Preface for Volume 2

On April 4, 2014, we celebrated Cora Sadosky's life with an *afternoon in her honor*, preceded by the 13th New Mexico Analysis Seminar[1] on April 3–4, 2014, and followed by the Western Sectional Meeting of the AMS on April 5–6, 2014, all held in Albuquerque, New Mexico, USA. It was a mathematical feast, gathering more than a hundred analysts – fledgling, junior and senior – from all over the USA and the world such as Canada, India, Mexico, Sweden, the UK, South Korea, Brazil, Israel, Hungary, Finland, Australia, Venezuela, and Spain, to remember her outspokenness, her uncompromising ways, her sharp sense of humor, her erudition, and above all her profound love for mathematics.

Many speakers talked about how their mathematical lives were influenced by Cora's magnetic personality and her mentoring early in their careers and as they grew into independent mathematicians. Particularly felt was her influence among young Argentinian and Venezuelan mathematicians. Rodolfo Torres, in a splendid lecture about Cora and her mathematics, transported us through the years from Buenos Aires to Chicago back to Buenos Aires, from Caracas to the USA back to Buenos Aires, and from Washington D.C. to California. He reminded us of Cora always standing up for human rights, Cora president of the Association for Women in Mathematics (AWM), and Cora always encouraging and fighting for what she thought was right.

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[1]The 13th New Mexico Analysis Seminar and *An Afternoon in Honor of Cora Sadosky* were sponsored by National Science Foundation (NSF) Grant DMS-140042, the Simons Foundation, and the Efroymson Foundation, and the events were done *in cooperation* with the Association for Women in Mathematics (AWM). See the conferences websites:

www.math.unm.edu/conferences/13thAnalysis

people.math.umass.edu/~nahmod/CoraSadosky.html

An Afternoon in Honor of Cora Sadosky was organized by Andrea Nahmod, Cristina Pereyra, and Wilfredo Urbina. The 13th New Mexico Analysis Seminar organizers were Matt Blair, Cristina Pereyra, Anna Skripka, and Maxim Zinchenko from the University of New Mexico and Nick Michalowski from New Mexico State University.

Cora was born in Buenos Aires, Argentina, on May 23, 1940, and died on December 3, 2010, in Long Beach, CA. Cora got her PhD in 1965 at the University of Chicago under the supervision of both Alberto Calderón and Anthoni Zygmund, the grandparents of the now-known Calderón-Zygmund School. Shortly after her return from Chicago, she married Daniel J. Goldstein, her lifelong companion who sadly passed away on March 13, 2014, a few weeks before the Albuquerque gathering. Daniel and Cora had a daughter, Cora Sol, who is now a political science professor at California State University in Long Beach, and a granddaughter, Sasha Malena, who brightened their last years. During her life, Cora wrote more than 50 research papers, a graduate textbook (*Interpolation of Operators and Singular Integrals: An Introduction to Harmonic Analysis*, Marcel Dekker 1979), and she edited two volumes: one celebrating Mischa Cotlar's 70th birthday (*Analysis and Partial Differential Equations: A Collection of Papers Dedicated to Mischa Cotlar*, CRC Press, 1989) and one celebrating Alberto Calderón's 75th birthday (*Harmonic Analysis and Partial Differential Equations: Essays in Honor of Alberto Calderón*, edited with M. Christ and C. Kenig, The University of Chicago Press, 1999). In the first volume, we have included a list as complete as possible of her scholarly work. Notable are her contributions to harmonic analysis and operator theory, in particular her lifelong and very fruitful collaboration with Mischa Cotlar.

When news of Cora's passing spread like wildfire in December 2010, many people were struck. The mathematical community quickly reacted. The AWM organized an impromptu memorial at the 2011 Joint Mathematical Meeting (JMM), as reported by Jill Pipher, at the time AWM president:

> Many people wrote to express their sadness and to send remembrances. The AWM business meeting on Thursday, January 6 at the 2011 JMM was largely devoted to a remembrance of Cora.

