford. He made short–term visits to China, Israel, Germany, South Africa, Chile, Spain, and other places, and lectured worldwide.

Peter supervised 25 Ph.D. students, all at the University of Michigan. In 2006, two of his former students, Dragan Vukotić and Rachel Weir, were among the organizers of an international conference on operator–related function theory held in El Escorial, Spain in celebration of Peter’s birthday. Participants spoke highly of Peter’s contributions to mathematics, especially his recent work with Dmitry Khavinson, Harold Shapiro, and Carl Sundberg on contractive divisors in Bergman spaces.

In college Peter met Gay Adkins when they sang in a Gilbert and Sullivan operetta. They were married in 1957 after Gay’s graduation from Radcliffe. In addition to music, their common interests included traveling, hiking, reading, and speaking French. They had two children, Betsy and Bill. Students were always welcomed to their home, especially for Thanksgiving dinners.

Peter touched and influenced the lives of many in profound ways. The writers appreciate all that he had done for the mathematical community and the stellar example he set.

Topic #6 ——— OP – SF Net 27.5 ——— September 15, 2020

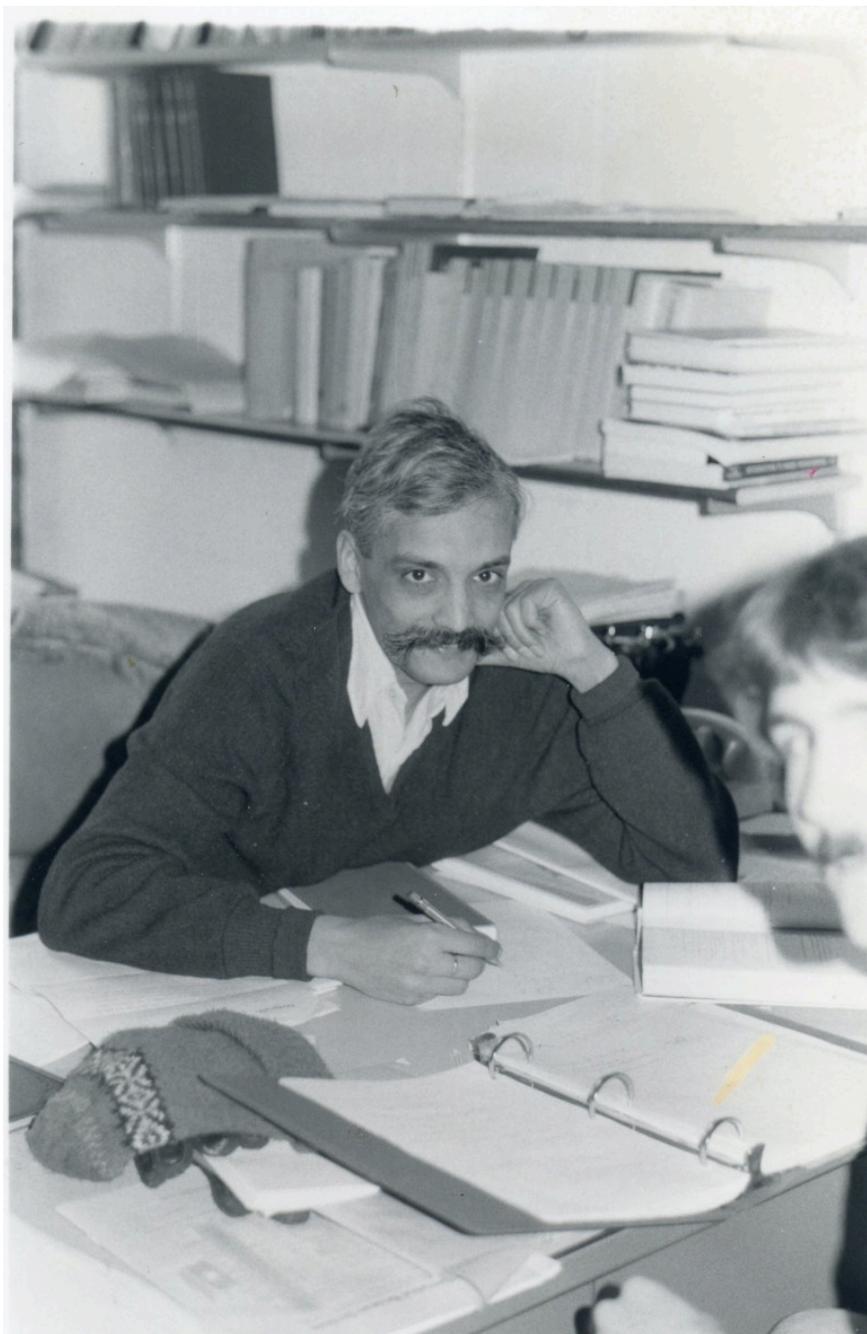
From: Gretchen Roy (ranjangretchen@gmail.com)
Subject: Obituary for **Ranjan Roy** (1947–2020)

Ranjan Roy died of a sudden heart attack on August 12, 2020, while on his daily walk with his wife, his companion of 49 years. From beginning to end, Ranjan was an exceptional human being who lived an exceptional life.

Ranjan Roy was born January 16, 1947 in Secunderabad, South India to Major (Dr.) Santosh Kumar (Mukhopadhyay) Roy and Syeda Zubaidah Raza Roy. He grew up in a home where learning and religious traditions were greatly valued. He had an abiding interest in the teachings of spiritual teachers. He attended school at St. Joseph’s College in the hills of Nainital where his interest in mathematics was awakened; after finishing school at the age of 15, he spent one year at home studying mathematics 16 hours per day. After this, he received in his B.A. in mathematics, physics and chemistry at I.I.T. Kharagpur and came first in his class in all three disciplines. He also came first in his M.A. in mathematics from I.I.T. Kanpur. Ranjan received an N.S.F. scholarship to SUNY Stony Brook and completed his Ph.D. there in 1974. In 1971, he married Gretchen Carey; they have two children and six grandchildren.

