Date Revised: 01/08/2021

WAYNE STATE UNIVERSITY

Professional Record

DANIEL S. DRUCKER

Department of Mathematics
College of Liberal Arts and Sciences

Areas of Research: Lie theory, Differential Geometry, and Applied Linear Algebra

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Telephone No.:	(313) 577-2499	**Telephone No.**	(248) 424-8122

PRESENT RANK & DATE OF RANK: Professor, August 1992
Assoc. Chair, August 2017

WSU APPOINTMENT HISTORY

Year Appointed/Rank:	1975 / Assistant Professor
Year Awarded Tenure:	1980
Year Promoted to Associate Professor:	1980
Year Promoted to Full Professor:	1992
Year Appointed Associate Chair:	2017
Sabbatical Leaves:	Fall 1983, Winter 1992, Winter 2003, Winter 2008

CITIZEN OF: U.S.A.

EDUCATION

Baccalaureate:	S.B.	Massachusetts Institute of Technology	1967
Master's:	M.A.	University of California at Berkeley	1973
Doctoral:	Ph.D.	University of California at Berkeley	1973

FACULTY APPOINTMENTS AT OTHER INSTITUTIONS

Assistant Professor, University of Washington, 1973–75

PROFESSIONAL SOCIETY MEMBERSHIPS

American Mathematical Society
Mathematical Association of America
Michigan section of Mathematical Association of America

HONORS/AWARDS

Woodrow Wilson Fellow, 1967
Nominated for President's Award for Excellence in Teaching, WSU, 1981–82
President's Award for Excellence in Teaching, WSU, April 22, 1987
College of Science Teaching Award, September 11, 2003
Nominated for President's Award for Excellence in Teaching, WSU, 2010–11
Membership in national honor societies: Sigma Xi

Signed _____ January 8, 2021

I. TEACHING

A. Years at Wayne State

Assistant Professor, August 1975 – July 1980
Associate Professor, August 1980 – July 1992
Professor, August 1992 – present

B. Years at Other Colleges/Universities

Assistant Professor, University of Washington, Seattle, August 1973 – July 1975

C. Courses Taught at Wayne State in Last Five Years

Undergraduate

SEMESTER	COURSE	SECTION	CRN	COURSE TITLE
Fall 2015	MAT 2020	003	15071	Calculus II
Fall 2015	MAT 2030	001	15069	Calculus III
Wint 2016	MAT 2010	008	20242	Calculus I
Fall 2016	MAT 2150	001	14134	Differential Equations and Matrix Algebra
Wint 2017	MAT 2150	001	25121	Differential Equations and Matrix Algebra

Graduate

SEMESTER	COURSE	SECTION	CRN	COURSE TITLE
Wint 2016	MAT 5410	001	26284	Applied Linear Algebra
Wint 2017	MAT 5410	001	26284	Applied Linear Algebra
Fall 2017	MAT 5400	001	15139	Elementary Theory of Numbers
Wint 2018	MAT 5410	001	23775	Applied Linear Algebra
Fall 2018	MAT 5400	001	15139	Elementary Theory of Numbers
Wint 2019	MAT 5410	001	23775	Applied Linear Algebra
Fall 2019	MAT 5530	001	18824	Elementary Differential Geometry and its Applications
Wint 2020	MAT 5410	001	23775	Applied Linear Algebra
Fall 2020	MAT 5400	001	13433	Elementary Theory of Numbers

D. Directed Studies/Essays/Theses – Director, Committee Member, or Reviewer

Directed Studies for Advanced Undergraduates

Michael Meisner, advanced linear algebra, Summer 1982
Victoria Alsobrooks, number theory, Winter 1985
Erik Torres-Bergman, differential geometry/computer graphics, Fall 1996 – Fall 1997
Barbara House, advanced linear algebra, Spring/Summer & Fall 1997 19xx
Nadine Crédi, advanced number theory, Fall 2002
Jolene Stewart, non-Euclidean geometry, Fall 2004
Charalambos Michael Koupparis, differential geometry of curves and surfaces with Mathematica, Winter & Spring/Summer 2007
Sarah Snyder, advanced linear algebra, Spring/Summer 2007
Luis Sordo Vieira, differential geometry of curves and surfaces, Fall 2011
Robert Morgan, Honors directed study, differential geometry of curves and surfaces, Winter 2017