This appeared in the March-April issue of the AWM Newsletter[2] which was entirely dedicated to the memory of Cora Sadosky.

An obituary by Allyn Jackson for Cora Sadosky appeared in Notices of the American Mathematical Society in April 2011.[3]

In June 2011, Cathy O'Neal wrote in her blog mathbabe[4] a beautiful remembrance for Cora:

> [...] Cora, whom I met when I was 21, was the person that made me realize there is a community of women mathematicians, and that I was also welcome to that world. [...] And I felt honored to have met Cora, whose obvious passion for mathematics was absolutely awe-inspiring. She was the person who first explained to me that, as women mathematicians, we will keep growing, keep writing, and keep getting better at math as we grow older [...]. When I googled her this morning, I found out she'd died about 6 months ago. You can read

[2] *President's Report*, AWM Newsletter, Vol. 41, No. 2, March-April 2011, p. 1. This issue was dedicated to the memory of Cora Sadosky and it was partially reproduced in Volume 1.

[3] Notices AMS, Vol. 58, Number 4, April 2011, pp. 613–614.

[4] http://mathbabe.org/2011/06/29/cora-sadosky/

> about her difficult and inspiring mathematical career in this biography.[5] It made me cry and made me think about how much the world needs role models like Cora.

In 2013, the Association for Women in Mathematics established the biennial AWM-Sadosky Prize in Analysis,[6] to be awarded every other year starting in 2014. The purpose of the award is to highlight exceptional research in analysis by a woman early in her career. Svitlana Mayboroda was the first recipient of the AWM-Sadosky Research Prize in Analysis awarded in January 2014. Mayboroda contributed a survey paper joint with Ariel Barton to the first of this series of two volumes. As the first volume went into press, the second recipient of the award, the 2016 AWM-Sadosky Prize, was announced: Daniela de Silva, from Columbia University. The award was presented to her in the January 2016 Joint Mathematical Meeting.

In 2015, Kristin Lauter, president of the AWM, started her report in the May-June issue of the AWM Newsletter,[7] with a couple of paragraphs remembering Cora:

> I remember very clearly the day I met Cora Sadosky at an AWM event shortly after I got my PhD, and, knowing very little about me, she said unabashedly that she didn't see any reason that I should not be a professor at Harvard someday. I remember being shocked by this idea, and pleased that anyone would express such confidence in my potential, and impressed at the audacity of her ideas and confidence of her convictions.
>
> Now I know how she felt: when I see the incredibly talented and passionate young female researchers in my field of mathematics, I think to myself that there is no reason on this earth that some of them should not be professors at Harvard. But we are not there yet … and there still remain many barriers to the advancement and equal treatment of women in our profession and much work to be done.

In these two volumes, friends, colleagues, and/or mentees have contributed research papers, surveys, and/or short remembrances about Cora. The remembrances were sometimes weaved into the article submitted (either at the beginning or the end), and we have respected the format each author chose. Many of the authors gave talks in *the 13th New Mexico Analysis Seminar*, in *An Afternoon in Honor of Cora Sadosky*, and/or in the Special Sessions of the AMS; others could not attend these events but did not think twice when given the opportunity to contribute to this homage.

The mathematical contributions naturally align with Cora's mathematical interests: harmonic analysis and PDEs, weighted norm inequalities, Banach spaces and BMO, operator theory, complex analysis, and classical Fourier theory.

Volume 1 contains articles about Cora and her mathematics and mentorship, remembrances by colleagues and friends, her bibliography according to MathSciNet, and survey and research articles on harmonic analysis and partial differential equations, BMO, Banach and metric spaces, and complex and classical Fourier analysis.

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[5] Biographies of Women in Mathematics: Cora Sadosky http://www.agnesscott.edu/lriddle/women/corasadosky.htm

[6] More details in the AWM-Sadosky Research Prize in Analysis webpage: https://sites.google.com/site/awmmath/programs/sadosky-prize.