Ranjan’s life was devoted to his family and to the subject of mathematics, especially classical mathematics. He served as a research fellow at the Indian Institute of Advanced Study, Simla for three years starting in 1975, after which he taught at Punjab University for one year and then at SUNY Plattsburgh for two years. In 1982, he joined the faculty of the Beloit College Department of Mathematics and Computer Science and taught there for 38 years, eventually being named Huffer Professor of Mathematics and Astronomy. In 1986–87, he held a visiting fellowship at the Indian Institute of Science in Bangalore.

Ranjan published numerous book reviews and scholarly papers on Kleinian groups, Riemann surfaces, hydrodynamics, and differential equations; refereed many papers for scholarly journals; and contributed chapters and expertise to the *Handbook of Mathematical Functions*, published by the National Institute of Standards and Technology. He also authored four advanced math–



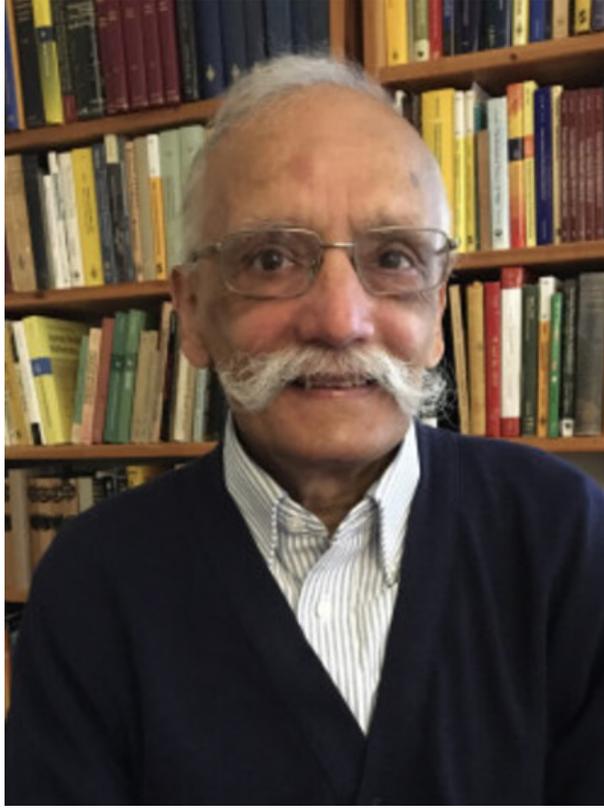
Ranjan Roy working at his desk in his college office in the 80's.

ematics books: *Special Functions*, on which he collaborated with his friends Richard Askey and George Andrews; *Sources in the Development of Mathematics*; *Elliptic and Modular Functions*; and (soon to appear) *Series and Products in the Development of Mathematics*.

Ranjan loved studying mathematics and he loved his students; he received teaching awards from Beloit College and from the MAA Wisconsin Section. In 2002, he was given the MAA Haimo Award for excellence in teaching. Teaching mathematics was great fun for him and he found tremendous joy in spending time working on proofs and problems with his students. He enjoyed helping them go into graduate studies or careers and keeping in touch with them over the years. He was looking forward to teaching in September.

Ranjan's calm and wisdom will be missed by all who knew him. He brought joy to many people's lives and strove to live his life with the great spiritual truths as his guide. His humor, his

intelligence, and his ability to listen made him a confidante to many. He loved music and was a life-long movie buff. He reveled in finding the underlying hilarity of the smallest moments in life, bringing levity and laughter to everyone around him. As a husband, a father, a grandfather, a brother, a colleague, a teacher, and a friend, he shaped our lives with his quiet presence. We will not be the same without him.



Ranjan Roy in his home office.
Photo taken by Gretchen Roy in 2020.

Topic #7 ——— OP – SF Net 27.5 ——— September 15, 2020

From: OP-SF Net Editors

Subject: Eight remembrances and communications to **Ranjan Roy**

Eight remembrances and communications to

Ranjan Roy

(January 16, 1947—August 12, 2020)

by Andrews, Ismail, Johnson, Boynton, Dik, Viswanathan, Straffin, Atwood and Campbell

Below are eight remembrances of Ranjan from some of his colleagues, students, and friends:

George Andrews, Mourad E. H. Ismail, Warren Johnson, Eric Boynton, Rama Viswanathan, Philip D. Straffin Jr., Bruce T. Atwood, Paul Campbell.

For a link to Ranjan's obituary, see <https://www.hansengravitt.com/obituary/ranjan-roy>.

* * *

George Andrews, Evan Pugh Professor of Mathematics, Pennsylvania State University, University Park, Pennsylvania, USA.

Ranjan Roy was a wonderful, thoughtful man and also an excellent mathematician.

Rajan is completely responsible for the existence of the book *Special Functions* (joint with Askey and me). The book appeared in 1999. Dick and I had been claiming we were writing it since 1976. Ranjan gathered lecture notes from both of us, and, along with his own cogent insights, set about putting the entire project together. Indeed, this collaboration with Ranjan on the book also led naturally to our only joint paper together. He was a godsend to a project regarded as important by both Dick and me even though we had spent two decades trying to get it done without success.

I especially remember when Ranjan was one of the winners of the MAA Haimo Teaching Award in 2003. Dick Askey and I attended the presentations by the winners. After the first two had finished, I said to Dick, "I hope I like Ranjan better than these last two." Their presentations were OK, but the educational philosophy left me cold. "Calm down," Dick responded. "You'll be very happy!" I was indeed. Ranjan's talk was wonderful drawing on history in an effective and compelling way. How sad it is that we no longer have Ranjan's wisdom, vision, and calm to reassure us. How I miss him.

Thank you, Ranjan, for everything!

* * *

Mourad E. H. Ismail, University of Central Florida, Orlando, Florida, USA.