Master's Essays Directed

Bi-Hua Li, *Gram-Schmidt Methods and Least Square Problems*, Fall 1985
Paul Bedard, *Generation of Pythagorean Triples*, Fall 1994 – Winter 1995
Robert Eckert, investigation of distribution of twin primes, Sophie Germain prime pairs, and related sets of primes, including an attempt to prove the infinitude of such sets of primes, Fall 1996, on hold during Ph.D. work, never completed
Eric Torres-Bergman, *Visualization of Functions of a Complex Variable*, Fall 1996 – Fall 1997
Elaine Lande, *An Exploration of Julia Sets and Their Properties*, Fall 2006 – Winter 2007
Sarah Bratek, *Counting Chords: An Application of Mathematics to Music*, Winter 2009 – Summer 2009

Lawrence E. Choraszewski, *theory of Elliptic Curves and Applications in Cryptography*, Summer 2009 – Fall 2009

Karolin Hakim, *Lattice Status (on lattice-based cryptography)*, Winter 2009 – Winter 2010

Master's Committee Membership

Master of Science thesis review committee for Christopher P. Griffin, Mechanical Engineering, Fall 1990 – Winter 1993

Master of Arts examination committee for Dennis Connolly, Mathematics, Winter 1994

Master of Arts examination committee for Bob Mariotti, Mathematics, Winter 1994

Chair of Master of Arts examination committee for Kirsten Henderson, Mathematics, Fall 1995

Ph.D. Examination Committees (Mathematics)

Member of Geometry-Topology Qualifying Exam Committee (with D. Handel), Winter 1982.

Member of Algebra Prelim Committee (with M. Konvisser), Mathematics, Winter 1984.

Member of Algebra Prelim Committee (with D. Handel), Mathematics, Fall 1986.

Member of Algebra Prelim Committee (with L. Makar-Limanov), Mathematics, Winter 1991.

Member of Algebra Prelim Committee (with D. Gluck), Mathematics, Winter 1993.

Chair of Algebra Prelim Committee (with D. Jonah), Mathematics, Winter 1996.

Ph.D. Committee Membership in Other Departments

Tahsin Hidayetoglu, Mechanical Engineering. Oral exam, Feb. 12, 1988.

Shyr-Hwa Jaw, Mechanical Engineering. Oral exam, Oct. 21, 1988.

Kurt Gillis, Economics, 1986 – 1989, *A Comparison of Alternate Functional Forms for Dichotomous Dependent Variable Models*. Thesis defense, Dec. 8, 1989.

Joong-Sub Han, Mechanical Engineering, *Characteristics of Advanced Diesel Fuel Injection Systems and Their High-Pressure Diesel Sprays*. Unsuccessful thesis defense, Feb. 13, 2003. Successful thesis defense, Oct. 10, 2003.

Jordan Sinclair, Biology, *Dioecious Plants: Evolution and Sex Ratio and Aspen Decline*. Prospectus presentation, Dec. 22, 2009. Progress reports to committee, Nov. 23, 2010 and Dec. 15, 2011. Thesis defense, Oct. 31, 2012. I worked extensively with Jordan on editing her drafts, articles, and thesis and had numerous discussions with her about the mathematics in her thesis work, even meeting with her on Nov. 6 and Nov. 12, 2013, after her thesis defense.