[7] President's Report. AWM Newsletter, Vol. 45, No. 3, May-June, p. 1 (2015).

The year 2014 saw the resolution of the two-weight problem for the Hilbert transform à la Muckenhoupt by Michael Lacey, Erik Sawyer, Chun-Yen Shen, and Ignacio Uriarte-Tuero, a problem that had been open for 40 years. This problem was solved à la Helson-Szegö by Cora Sadosky and Mischa Cotlar in the early 1980s using complex analysis and operator theory methods. In the last 15 years, a number of techniques have been developed and refined to yield this result, including stopping time arguments, Bellman functions, Lerner's median approach, and bumped approach.

Volume 2 contains more remembrances and survey and research articles on weighted norm inequalities, operator theory, complex analysis, dynamical systems, and dyadic harmonic analysis. The articles illustrate surprising connections to Tauberian functions, number theory, and wavelet systems. A survey of the two-weight problem for the Hilbert transform by Michael Lacey is featured.

Before describing in detail the contents of the second volume in this series, we would like to end with some words by Nikolai Nikolski[8] regarding Cora Sadosky's joint work with Mischa Cotlar on the two-weight problem:

> My next impression on Mischa's mathematics is dated about 10 years later when his great series of papers with Cora Sadosky on Generalized Toeplitz Kernels (GTK) started to appear. On the age when all people involved in "weighted analysis" were excited with the Muckenhoupt-type approach (which is efficient for real variable applications), the Cotlar-Sadosky's idea to develop Helson-Szegö classical techniques was revolutionary. They immediately obtained important applications of the GTK theory in a variety of domains where complex analysis language is more appropriate than the real analysis one (scattering theory, Hankel and Toeplitz operators, dilation theory…, but also singular integrals for so important problems as the famous two-weighted estimates). This Cotlar-Sadosky series appeared almost simultaneously with the well-known Krein's school achievements (Adamyan-Arov-Krein) and the Lax-Phillips approach to scattering theory, but the GTK theory showed several advantages (as, for example, an important - and growing with time! - efficiency in several complex variables.)

Contents of Volume 2

We now describe in more detail the contents of the second volume. Volume 2 includes remembrances, photos, two survey articles, and research articles by an array of mathematicians representing themes at the heart of Cora's mathematical interests: weighted inequalities, complex analysis, and operator theory.

In the chapter "Remembering Corita", author and poet Margaret Randall, longtime friend of Corita and her parents, Manuel and Cora, shares her memories of the family, and in chapter "Remembering Cora" Neil Hindman, Howard University Cora's former colleague, shares a few memories.

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[8] This is a paragraph in a remembrance for Mischa Cotlar that can be found at www.math.unm.edu/conferences/10thAnalysis/resources/cotlar/nikolski.pdf.

In the chapter "The Two-Weight Inequality for the Hilbert Transform: A Primer," Michael Lacey surveys the resolution of the two-weight problem for the Hilbert transform. This is a valuable and insightful survey on the recent advances on the two-weight inequality for the Hilbert transform, where the author has been a leading contributor. With the fast development of the field in the last few years, hundreds of pages have been published. While much of that has quickly become outdated with the arrival of more powerful and more efficient approaches, there are still important parts in the non-latest papers that have not been redone or surpassed by the newest developments. In this survey article, there is a detailed presentation of the unconditional characterization of the two-weight inequality by Lacey, Sawyer, Shen, and Uriarte-Tuero, incorporating at the core a refinement by Hytönen. An earlier conditional result of Nazarov, Treil, and Volberg, under a "pivotal" condition, is reworked in the style of the more recent papers for the sake of both simplification and easier comparison. Some important counterexamples and a thorough discussion of motivation and applications are presented. Michael Lacey reflects in his article about Cora Sadosky and how his research was strongly influenced by her passion and interests, he gave a talk titled *Cora Sadosky Influence on my Work* in an AMS Special Session on "Harmonic Analysis and Operator Theory (In Memory of Cora Sadosky)" co-organized by two of the editors of this volume, Stokolos and Urbina, in Albuquerque on April 2014.