I met Ranjan only a few times over the years. I received my Ph.D. in 1974 and had a one year research appointment at the Mathematics Research Center at the University of Wisconsin to work with Richard Askey. During my first meeting with Dick he said that he has two jobs for me. He was writing a book on orthogonal polynomials and expected me to read what he wrote, criticize it, catch errors, This was my first task and the second task was to co-author a paper on quadratic transformations because he had a new way to classify them. A few days later he showed me an integral representation of the derangements (multisets). He raised the question of determining their asymptotics as the number of sets tends to ∞ , which we did. During my stay, Dick came up with other combinatorial problems which used all my time, so neither the book nor the paper on quadratic transformations was written. George Andrews visited Wisconsin the following year and Dick eventually got heavily involved in q -series. Now the book became a special functions book co-authored with George. Part of their approach to orthogonal polynomials became a longish survey article which appeared in 1985. Very preliminary versions of their notes on the book on special functions were circulated since the early 1980's.

I remember the days when people used the notes and really liked them but there was this concern that they may become a historical document. Luckily Ranjan Roy stepped in. With his organizational ability, and clear lucid exposition, they were able to finish the book within two or three years. He really put it together in a remarkable way. I read the original submission and sent Dick a large number of corrections and suggestions. The final product is a book that is destined to be a classic.

Ranjan also published original research papers in special functions and q -series. There is an Askey-Roy integral which has become a standard integral. He also wrote several books and source books. He was in constant contact with Dick Askey and attended many of the seminars at the University of Wisconsin in Madison. He was well-liked and well-respected by every one who knew him.

My former student, the late Li-Chen Chen, visited Beloit College for a year after her Ph.D. She told me that Ranjan helped her a great deal and was a fantastic mentor. He was very kind and he was always there when she needed advice. I feel sad that I have not thanked him personally for such a great favor, but knowing Ranjan he probably felt he has not done anything out of the ordinary. What Ranjan considered ordinary, many of us consider going out on a limb to be helpful and kind. Thank you Ranjan. We all miss you.

* * *

Warren Johnson, Connecticut College, New London, Connecticut, USA.

I've been extremely fortunate to have been influenced by all three authors of *Special Functions*, George Andrews, Dick Askey, and Ranjan Roy. While I learned more mathematics from Dick and George, Ranjan was important in another way: He showed me the kind of mathematical career that I could have. I've modeled myself after him more than anyone else.

Best wishes, Warren

* * *

Eric Boynton, Provost & Dean of the College, Beloit College, Beloit, Wisconsin, USA.

This is a letter written to campus President Scott Bierman and Provost and Dean of the College by Eric Boynton, Provost & Dean of Beloit College, reflecting on Professor Roy's legacy at Beloit.

Ranjan Roy: A teacher who transformed lives.

Beloit College lost one of its brilliant teachers and scholars on Aug. 12 when Ranjan Roy died suddenly of a heart attack in Beloit.

Beloved by generations of students who said he was the best math teacher they ever had, he brought his passion and knowledge to his teaching and sparked an interest in math among students who had little confidence in the subject. He was equally a favorite among math majors and students who took his advanced mathematics courses. Students often said they would take any course at Beloit, as long as he was teaching it.

Ranjan earned his reputation as an amazing teacher by quickly learning his students' names, then tuning into them individually to understand what they needed, and often staying in touch with them long after they graduated. His kindness and pithy humor in the classroom and beyond were legendary. Many of his former students attribute his teaching to nothing less than changing the way they think about the world. One described Ranjan as "funny and brilliant ... a great combination ... the kind of teacher who changes your life."

Ranjan started his Beloit career in 1982. At the time of his death, he was the Ralph C. Huffer Professor of Mathematics and Astronomy and current chair of the Math and Computer Science Department. His family said he was looking forward to teaching this fall.

Ranjan's life was devoted to his family and to the subject of mathematics, especially classical mathematics. He found tremendous joy working on proofs and problems with his students, and he enjoyed helping former students go into graduate studies or careers and keeping up with them over the years.

He was a prolific researcher, author, and co-author of papers and mathematics textbooks. His interests in the history of mathematics and in the lives and work of mathematicians brought a deep historical perspective to his teaching and research. Among his books is the highly praised

Special Functions, co-authored with Richard Askey and George Andrews and published by Cambridge University in English, with Chinese and Russian editions.

In 2003, he was one of three professors to receive the Haimo Award, the Mathematical Association of America's (MAA) highest national teaching honor, for those who have been "extraordinarily successful, both in their home institutions and also in a wider setting." The MAA award citation read in part: "Professor Roy teaches mathematics as a body of ideas of great depth and beauty, and as a way of thinking which can improve the lives of all who study it ..." He received Teacher of the Year honors from Beloit College in 1986 and 2000.

For all these reasons and more, the College's Board of Trustees fully endorsed our enthusiastic recommendation and that of the Faculty Status and Performance Committee that Professor Ranjan Roy be promoted immediately to the rank of Professor Emeritus.

Ranjan is survived by Gretchen Roy, his wife of 49 years, his son Kalyan, daughter Maitreyi, six grandchildren, and two brothers. Our thoughts are with his family, his colleagues, and the generations of Beloit students whose lives he touched.

* * *

Rama Viswanathan, Professor Emeritus of Chemistry and Computer Education,
Beloit College, Beloit, Wisconsin, USA

Ranjan Roy was my mentor, a distinguished colleague, and a dear family friend for almost four decades. It is like yesterday...I still remember when I arrived in Beloit on a warm August morning in 1983 to move into an apartment on Church Street, and the Roy children came out from their college house across the street to watch me unload my car, and then the parents themselves came and said hello! That was the start of a lasting friendship with Ranjan and his family, and I was deeply saddened to hear about his untimely demise on August 12.

The Beloit College website has a page that honors Ranjan and describes his lasting and transformative contributions to the community in detail, but I would like to share a few personal reminiscences about our interactions that may provide more detail and insights into the multi-faceted nature of his interests and his enduring mathematical legacy.

I observed first hand over the years how Ranjan's passion for mathematics was shared by his family, especially in the writing and publication of a series of classic books that he authored over the years. For me, sitting in Ranjan's study at home was tantamount to visiting a well-stocked Math library with hand-picked books and journals. Gretchen was involved in the proof-reading and editing of every book, including the soon-to-be published volumes of "Series and Products in the Development of Mathematics," which he just finished before he passed. Son Kalyan, an accomplished artist, envisioned, designed, and executed the distinctive artwork for the covers of almost all of Ranjan's books. Truly a unique family collaboration!