Essays/Theses Reviewed

At the request of the students and/or their advisers, I have critically read and proofread the following essays and theses, usually attending the oral presentations as well:

Joel David Katz, Master's Essay, Winter 1983
An APL Implementation of the Householder Algorithm for the Q-R Factorization of a Matrix

Yi Hong, Ph.D. Thesis, Winter 1984
On Helical Submanifolds in Euclidean Space

Xu Ming Chen, Master's Thesis, Winter 1984
A Generational Property of Some Alternating Groups

Qaiser Imam, Master's Essay, Summer 1984
Summary and Discussion of Well-Known Facts About the Moebius Function, Its Inversion, and Its Applications

Stewart Bronstein, Master's Essay, Fall 1984
Set Theory

Maurice Lou, Master's Essay, Fall 1984
Dynamics of Volleyball Flight

Shida Chen, Master's Essay, Fall 1984 and Winter 1985
Some Basic Theorems About Minimal Surfaces in E^n

Tao Hong, Master's Essay, Winter 1985
Linear Programming: Ellipsoid Algorithms and Linear Time Algorithms

Hongjian Lai, Master's Thesis, Winter 1985
Unique Graph Homomorphisms Onto Odd Cycles

Trudy Weber, Master's Thesis, Winter 1985
Optimal Control in an Automotive Application
Wen-Jun Wu, Master's Essay, Winter 1985
Graphs on Surfaces
Mi Kyung Joo, Master's Thesis, Fall 1989
Egyptian Fractions and Conjugate Near Perfect Numbers, with a Topological Application
Christopher P. Griffin, Master's Thesis (Mechanical Engineering), Winter 1993
Mass Invariant Structural TransformationFoundations for an Algorithmic Approach

E. Course and Curriculum Development

Revised and supervised Basic Sequence (now MAT 2010, 2020, 2030, 2040), 1977–1980.
Revised MAT 180, 1979–1980.
Helped revise second year of Basic Sequence (MAT 203, 204), 1981–1982.
Proposed, developed, and taught sequence in Differential Geometry (MAT 0641 and 0642, now MAT 553 and 653), 1976–1977.
Proposed, developed, and taught Riemannian Geometry (MAT 0770, now MAT 753), 1979–1980.
Proposed, developed, and taught Applied Linear Algebra (MAT 541), 1983–1984. Taught it again in Winter 1986, Fall 1986, Winter 1994, Winter 1996, Fall 1997, Winter 2000, Winter 2002, and Winter 2004.
Proposed Special Topics in Mathematics course (MAT 589), 1984–1985. Taught first version (Applications of Number Theory), Winter 1986. Taught second version (Introduction to Applied Mathematics), Winter 1987.
Developed and taught new version of Topics in Applied Mathematics (MAT 727) to be used as continuation of Introduction to Applied Mathematics (MAT 589), Fall 1987.
Class-tested new calculus text (under development) with honors calculus classes (special sections of MAT 201 in Fall 1988, MAT 202 in Winter 1989, and MAT 203 in Fall 1989).
Proposed major changes in curriculum and administration of MAT 098 and MAT 095, Winter 1990. First changes implemented and more changes proposed, Winter 1991. Course materials for MAT 095 revised, Summer 1991.
Developed curriculum and syllabi for MAT 093 and new version of MAT 095, Fall 1991 – Summer 1992.
Reviewed Mathematical MacTutor, a large-scale software package for enhancing the undergraduate teaching of mathematics, Summer and Fall 1992.
Reviewed and compared the HP-48 and TI-85 calculators for possible use in undergraduate mathematics, science, and engineering courses at Wayne State University, 1992–1993.
Planned and designed calculator-enhanced calculus courses to be offered starting in Fall 1994. Revised syllabi each semester. Maintained list of errata and proposed changes for text.
Developed handouts and software (nine handouts and over two dozen programs) for use in calculator-enhanced calculus courses while coordinating and teaching them, 1994–1995.
Developed additional software for use in calculator-enhanced calculus courses while coordinating them, teaching them, and acting as calculator adviser for both faculty and students, 1995–1996.
Continued to enhance and expand calculator software while updating the handouts, 1996–1997. Meanwhile the calculator-enhanced calculus sequence evolved into a new calculator-based sequence for *all* calculus students with a new book (between our previous standard and reform texts in outlook).
Taught four graduate courses in 1997–1998, three of them using the departmental computer lab in State Hall. Three of the courses were brand new, using new texts and different approaches to the material. Those courses required substantial curriculum development:

MAT 541 (Applied Linear Algebra): I created this course and taught it five times previously. For the first time, I introduced the use of mathematical software (MATLAB) to (1) enable students to explore numerous examples that illustrate the theory and (2) remove the computational drudgery and the need for artificially simplified data in applications-oriented projects.

MAT 510 (Numerical Methods): I chose a new text on scientific computation. For the first time, the course utilized a matrix-vector approach and all students used MATLAB software.

MAT 5530 (Elementary Differential Geometry and Its Applications): I used a new applications-oriented text by John Oprea and, for the first time, introduced the use of computer software (MAPLE) to aid in the visualization and detailed study of curves and surfaces.

MAT 6140 (Topics in Mathematics for High School Teachers): I took an analytic, rather than a synthetic, approach to non-Euclidean geometries. The new text by Michael Henle is based on calculations with complex numbers and quaternions rather than on axioms, and it emphasizes the role of geometric transformations (Klein's Erlanger Programm) in providing a unified vision of geometry. The goal of the new approach is to minimize the trauma and maximize the intuitive content of this important course for high school teachers.

Taught MAT 6500 (Topology I) for the first time in Fall 1998. Combined material from several sources and created 51 pages of single-spaced notes that expand on and clarify the course content as it is presented in the text by Munkres. Also wrote up detailed solutions to many of the exercises.

Created and taught HON 4280 (General Honors Seminar: Explorations in Mathematics) in Fall 2003 at the invitation of Jerry Herron, Director of the Honors Program. This was a challenging task because these seminars are not allowed to have any mathematical prerequisites. I am the first WSU instructor to have taught a junior/senior mathematics seminar for honors students.

I prepared to teach four graduate courses in academic year 2006–2007, including a new special topics course to serve as an introduction to differential geometry and Riemannian geometry, a full year of number theory consisting of a basic course and a topics course, and applied linear algebra. The differential geometry course did not run due to low enrollment.

Prepared an advanced topics course on Lie algebras and representation theory for Winter 2009.

Prepared a basic course and a topics course on number theory for 2009–2010.

Prepared new version of MAT 5530 for Fall 2011 based on a new text by Thomas Banchoff and Stephen Lovett. Prepared extensive errata list and typeset solutions to many of the challenging exercises.

In February – March 2014, I was one of ten mathematicians who reviewed and rated numerous linear algebra materials (books, articles, notes, videos, applets, etc.) for the MAA. These materials, some of which were my own submissions, formed the MAA's Course Community in Linear Algebra. The Course Community materials are freely available online at
`www.maa.org > Programs > Faculty and Departments > Course Communities > Linear Algebra`.

Starting in April 2014, I prepared a history-based version of MAT 5400 for Fall 2014 based on a new text by John J. Watkins. I wrote extensive lecture notes for the course. (See **Course Materials (Unpublished)** below.)

F. Course Materials (Unpublished)

CALCULATORS

Introduction to the HP 48G/GX, 8 pages typeset, 1/95. Expanded 8/95. Revised 1/02.

Introduction to the TI-85, 5 pages typeset, 9/95. Revised 1/04.

Introduction to the TI-86, 5 pages typeset, 1/04.

Comparison of TI-85 and HP 48G/GX Calculators, 2 pages typeset, small print, 7/94. Revised 1/95 and 8/95.

Calculator References, 2 pages typeset, 9/94. Revised 1/95 and 1/96.

Utility Program: FIXVU, graphing utility in HP 48G/GX and TI-85 versions, 2 pages typeset, 9/94. Revised 1/96 and 3/04.