In the chapter "Singular Integrals, Rank-One Perturbations, and Clark Model in General Situation," Constance Liaw and Sergei Treil present a survey and discuss generalizations of the Clark model to the case of non-singular measures and applications to the study of rank-one perturbations for unitary and self-adjoint operators. This survey summarizes several well-known papers in that direction written previously by the authors and gives some new ideas on the construction of a similar model for dissipative operators. Rank-one perturbations play an important role in operator theory and mathematical physics. One of the principal attractions of rank-one perturbations is that for such operators almost everything can be explicitly computed, and then advanced techniques of harmonic analysis, like the study of fine properties of Cauchy-type integrals or advanced theory of singular integral operators, can be applied. These lecture notes give an account of the mini-course delivered by the authors in the 13th New Mexico Analysis Seminar in April 2014 on *Perturbations, Two-Weight Estimates, and Clark Model*. Sergei Treil also gave an invited lecture on *Two-Weight Estimates Following Arocena-Cotlar-Sadosky* during "An Afternoon in Honor to Cora Sadosky" held in Albuquerque, NM, in April 2014.

In the chapter "On Two-Weight Estimates for Dyadic Operators," Oleksandra Beznosova, Daewon Chung, Jean Moraes, and María Cristina Pereyra discuss quantitative two-weight estimates for dyadic operators in a nonhomogeneous setting. They review the prior known estimates for the maximal dyadic function, dyadic square function, martingale transform, and the dyadic paraproduct. They compare their results for the dyadic paraproduct to results of Holmes, Lacey, and Wick on a homogeneous setting where the two weights are assumed to be in the Muckenhoupt A_p class and the Bloom *BMO property* is necessary and sufficient for boundedness of the dyadic paraproduct and its adjoint. In this paper, the weights are not necessarily doubling, they satisfy a joint A_2 condition, and the dyadic square function is assumed to be two-weight bounded.

In the chapter "Potential Operators with Mixed Homogeneity," Calixto Calderón and Wilfredo Urbina present a *fitting tribute to Corita* (in the reviewer's words). In 1966 Cora Sadosky discussed a quasi-homogeneous version of Sobolev's immersion theorem. Later the first author and T. Kwembe proved a similar result for potential operators with kernels having mixed homogeneity very much in the spirit of Sadosky's result. The aim of this paper is to extend Calderón-Kwembe's theorem in two directions: first by establishing a corresponding result in terms of mixed norms in the Benedek-Panzone's sense and second by obtaining results for the case of unbounded characteristics.

In the chapter "Elementary Proofs of One-Weight Norm Inequalities for Fractional Integral Operators and Commutators," David Cruz-Uribe presents new proofs of some recent results concerning weighted inequalities for the fractional integral operator and its commutator with *BMO* functions. The author reduces the problem to obtaining estimates for a sparse fractional operator which majorizes the fractional integral operators. As pointed out by the author, the advantage of this approach is its simplicity: it avoids extrapolation, good-λ inequalities, and comparisons to the fractional maximal operator; however the proofs do not give sharp dependence on the $A_{p,q}$ characteristic of the weights; nevertheless this dependence is carefully tracked. This is a nice summary and introduction into the modern dyadic techniques in weighted inequalities. This chapter should be read in conjunction with the chapter about two-weight inequalities for fractional integral operators by Sawyer, Shen, and Uriarte-Tuero in this volume. Cruz-Uribe ends with a very touching personal story about Cora Sadosky.