I was trained as a physical chemist and taught quantum chemistry, computational chemistry, chemical thermodynamics, and chemical kinetics during my 30+ year tenure at Beloit College. It was clear to me immediately after I first met Ranjan that I could learn a lot from him. He was an expert in and had an encyclopedic knowledge of applied mathematics, in particular the applications of Special Functions in physics and chemistry. I was very pleased and grateful when one of the few general and accessible texts on Special Functions that he coauthored was published in 1999. It is a classic and what the reviewer in the Bulletin of the American Mathematical Society said about it, "The book is packed with brief, challenging superveniences that make it a browser's delight...One of the delightful features of this book is how the sense of history, of mathematics being created and savored, informs the text... This is a splendid work, and I predict that it will

be a bestseller as well.” applies equally well to all of Ranjan’s books and aptly describes his distinctive style as well.

The promise of the Internet in terms of completely online publication of mathematical and scientific reference material in searchable databases had matured by the early 2000’s. Ranjan coauthored three of the chapters (Algebraic and Analytic Methods, Elementary Functions, Gamma Function) in the landmark Digital Library of Mathematical Functions (DLMF) published online and in print in 2010 and maintained by the National Bureau of Standards and Technologies (NIST). Online access to DLMF, the most comprehensive, authoritative, and curated handbook of mathematical functions currently available, is free. The publication was a welcome and much needed complete update and revision of the venerable printed version (Handbook of Mathematical Functions) by Abramowitz and Stegun, used by generations of scientists world-wide since the 1960’s. He was named a Validator for the first release of both the digital and printed versions of the new NIST Handbook, and subsequently appointed an Associate Editor. While this contribution may not be well known as his other books, I regard it as his most important contribution to the scientific community at large, and it will surely be an evergreen.

I have many stories about Ranjan’s teaching, as well as his mathematical genius and acumen in quickly and elegantly solving a problem presented to him and explaining it clearly, no matter what the mathematical background of the persons posing the problem or the audience was. I would like to finish this tribute by sharing one such example, and hope it will provide the reader with a glimpse of the distinctive style of teaching that made Ranjan a beloved Math Professor, and one of the very few two-time winners of the Teacher of the Year Award at Beloit College. I often had to struggle to read sections of text books that had mathematical results stated as equations without any proof, in particular when authors used phrases like “It can be shown that..” or “It is easy to show that..” without bothering to show the proof. In this particular instance, it was a spectral radiation equation derived first by Max Planck and stated in most physics and chemistry text books without proof. In addition, the original proof in the early 1900’s was in German and hard for me to read with my very limited knowledge of the language. I showed the equation to Ranjan and remarked, “Is it really easy to show? Does not seem that easy to me.” He took one look at it and replied, in his typical gentle and understated style, “Ramaswami, it is easy, if you know how to work with infinite series..” and picked up a notepad and proceeded to write out a clear step-by-step proof on one page, without a single correction or crossed-out (or missing) intermediate step!

I will sorely miss Ranjan’s collegiality and fellowship. May his soul rest in peace.

* * *

Philip D. Straffin Jr., Professor Emeritus of Mathematics, Beloit College, Beloit, Wisconsin, USA

I taught mathematics at Beloit College from 1970 to 2007, and was Chair of the Mathematics Department from 1980 to 1990. I worked hard and I enjoyed teaching at Beloit enormously, but I’m pretty sure that my single most important contribution to the College was hiring Ranjan Roy in 1982. Beloit has had many inspiring teachers, but Ranjan was the teacher I admired most and learned most from. He was an inspiration to us all.

One of the happiest things I did at Beloit was to prepare the nomination of Ranjan for the Mathematical Association of America’s Haimo Award for Distinguished Teaching of College Mathematics, which Ranjan won in 2003. (It took me ten years to overcome Ranjan’s serious modesty and get his permission to do this.) What I said then remained true, and I’d like to quote from that nomination, and add a postscript at the end. I was asked at the beginning to “briefly describe the unusual personal and professional qualities that contribute to his or her extraordinary teaching success.”

First, Ranjan's teaching comes from a knowledge of mathematics which is amazingly broad, and more deeply based in the history of mathematics than that of anyone else I know. He has read systematically the original works of Newton, Euler, Gauss, Abel, Eisenstein, and Ramanujan. He knows their lives and their methods of thought as if he had lived with them, and this brings both clarity and a sense of immediacy when he teaches those ideas. Many of Ranjan's students come to feel that mathematics is something which can be lived.

Second (first, I think, in the eyes of students) is Ranjan's devotion to students. He thinks of teaching mathematics as a way of teaching effective thinking, and he works incredibly hard to teach students of all abilities. He holds office hours in the late afternoon and evening since those are times which are most convenient for students, and his office overflows with students gathering around the blackboard, asking about ideas and trying our explanations. He listens to students and supports them. He cares about what matters to them beyond classes. He is a special source of refuge for our minority students and international students. Students say Ranjan changed their lives.

On a lighter note, I would add Ranjan's sense of humor, since so many of our students value it. It is very dry, and seems to have the effect of making students hang on his words, realizing there may be something there which will hit two hours later. Ranjan uses this to great effect to make important points memorable. Our students collect and trade "Ranjanisms."

Ranjan has taught all of the mathematics courses in our curriculum except statistics. In addition, our students often "draft" him for courses. For instance, they persuaded him to teach a History of Mathematics course. (Ranjan was originally reluctant to teach the course because he had studied in depth only the first two of ten volumes of Newton's unpublished papers...). I sat in on the first offering and learned an enormous amount. Last spring we were presented with a petition signed by 16 majors asking that Ranjan teach Number Theory, which is not in our curriculum. The course started from the beginning but progressed to a series of proofs of quadratic reciprocity. The five students I'm teaching this term who took Number Theory last term agree unanimously: it was "really hard," but "fascinating" and "absolutely wonderful."