Function Table Program: TBL, program for tabulating functions and investigating limits, HP 48G/GX and TI-85 versions, 3 pages typeset, 9/94. Revised 1/96 and 3/04.

Some HP 48G/GX Programs, descriptions and instructions for 29 programs, 11 pages typeset. Written 1/96. Revised and expanded 8/97 and 1/02.

Some TI-85/86 Programs, descriptions and instructions for 25 programs, 11 pages typeset, 3/04.

The TI-86: How It Compares With the TI-85, 3 pages typeset, 8/97.

CALCULUS

Notes on Curves: discussion of space curves, including tangential and normal components of acceleration, curvature, torsion, and the Frenet-Serret equations, with special treatment of planar curves, including polar graphs and graphs of the form $y = f(x)$ or $x = g(y)$, 2 pages typeset, small print, 2/97. Expanded 2/01. Revised 9/10.

Parabolic coordinates project with solutions, 2 pages typeset, 11/15.

Solving Problems About Lines and Planes, 8 pages typeset, 2/12, expanded 4/13.

Space curves project, with solutions, 4 pages typeset, 11/15.

Tips on Teaching Calculus with Calculators, 5 pages typeset, 9/95. Expanded 1/96. Revised and expanded 1/01.

Transformations of Graphs, 2 pages typeset, 1/10. Expanded 1/11.

DIFFERENTIAL GEOMETRY

Annotated List of Books on Elementary Differential Geometry, HTML document, 1/98. Updated and expanded 9/00, 10/03, 10/05, 8/07, 12/08, 8/10, and 6/19.

Differential Geometry of Curves and Surfaces, 52 pages single-spaced, 1976–1977; revised and expanded in 1982.

Foundations of Differential Geometry, 211 pages single-spaced, used as text at University of Washington, Seattle, written 1974–75.

Frenet formulas: kinematic interpretation, 1 page typeset, 9/05. Revised 9/10.

Frenet formulas in $\mathbb{R}^n$, 1 page typeset, 12/03.

Grad, curl, div, and Laplacian in terms of differential forms, 4 pages typeset, 9/03.

Klein bottle, online references, text and web page, 10/11.

Involutes and evolutes, 3 pages typeset, 11/05.

Signed curvature, 2 pages typeset, 9/05.

Solutions to exercises in Banchoff and Lovett, *Differential Geometry of Curves and Surfaces*, 41 typeset pages, 12/11.

LIE THEORY

Books on Lie Theory, 4 pages, typeset, 2/09.

LINEAR ALGEBRA

Annotated bibliography of linear algebra books, 6 pages typeset, small print, 5/04, updated and expanded 3/07, 2/12, and 2/16

Anticommutativity of 2×2 matrices, 2 pages typeset, 1/94, expanded 4/18.

Bases for four fundamental subspaces, 1 page typeset, 2/17.

Bases of sums and intersections of subspaces, 2 pages typeset, 2/12, expanded 4/15.

Change of basis (for vectors and linear transformations), 5 pages typeset, original version 3/02; revised 5/04 and 4/06; expanded 4/07.

Computer graphics project with solutions, 14 pages typeset with illustrations, original version 10/93; revised and expanded, 1/04, 4/06, 4/07, and 4/13. Minor revision, 3/18.

Classification of quadratic curves, 12 pages typeset, 5/19.

Curve fitting in Hilbert space, with solutions, 4 pages typeset, 3/04, expanded 4/18.

Exploration of special matrices, 4 pages typeset, small print, 5/02.

Exponential of a matrix, 1 page typeset, 1/09.

Food costs project with solutions, 2 pages typeset, 1/19.

Four fundamental subspaces, 7 pages typeset, 2/06; expanded 2/07, revised 2/12 and 2/19.

Graphs and Networks, 3 pages, small print, describes the four fundamental subspaces associated to incidence matrices, with applications to electrical circuits, 2/94 and 2/02.