In the chapter "Finding Cycles in Nonlinear Autonomous Discrete Dynamical Systems," Dmitriy Dmitrishin, Anna Khamitova, Alex Stokolos, and Michai Tohaneanu provide an exposition of their recent results concerning cycle localization and stabilization in nonlinear dynamical systems. Both the general theory and numerical applications to well-known dynamical systems are presented. Following on the footsteps of the pioneering work of Grebogi, Ott, Pyragas, York, et al., the authors consider associating to a given map f on $\mathbb{R}^n$ and for each N another map F_N on $(\mathbb{R}^n)^N$ that will stabilize certain unstable orbits common with the initial map f for appropriately chosen parameters. The authors show for a fixed N not all unstable orbits may be stabilized by the given control and indicate explicit bounds on the multiplier of a T-cycle of f that enable control of the above form to stabilize the orbit. This paper will be of primary interest to those with prior experience in dynamical systems; fortunately the authors provide a very suitable list of references for those who wish to study the prerequisites necessary for a good understanding of this paper. Alex Stokolos gave an invited talk on *Complex and Harmonic Analysis in Nonlinear Dynamics* during "An Afternoon in Honor of Cora Sadosky" held in Albuquerque, NM, in April 2014. Stokolos ends their article with a heartfelt remembrance of Cora Sadosky.

In the chapter "Smooth Analytic Functions and Model Subspaces," Konstantin Dyakonov surveys the canonical Riesz-Nevanlinna factorization in various classes of analytic functions on the disk that are smooth up to its boundary and model subspaces (i.e., invariant subspaces of the backward shift) in the Hardy spaces H^p and in *BMOA*. It is the interrelationship and a peculiar cross-fertilization between these two topics that the author wishes to highlight. This article deals with the canonical factorization in classes of "smooth" analytic functions on the unit disk on one hand and the so-called model subspaces on the other hand. The author gives a (almost) self-contained presentation (with proofs) of several deep and beautiful results which are related in a natural way to the theory of Hankel and Toeplitz operators, one of Cora Sadosky's favorite themes.

In the chapter "Rational Inner Functions on a Square-Matrix Polyball," Annatoli Grinshpam, Dmitry Kaliuzhnyi-Verbovetskyi, Victor Vinnikov, and Hugo Woerdeman establish among other results the existence of a finite-dimensional unitary realization for every matrix-valued rational inner function from the Schur-Agler class on a unit square-matrix polyball. It is well known that for polydisks, the Schur-Agler class and the Schur class only coincide in dimensions 1 and 2. Furthermore, in the other cases, though one might naively expect otherwise, not all rational inner functions are in the Schur-Agler class. As a consequence, it is of interest to characterize those which are. The authors describe those matrix-valued rational inner functions in the Schur-Agler class over square-matrix polyballs, which includes the polydisks. This is done in terms of the transfer function representation, which, as might be expected, coincides with the unitary colligation being finite dimensional. The last section of the paper attempts in the scalar case to more directly describe the polynomials appearing the Korányi and Vagi description when dealing with Schur-Agler class rational inner functions. This connects with much interesting recent work, including by the authors, on determinantal representations. Finally, a number of thought-provoking open questions are posed.

In the chapter "A Note on Local Hölder Continuity of Weighted Tauberian Functions," Paul Hagelstein and Ioanis Parissis discuss how Solyanik estimates may be used to establish local Hölder continuity estimates for the Tauberian functions associated to the Hardy-Littlewood and strong maximal operators in the context of Muckenhoupt weights. The Tauberian condition for the geometric maximal operators was introduced by A. Córdoba and R. Fefferman in 1977. In this nice and clearly written article, the authors introduce the Tauberian function as a weighted generalization of the halo function, which is a classical object in the theory of differentiation of integrals, and they establish belonging of the function to the local Hölder classes, with the Hölder exponent proportional to the reciprocal value of the A_∞ norm of the weight. The main tool used is Solyanik estimates – a series of results initiated by A. Solyanik in 1995 and developed further by the authors of the current article. In particular, they proved that Solyanik estimates imply the continuity of halo function for the most important case of density bases. The main result of the article provides the quantitative version of continuity of the Tauberian function for bases of all cubes and all rectangles with sides parallel to the coordinate axis. The novelty of the article is in the remarkable connection of the A_∞ norm of the weights with the smoothness of the Tauberian functions.