In addition to teaching students, Ranjan teaches us, his colleagues. In the past few years he has organized, and presented most of the talks in, mathematics faculty colloquia on the proof of the Bieberbach Conjecture, Wiles' proof of Fermat's Last Theorem, generating functions, the combinatorics of finite sets. These have been highlights of my learning at Beloit.

Finally, Ranjan teaches the international community of mathematicians. Of his thirty-some articles, I'll mention just two. "Binomial identities and hypergeometric series" (American Mathematical Monthly, 1987) let those of us who are not experts in on how the experts use hypergeometric series to prove binomial identities systematically. "The discovery of the series formula for pi by Leibniz, Gregory and Nilakantha" (Mathematics Magazine, 1990) made the wider mathematical community aware that Leibniz' series for pi was known in the 15th century in south India. This paper won the Mathematical Association of America's Allendoerfer Award for mathematical exposition.

The most recent, and spectacular, example is Ranjan's book with Richard Askey and George Andrews, Special Functions, Cambridge University Press, 1999. This project absorbed much of Ranjan's considerable energy for six years. Its 664 pages comprise a major compilation of knowledge in a central field of mathematics. Ranjan was the

primary writer for ten of the book's twelve chapters, so that much of the clear exposition and strong historical sense, and most of the hundreds of challenging problems enthusiastically admired by reviewers, are due to Ranjan.

I'll let our students, in their enthusiasm, have the final say with three summary quotes from Ranjan's course evaluations:

"This course is a living legend."

"Ranjan is God."

"He's funny and brilliant. Great combo, sir! He's the best; 'nuff said."

In the ten years after I wrote this, Ranjan worked on what is his greatest work. Sources in the Development of Mathematics: Series and Products from the Fifteenth to the Twenty-First Century was published by Cambridge University Press in 2011. In its 974 pages, it gives nothing less than an erudite but highly accessible history of the development of classical mathematics from the study of power series in 15th century Kerala to the study of univalent functions and finite fields in the 20th century. Reviewers praise Ranjan's deep immersion in primary and secondary sources, his taste in selecting material, and the clarity of his writing which makes all but the most advanced parts of the book readable and enjoyable by students. Indeed, many of Beloit's senior projects and colloquium talks have been based on material from this book. At every national Mathematics Meeting I stop by the Cambridge University Press booth to make sure Sources is prominently placed. It always is, and the Cambridge people always want to tell me how proud they are to have published such an eminent study. With this book, Ranjan has done a great and lasting service to the mathematics community.

I'd like to end with what I wrote in recommending Ranjan for promotion to full professor in his first year of eligibility:

What makes a great teacher-scholar? Surely knowledge, meticulous organization, clarity, sympathetic concern for students and a certain exuberant showmanship all play their part. I think, though, that the most important attribute has to be love of learning, together with the willingness and faith to invite students to share in that love. Ranjan has this. Students react to it, and often come away from one of Ranjan's courses with a new appreciation of what learning can be. What more valuable gift could the College offer its students?

* * *

Bruce T. Atwood, Adjunct Associate Professor of Mathematics, Beloit College,
Beloit, Wisconsin, USA

I want to second Phil Straffin's eloquent comments about Ranjan's remarkable teaching and research. As a part-time member of the department, I had the opportunity to see his brilliance first-hand by auditing one of his classes. But rather than duplicate what Phil has written, I will describe some of Ranjan's personal interactions with me.

I came to Beloit from the business world and thus was a little unsure of myself at first. Like Paul Campbell, who was department chair before him, and all of the other members of the Math Department, Ranjan treated me as if I were a full-time member of the faculty. At department meetings he asked for and listened to my opinions and made me feel like a valued member of the team.

Ranjan was often a quiet person, but his thank you notes were frequent. On the occasion of his passing I re-read many of his emails to me. There was a thank you for helping host department

visitors, a thank you for helping with open houses, a thank you for helping organize the course assistants, a thank you for helping with the Bushnell exams, a thank you for helping advising, and a thank you for helping with Mathematica, and on and on.

When I would bring cookies for the weekly department colloquium, despite much teasing I could never get Ranjan to eat one. I think maybe, just once, he might have tried a Fig Newton. But it was very touching to see that he would often carefully wrap up a cookie or cider doughnut to take home to Gretchen.

Professionally he encouraged me to give colloquium talks and went out of his way to support my work. He arranged for me to teach topics courses, to add Mathematica labs for calculus, and to teach wavelets. I am grateful for these rare opportunities for an adjunct faculty member. Most of all, I am grateful and honored to have been his colleague and friend.

Ranjan went through life with a spring in his step. Literally, I sometimes saw him go up stairs two at a time, and he was even more energetic when mental effort was required. He was always positive. In our last email exchanges, we were discussing some of Beloit College's financial challenges. His final words to me were "We shall see. Meanwhile we can only do our best."

Ranjan, you will be missed!

* * *

Paul Campbell, Emeritus Professor of Mathematics and Computer Science,
Beloit College, Beloit, Wisconsin, USA

I thank Phil Straffin for sharing in advance his "In Appreciation of Ranjan Roy." He writes about Ranjan's qualities with far more insight and eloquence than I am capable of, and his affection for Ranjan is palpable.

Phil and I both I admired Ranjan Roy because he epitomized what a professor at a liberal arts college should be.

He was a charismatic instructor who developed strong relationships with his students and was valued and loved by them. Every afternoon, he had an overflow crowd of students in his office, all doing mathematics together at the board in tutorial fashion. He gave eagerly-anticipated talks in the weekly Mathematics Colloquium that were outstanding for their insight and organization.

But he also pursued research and exposition that arose from and contributed to his teaching. Before coming to Beloit, he had amassed research publications in differential equations, the area of his thesis; at Beloit he changed his interests, first to special functions, publishing with leading researchers a clear guide to the history, advances, and problems in that field. He moved on to a thorough investigation of sources in the history of analysis, producing a book notable both for its scholarship and for its exposition, one that he used in his courses in the history of mathematics.