Hermitian, skew-hermitian, unitary, and normal matrices, 5 pages typeset, original version 4/02; revised and expanded 4/06; revised 4/07; expanded 4/13; minor corrections, 4/15.

Ice cream (an application of systems of equations), 3 pages typeset, 1/02.

Laspeyres index; magazine subscriptions, 3 pages typeset, small print, 2/02.

Left and right inverses, 2 pages typeset, small print, 3/02; revised 4/06 and 3/15.

Leslie model of population growth, 3 pages typeset, 4/00, revised 4/06, 4/12, and 5/16.

Matrices and digraphs, 4 pages typeset with illustrations, original version 3/02, revised 4/06, 3/07, 4/09, and 2/12.
Missile tracking project with solutions, 4 pages typeset, 4/20.
Modified QR factorization, 4 pages typeset, original version 4/02, expanded to include complex matrices, 2/06, revised 4/09.
Nondegenerate bilinear forms, 4 pages typeset, 2/09.
Oxidation-reduction equations, 5 pages typeset, 2/02. Bonus problem on balancing chemical equations, 2 pages typeset, 5/18.
Oxidation-reduction equations II, 2 pages typeset, 2/02.
Positive definite and positive semidefinite matrices, 2 pages typeset, original version 4/02, corrected and expanded 3/06, 4/07, 4/09, 4/12, and 3/15.
Problem linking determinants and difference equations, 1 page typeset, 4/17.
Projections in real inner product spaces, 4 pages typeset, 2/06, expanded 2/07, revised 2/13, additions 2/17 and 2/18.
The pseudoinverse, 4 pages typeset, original version 4/06, revised and expanded 4/09, major revision 4/13, correction 4/16.
Quadric curves, scanned notes, 1 page handwritten, 5/17.
Quadrics in $\mathbb{R}^n$, 3 pages typeset, 5/19.
Sign of a permutation, 3 pages typeset, 2/06, minor revision 2/12.
Similarity preserves eigenvalues but not singular values, 1 page typeset, 2/17.
Simultaneous diagonalization, 2 pages typeset, 4/13.
The singular value decomposition, 2 pages typeset, 4/06, revised 4/09, 4/12, 4/13, 4/16, and 4/18.
Tape counter and playing time project with solutions in MATLAB and Maple, 4 pages typeset, original version 3/02, major revision and expansion 2/13.
Traffic flow project with solutions, 4 pages typeset, 1/19.
Voltage and Current Sources, 1 page, small print, 3/87 and 2/02.
Volume of an n-box in $\mathbb{R}^m$, 1 page typeset, small print, 3/00.

MODERN (ABSTRACT) ALGEBRA

Linear Algebra, Groups, Rings, and Fields, 118 pages single-spaced, 198182.
Basic Facts About Sets and Functions, 1 page typeset, 9/98

NUMBER THEORY

Annotated bibliography of number theory books, 9 pages typeset, small print. First version, 9/96. Updated and expanded 9/99, 10/01, 11/02, 2/03, 11/04, 12/06, 2/07, 8/07, 12/08, 8/10, 11/13, 8/14, 8/16, and 8/20.
Applications of Number Theory, 53 pages single-spaced, 1986.
Decimal expansions, 2 pages typeset, small print, 12/02.
Divisibility in base b, 4 pages typeset, original version 1/07, revised and expanded, 11/13.
Divisibility tests, 2 pages typeset, small print, 11/00.
Family of positional numbering systems (with Michael Bell), 3 pages typeset, 4/10.
Fermat's Factorization Method, 1 page typeset, 9/99. Explains how to implement method more efficiently than as described in textbooks. Revised 1/10. Improved method, 12/16.
Induction from well ordering, 2 pages typeset, 9/09.
Jacobi symbols, 1 page, small print, 4/79 and 12/01.
Keith Curley's proposition (on Fibonacci numbers), 1 page typeset, 10/96.
Lecture notes on number theory from an historical point of view, 84 pages typeset, 12/14, important additions 12/15, 11/17, 12/17, 10/18, and 12/18.
Magic squares, 4 pages, small print, 4/79 and 12/01.
Order of an Integer, Primitive Roots; Indices, 7 pages typeset, small print, 12/00, revised 11/07, 11/08, and 12/09. Revised and expanded 12/10 and 11/13. Corrections, 11/16.
Pell's equation, 1 page typeset, small print, 10/04, minor corrections 3/10.
Primitive Pythagorean triples in lexicographic order, 4 pages, 10/14.
Pythagorean triangles with sides less than 100, 2 pages, 9/14.
Pythagorean triples, 4 pages typeset, 12/17.