In the chapter "Three Observations on Commutators of Singular Integral Operators with *BMO* Functions," Carlos Pérez and Ismael Rivera present interesting observations concerning commutators of singular integral operators with *BMO* functions. Namely, they discuss sharpness of the sub-exponential local decay, sparse domination result for commutators, and the failure of an endpoint estimate motivated by the conjugation method. This paper is very useful not only for the researcher who is carefully studying the commutator but also for the beginners who want to be acquainted with the theory of commutators. Carlos Pérez gave an invited talk on *Optimality of Exponents and Yano's Condition in Weighted Estimates and Endpoint Estimates* during "An Afternoon in Honor of Cora Sadosky" held in Albuquerque, NM, in April 2014.

In the chapter "A Two-Weight Fractional Singular Integral Theorem with Side Conditions, Energy, and k-Energy Dispersed," Erik Sawyer, Chun-Yen Shen, and Ignacio Uriarte-Tuero present a follow-up to a paper of theirs, where the two-weight inequality for fractional singular integral operators is studied under the assumption that the pair of weights does not have common point masses. In this chapter, the authors allow for common point masses. Under appropriate Muckenhoupt (joint $\mathcal{A}_\alpha^2$ and punctured $\mathcal{A}_\alpha^2$ conditions) and α-quasi-energy side conditions, the authors show that a fractional singular integral operator, T_α, is bounded from one weighted space to another if certain quasicube testing conditions (involving a globally bi-Lipschitz map $\Omega : \mathbb{R}^n \to \mathbb{R}^n$) hold for T_α and its dual and if the quasiweak boundedness property holds for T_α. Conversely, if T_α is bounded, then the quasitesting conditions hold, and the quasiweak boundedness condition holds. It is unknown whether the quasi-energy conditions are necessary in higher dimensions in general. This is a highly technical paper and the authors do a very good job placing road maps and diagrams and sometimes iterating ideas so the reader does not get lost.

In the chapter "A Partition Function Connected with the Göllnitz-Gordon Identities," Nicolas A. Smoot presents a Rademacher-type formula for the partition of a positive integer into parts of special type, associated to the Göllnitz-Gordon identities. The subject of this paper constitutes a beautiful application of complex analysis to number theory. The proof of the main result follows in the spirit of the Rademacher approach and involves its basic components – generating functions, Rademacher contours, the Hardy-Ramanujan circle method, Bessel functions. The argument is quite involved but very well written and illustrated by nice sketches. The paper is almost self-contained and is accessible to nonexpert researchers and graduate students.

In the chapter "On Toeplitz Operators with Quasi-radial and Pseudo-homogeneous Symbols," Nikolai Vassilevskii explores a new wide class of symbols that generate commutative Banach algebras on each weighted Bergman space on the unit ball in $\mathbb{C}^n$. These symbols are a natural extension of the previously studied quasi-radial quasi-homogeneous symbols and contain them as a very special particular case. The commutative C^*-algebras of Toeplitz operators on Bergman spaces of the unit ball $\mathbb{B}^n$ of $\mathbb{C}^n$ are fairly well understood nowadays. Some examples of commutative Banach (not C^*) algebras of such operators are known. The current paper exhibits a new wide class of functions that generate such algebras on each of the standard weighted Bergman spaces on $\mathbb{B}^n$. The results are of interest and contribute toward the (as yet fairly incomplete) understanding of the commutative subalgebras of Toeplitz operators on the ball in $\mathbb{C}^n$, in dimension larger than one.