Topic #8 ——— OP – SF Net 27.5 ——— September 15, 2020

From: OP-SF Net Editors
Subject: Preprints in arXiv.org

The following preprints related to the fields of orthogonal polynomials and special functions were posted or cross-listed to one of the subcategories of arXiv.org during July and August 2020. This list has been separated into two categories.

OP-SF Net Subscriber E-Prints

<http://arxiv.org/abs/2007.00065>

The irreducibility of some Wronskian Hermite polynomials
Codruț Grosu, Corina Grosu

<http://arxiv.org/abs/2007.00343>

On second order q -difference equations satisfied by Al-Salam-Carlitz I-Sobolev type polynomials of higher order
Carlos Hermoso, Edmundo J. Huertas, Alberto Lastra, Anier Soria-Lorente

<http://arxiv.org/abs/2007.00867>

The continuous part of the axial distance spectrum for Kleinian groups
G. J. Martin

<http://arxiv.org/abs/2007.02694>

On the correctness of finite-rank approximations by series of shifted Gaussians
S. M. Sitnik, A. S. Timashov, S. N. Ushakov

<http://arxiv.org/abs/2007.03174>

An elliptic hypergeometric function approach to branching rules
Chul-hee Lee, Eric M. Rains, S. Ole Warnaar

<http://arxiv.org/abs/2007.03267>

On the families of polynomials forming a part of the so-called Askey-Wilson scheme and their probabilistic applications
Paweł J. Szabłowski

<http://arxiv.org/abs/2007.03445>

Zeros of Complex Random Polynomials Spanned by Bergman Polynomials
Marianela Landi, Kayla Johnson, Garrett Moseley, Aaron Yeager

<http://arxiv.org/abs/2007.04061>

A discrete weighted Markov-Bernstein inequality for polynomials and sequences
Dimitar K. Dimitrov, Geno P. Nikolov

<http://arxiv.org/abs/2007.04952>

Demazure crystals and the Schur positivity of Catalan functions
Jonah Blasiak, Jennifer Morse, Anna Pun

<http://arxiv.org/abs/2007.05691>

Discrete diffusion semigroups associated with Dunkl-Jacobi and exceptional Jacobi polynomials
Á. P. Horváth

<http://arxiv.org/abs/2007.05698>

From Heun class equations to Painlevé equations
Jan Dereziński, Artur Ishkhanyan, Adam Latosiński

<http://arxiv.org/abs/2007.05925>

On a generalized three-parameter Wright function of the Le Roy type
Roberto Garrappa, Sergei Rogosin, Francesco Mainardi

<http://arxiv.org/abs/2007.06261>

Macdonald polynomials and extended Gelfand–Tsetlin graph
Grigori Olshanski

<http://arxiv.org/abs/2007.06264>

Macdonald–level extension of beta ensembles and large– N limit transition
Grigori Olshanski

<http://arxiv.org/abs/2007.07473>

Quantifying dip–ramp–plateau for the Laguerre unitary ensemble structure function
Peter J. Forrester

<http://arxiv.org/abs/2007.07727>

Discrete Lebedev’s index transforms
Semyon Yakubovich

<http://arxiv.org/abs/2007.09661>

On a new result for the hypergeometric function
A. K. Rathie, R. B. Paris

<http://arxiv.org/abs/2007.09821>

Hankel Determinants of sequences related to Bernoulli and Euler Polynomials
Karl Dilcher, Lin Jiu

<http://arxiv.org/abs/2007.10073>

Hardy’s inequalities in finite dimensional Hilbert spaces
Dimitar K. Dimitrov, Ivan Gadjev, Geno Nikolov, Rumen Uluchev

<http://arxiv.org/abs/2007.10161>

A note on an extension of Gelfond’s constant
A. K. Rathie, R. B. Paris

<http://arxiv.org/abs/2007.10447>

On q -analogs of zeta functions associated with a pair of q -analogs of Bernoulli numbers and polynomials
Ahmad El–Guindy, Zeinab Mansour

<http://arxiv.org/abs/2007.10726>

The geometry of diagonal groups
R. A. Bailey, Peter J. Cameron, Cheryl E. Praeger, Csaba Schneider

<http://arxiv.org/abs/2007.10748>

Asymptotic expansions of Jacobi polynomials and of the nodes and weights of Gauss–Jacobi quadrature for large degree and parameters in terms of elementary functions
Amparo Gil, Javier Segura, Nico M. Temme

<http://arxiv.org/abs/2007.11300>

Bounds for an integral of the modified Bessel function of the first kind and expressions involving it
Robert E. Gaunt

<http://arxiv.org/abs/2007.11492>

A note on a generalization of two well-known Combinatorial identities via a Hypergeometric series approach

A. K. Rathie, Insuk Kim, R. B. Paris

<http://arxiv.org/abs/2007.12691>

On the deformed Pearcey determinant

Dan Dai, Shuai-Xia Xu, Lun Zhang

<http://arxiv.org/abs/2007.13015>

Equidistributions of mesh patterns of length two and Kitaev and Zhang's conjectures

Bin Han, Jiang Zeng

<http://arxiv.org/abs/2007.13154>

Lower bounds for moments of zeta and L -functions revisited

Winston Heap, K. Soundararajan

<http://arxiv.org/abs/2007.13340>

Some applications of Wright functions in fractional differential equations

R. Garra, F. Mainardi

<http://arxiv.org/abs/2007.13700>

The smoothest average: Dirichlet, Fejér and Chebyshev

Noah Kravitz, Stefan Steinerberger

<http://arxiv.org/abs/2007.15670>

Automatic Solving of Cubic Diophantine Equations Inspired by Ramanujan

Shalosh B. Ekhad, Doron Zeilberger

<http://arxiv.org/abs/2008.00600>

Large-degree asymptotics of rational Painlevé-IV solutions by the isomonodromy method