In the chapter "A Bump Theorem for Weighted Embedding and Maximal Operator: The Bellman Function Approach," Sasha Volberg gives a simple Bellman function proof of Carlos Pérez's "bump theorem" for the two-weight estimates of maximal operators. The author shows how the Bellman function method proves a certain "discrete" inequality (i.e., a bound on discrete operator), which, in its turn, implies a bound of a certain continuous operator. The main difference from a, by now, classical procedure is that here one needs a Bellman "functional." Since the operator under consideration (maximal function) is, in some sense, easy, the paper is intended to give a clear and not very technical presentation of the method.

In the chapter "The Necessity of A_∞ for Translation and Scale Invariant Almost-Orthogonality," Mike Wilson continues his study of general wavelet systems in the context of weights. For a weight μ in the Muckenhoupt class A_∞, the author has shown previously that for sufficiently nice mother wavelets and arbitrary T-systems, the resulting system is almost orthogonal in $L^2(\mu)$. This paper concerns the converse result. In the reviewer's own words: *The current version of the converse seems now fully satisfactory. It has the nice feature then that if you can obtain the almost orthogonality in $L^2(d\mu)$ for one choice of a wavelet meeting the minimum requirements and all T-systems, then one can conclude that $\mu \in A_\infty$, and then that one has the almost orthogonality in $L^2(\mu)$ for all reasonable wavelets systems and all T-systems, by the other direction of the theorem. This "prove it for one, get it for all" feature, although not uncommon in this general area, is quite pleasing.*

Alex Stokolos, Sergei Treil, and Carlos Pérez were invited speakers to "An Afternoon in Honor of Cora Sadosky." Beznosova, Cruz-Uribe, and Pereyra and Stokolos and Urbina were co-organizers of AMS Special Sessions on "Weighted Norm Inequalities and Related Topics" and on "Harmonic Analysis and Operator Theory (In Memory of Cora Sadosky)," respectively, on April 5–6, 2014, held in Albuquerque, NM. Michael Lacey, Oleksandra Beznosova, Daewon Chung, Jean Moraes, Paul Hagelstein, Dmitry S. Kaliuzhnyi-Verbovetskyi, Constance Liaw, Nikolai Vassilevskii, and Mike Wilson gave talks in the AMS meeting in Albuquerque in April and honored there as they are doing here the life and work of Cora Sadosky. Vinnikov is Cora Sadosky's coauthor; in fact they were both co-authors of the abstract for the AMS talk delivered by Kaliuzhnyi-Verbovetskyi. Other authors could not make it to the conference but were more than happy to contribute to this volume.

Acknowledgments

These volumes would not have been possible without the contributions from all the authors. We are grateful for the time and care you placed into crafting your manuscripts. Thank you!

All the articles were peer reviewed, and we are indebted to our dedicated referees, who timely and often enthusiastically pitched in to help make these volumes a reality. We used your well-placed comments and words to describe in the preface the articles in these volumes. Thank you!

We would like to thank Cora Sol Goldstein, Cora's daughter, who blessed the project and gave us a selection of beautiful photos for us to choose and use. When she first heard about the volumes, she said, *"My father would had been so happy to know about these books."*

Andrea Nahmod spotted a photo with Cora at the Mathematical Sciences Research Institute (MSRI) at Berkeley, CA, and facilitated communication with Hélène Barcelo (MSRI deputy director), Christine Marshall (MSRI program manager), and David Eisenbud (MSRI director), who kindly gave us permission and sent us a high-resolution copy of the photo which is in display at MSRI that we are reproducing in this second volume. Margaret Randall, writer and longtime friend of Corita and her parents, shared her memories and provided the opening photo for both volumes after a serendipitous encounter in Albuquerque. Thank you!

Our editor at Springer, Jay Popham, was very accommodating and patient, so was editor Marc Strauss who came on board later as the editor of the AWM-Springer Series.

We thank Kristin Lauter, AWM president, for embracing this project and the AWM staff for helping us in the final laps, in particular Anne Leggett Macdonald, AWM Newsletter editor, who provided guidance and moral support.

We cannot help but to think that Cora's spirit was around helping us finish this project. Cora's legacy is strong and will continue inspiring many more mathematicians!

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