Robert J. Buckingham, Peter D. Miller

<http://arxiv.org/abs/2008.01017>

A vector equilibrium problem for symmetrically located point charges on a sphere

Juan G. Criado del Rey, Arno B. J. Kuijlaars

<http://arxiv.org/abs/2008.01240>

Elliptic functions from hypergeometric integrals

P. L. Robinson

<http://arxiv.org/abs/2008.01319>

Rate of convergence at the hard edge for various Pólya ensembles of positive definite matrices

Peter J. Forrester, Shi-Hao Li

<http://arxiv.org/abs/2008.01480>

Some Properties of a Class of Sparse Polynomials

Karl Dilcher, Maciej Ulas

<http://arxiv.org/abs/2008.01601>

Asymptotic expansions of Kummer hypergeometric functions for large values of the parameters

Nico M. Temme, Raffaello Seri

<http://arxiv.org/abs/2008.01812>

Computation and applications of Mathieu functions: A historical perspective
Chris Brimacombe, Robert M. Corless, Mair Zamir

<http://arxiv.org/abs/2008.02561>

Discrete Fourier–Jacobi transform
Semyon Yakubovich

<http://arxiv.org/abs/2008.02822>

Exceptional Legendre polynomials via isospectral deformation and confluent Darboux transformations
María Ángeles García–Ferrero, David Gómez–Ullate, Robert Milson

<http://arxiv.org/abs/2008.03266>

Sklyanin–like algebras for $(q-)$ linear grids and $(q-)$ para–Krawtchouk polynomials
Geoffroy Bergeron, Julien Gaboriaud, Luc Vinet, Alexei Zhedanov

<http://arxiv.org/abs/2008.04797>

Some analytical results associated with extensions of the canonical Feller–Spitzer distribution
R. B. Paris, V. V. Vinogradov

<http://arxiv.org/abs/2008.04925>

Entanglement of Free Fermions on Hadamard Graphs
Nicolas Crampe, Krystal Guo, Luc Vinet

<http://arxiv.org/abs/2008.06349>

A family of Horn–Bernstein functions
Christian Berg, Henrik L. Pedersen

<http://arxiv.org/abs/2008.06936>

Pure tone modes for a 5:3 elliptic drum
Robert M. Corless

<http://arxiv.org/abs/2008.07195>

Explicit expressions of the Hua–Pickrell semi–group
Jonas Arista, Nizar Demni

<http://arxiv.org/abs/2008.07206>

Jensen polynomials are not a viable route to proving the Riemann Hypothesis
David W. Farmer

<http://arxiv.org/abs/2008.07296>

Orthogonal polynomials with periodically modulated recurrence coefficients in the Jordan block case
Grzegorz Świdorski, Bartosz Trojan

<http://arxiv.org/abs/2008.07459>

On the Suboptimality of Negative Momentum for Minimax Optimization
Guodong Zhang, Yuanhao Wang

<http://arxiv.org/abs/2008.07785>

Asymptotics for averages over classical orthogonal ensembles
Tom Claeys, Gabriel Glesner, Alexander Minakov, Meng Yang

<http://arxiv.org/abs/2008.08079>

Harmonic analysis of little q -Legendre polynomials
Stefan Kahler

<http://arxiv.org/abs/2008.08082>

Fractional powers of Bessel operator and its numerical calculation
Durdimurod Durdiev, Elina Shishkina, Sergei Sitnik

<http://arxiv.org/abs/2008.08210>

Spectral theory of Jacobi matrices on trees whose coefficients are generated by multiple orthogonality
Sergey A. Denisov, Maxim L. Yattselev

<http://arxiv.org/abs/2008.08390>

Polyanalytic Reproducing Kernels on the Quantized Annulus
Nizar Demni, Zouhair Mouayn

<http://arxiv.org/abs/2008.08641>

Fast and reliable high accuracy computation of Gauss-Jacobi quadrature
A. Gil, J. Segura, N. M. Temme

<http://arxiv.org/abs/2008.08724>

Global Phase Portrait and Large Degree Asymptotics for the Kissing Polynomials
Ahmad Barhoumi, Andrew F. Celsus, Alfredo Deano

<http://arxiv.org/abs/2008.09176>

Electrostatic Equilibria on the Unit Circle via Jacobi Polynomials
Kev Johnson, Brian Simanek

<http://arxiv.org/abs/2008.09189>

Introduction to Cluster Algebras. Chapter 6
Sergey Fomin, Lauren Williams, Andrei Zelevinsky

<http://arxiv.org/abs/2008.09260>

Greedy Approaches to Online Stochastic Matching
Allan Borodin, Calum MacRury, Akash Rakheja

<http://arxiv.org/abs/2008.09669>

Asymptotics of Chebyshev Polynomials, V. Residual Polynomials
Jacob S. Christiansen, Barry Simon, Maxim Zinchenko

<http://arxiv.org/abs/2008.09776>

Hankel hyperpfaffian calculations and Selberg integrals
Masao Ishikawa, Jiang Zeng

<http://arxiv.org/abs/2008.11884>

Orthogonal rational functions with real poles, root asymptotics, and GMP matrices
Benjamin Eichinger, Milivoje Lukić, Giorgio Young

<http://arxiv.org/abs/2008.13071>

Quantitative weighted bounds for the q -variation of singular integrals with rough kernels
Yanping Chen, Guixiang Hong, Ji Li

<http://arxiv.org/abs/2008.13124>

Asymptotic correlations with corrections for the circular Jacobi β -ensemble
Peter J. Forrester, Shi-Hao Li, Allan K. Trinh

<http://arxiv.org/abs/2008.13263>

Discrete Lebedev–Skalskaya transforms
Semyon Yakubovich

<http://arxiv.org/abs/2008.13475>

Divisibility and Arithmetic Properties of a Class of Sparse Polynomials
Karl Dilcher, Maciej Ulas

<http://arxiv.org/abs/2008.13572>

The elliptic function dn_3 of Shen
P. L. Robinson

<http://arxiv.org/abs/2008.13666>

A Superpolynomial Version of Nonsymmetric Jack Polynomials
Charles F. Dunkl

Other Relevant OP–SF E–Prints

<http://arxiv.org/abs/2007.00069>

On stable and finite Morse index solutions of the fractional Toda system
Mostafa Fazly, Wen Yang

<http://arxiv.org/abs/2007.00172>

Iterated integrals, multiple zeta values and multiple Beta functions
Jiangtao Li

<http://arxiv.org/abs/2007.00173>

Unit cyclotomic multiple zeta values for μ_2, μ_3 and μ_4
Jiangtao Li

<http://arxiv.org/abs/2007.00369>

Inhomogeneous XX spin chains and quasi–exactly solvable models
Federico Finkel, Artemio González–López

<http://arxiv.org/abs/2007.00988>

The Fyodorov–Hiary–Keating Conjecture. I
Louis–Pierre Arguin, Paul Bourgade, Maksym Radziwiłł

<http://arxiv.org/abs/2007.01329>

On the arithmetic of Padé approximants to the exponential function
John Cullinan, Nick Scheel

<http://arxiv.org/abs/2007.01607>

Pointwise Remez inequality
B. Eichinger, P. Yuditskii

<http://arxiv.org/abs/2007.01865>

A New Linear Inversion Formula for a class of Hypergeometric polynomials
Ridha Nasri, Alain Simonian, Fabrice Guillemin

<http://arxiv.org/abs/2007.02508>

On relations between hypergeometric series and MZVs
Ming Hao Zhao

<http://arxiv.org/abs/2007.02541>

Higher moments of the multivariate Beta distribution
Feng Zhao

<http://arxiv.org/abs/2007.02877>

Sufficient conditions for strong starlikeness
Kanika Sharma, Nak Eun Cho, V. Ravichandran

<http://arxiv.org/abs/2007.03170>

Eisenstein series twisted Shintani zeta function
Robert Hough, Eun Hye Lee

<http://arxiv.org/abs/2007.03646>

Blowups in BPS/CFT correspondence, and Painlevé VI
Nikita Nekrasov

<http://arxiv.org/abs/2007.03664>

Parity of coefficients of mock theta functions
Liuquan Wang

<http://arxiv.org/abs/2007.03957>

Evaluation of one-dimensional polylogarithmic integral, with applications to infinite series
Kam Cheong Au

<http://arxiv.org/abs/2007.04317>

On the nontrivial zeros of the Dirichlet eta function
Vladimir García-Morales

<http://arxiv.org/abs/2007.04471>

Properties of fractional integral operators involving the three-parameters Mittag-Leffler function in the kernels with respect to another function
D. S. Oliveira

<http://arxiv.org/abs/2007.05162>

Solutions of Painlevé II on real intervals: novel approximating sequences
A. J. Bracken

<http://arxiv.org/abs/2007.05510>

McKay Matrices for Finite-dimensional Hopf Algebras
Georgia Benkart, Rekha Biswal, Ellen Kirkman, Van C. Nguyen, Jieru Zhu

<http://arxiv.org/abs/2007.05599>

Linear programming bounds for covering radius of spherical designs
Peter Boyvalenkov, Maya Stoyanova

<http://arxiv.org/abs/2007.05707>

A fully noncommutative Painlevé II hierarchy: Lax pair and solutions related to Fredholm determinants

Sofia Tarricone

<http://arxiv.org/abs/2007.05998>

Two-parameter generalisations of Cauchy bi-orthogonal polynomials and integrable lattices

Xiang-Ke Chang, Shi-Hao Li, Satoshi Tsujimoto, Guo-Fu Yu

<http://arxiv.org/abs/2007.07026>

Exponentially growing bulk Green functions as signature of nontrivial non-Hermitian winding number in one dimension

Heinrich-Gregor Zirnstern, Bernd Rosenow

<http://arxiv.org/abs/2007.08008>

Notes on the Phase Statistics of the Riemann Zeros

Jeffrey Stopple

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Dynamical Zeta Functions in the Nonorientable Case

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Computing zeta functions of large polynomial systems over finite fields
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Tornheim-like series, harmonic numbers and zeta values
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The Davenport–Heilbronn function and zeta functions composed by the Hurwitz and periodic zeta functions

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Riemann–Hilbert hierarchies for hard edge planar orthogonal polynomials

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On the Balasubramanian–Ramachandra method close to $\Re(s) = 1$

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Computing cohomology intersection numbers of GKZ hypergeometric systems

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One idea and two proofs of the KMT theorems

Manjunath Krishnapur

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A note on some identities involving special functions from the hypergeometric solution of algebraic equations

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Eulerian series, zeta functions and the arithmetic of partitions

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Lyapunov exponents for the map that passes through the non–trivial zeros of Riemann zeta–function

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Universality of the Hurwitz zeta–function on the half plane of absolute convergence

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A Neumann series of Bessel functions representation for solutions of the radial Dirac system
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A closed-form expression for $\zeta(3)$
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The Ising correlation $C(M, N)$ for $\nu = -k$
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On a Class of Hypergeometric Diagonals
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On the maximum of a function connected with the Green function of a focal boundary value problem
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Explicit Relations between Kaneko–Yamamoto Type Multiple Zeta Values and Related Variants
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$S^*(\varphi)$ and $\mathcal{C}(\varphi)$ –radii for some special functions
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Topic #9 ——— OP – SF Net 27.5 ——— September 15, 2020

From: OP–SF Net Editors

Subject: Submitting contributions to OP–SF NET and SIAM–OPSF (OP–SF Talk)

To contribute a news item to OP–SF NET, send e–mail to one of the OP–SF Editors
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Contributions to OP–SF NET 27.6 should be sent by November 1, 2020.

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Topic #10 OP – SF Net 27.5 September 15, 2020

From: OP–SF Net Editors

Subject: Thought of the Month by **Karl Weierstrass**

“But this is something very important; one can render our youthful students no greater service than to give them suitable guidance, so that the advances in science become known to them through a study of the sources.”

Karl Weierstrass to Felice Casorati, December 21, 1868, Taken from the Preface of *Sources in the Development of Mathematics: Series and Products from the Fifteenth to the Twenty-first Century*, Ranjan Roy, Cambridge University Press, Cambridge, 2011.