Problems on Fibonacci numbers with solutions, 10 pages typeset, small print, 10/99 and 12/02. Practically a whole course on Fibonacci numbers in one problem set.
Quadratic congruences, 6 pages typeset, 11/07. Details of complete solution of all quadratic congruences with arbitrary moduli. Revised 11/10.
Quadratic reciprocity, 1 page typeset, small print, 11/02. Revised 11/10.
Solutions to exercises in Stillwell, *Elements of Number Theory*, 24 typeset pages, 12/04.
Strong divisibility tests for 6, 12, 15, 18, and 36; 2 pages typeset; 11/17.
Sums of four squares, 1 page, small print, 10/04.
Well ordering and induction, 3 pages typeset, 11/17.

STATISTICS

Annotated list of sources for statistical software, videos, applets, etc., 1 page typeset, 9/09.
Some statistical vocabulary, 2 pages typeset, 9/09.

TOPOLOGY

Notes on General Topology, 51 pages single-spaced, 12/98.
Notes on Zorn's lemma, 2 pages typeset in small print, 12/98.

II. Research

Current Topics of Interest

Differential geometry of curves and surfaces, including curves resulting from reflection/refraction of light by surfaces onto a collection plane
Detailed classification of quadratic curves and surfaces; distinguishing degenerate from nondegenerate cases
Applications of number theory and algebra to geometry, including:
Generation of Pythagorean triples
Norms of solutions of linear Diophantine equations

A. Research in Progress, Not Funded:

A deeper look at the classification of quadratic curves
Morphs of polygons (with Tom Zerger)
Formation of generalized conchoids by reflection and refraction of light from a surface of revolution (with Frank Szmulowicz)
Smallest solutions of linear Diophantine equations
Reconstruction of loan and mortgage parameters from minimal data
Slide rule algebra
Spherical conics

III. Publications

NOTE: It is standard practice in mathematics to list as authors only those whose research contributions to a paper are significant. Minor contributors receive acknowledgments, but are not listed as authors. Therefore the order, usually alphabetical, in which the authors are listed should not be interpreted as meaning that any author's contribution was insignificant.

A. Scholarly Books Published

1. Exceptional Lie algebras and the structure of hermitian symmetric spaces, *Memoirs of the AMS* #208, **16** (1978), 211 pages.

D. Journal Articles Published

Refereed Journals

2. Orbit structure of the exceptional hermitian symmetric spaces I, *Bull. AMS* **80** (1974), 285–289.
3. Orbit structure of the exceptional hermitian symmetric spaces II, *Bull. AMS* **80** (1974), 1225–1229.
4. Une description explicite des orbites dans les espaces hermitiens symétriques irréductibles compacts exceptionnels, *C. R. Acad. Sci. Paris*, Ser. A, **287** (1978), 495–496.

5. Triple Jeopardy, *Mathematics Magazine* **52** (1979), 59. (Published letter containing comments on the paper "Tabulating All Pythagorean Triples" by H. Klostergaard in *Mathematics Magazine* **51** (1978), 226–227, together with improvements of the estimates in the paper.)
6. (with David M. Goldschmidt) Graphical evaluation of sparse determinants, *Proc. AMS* **77** (1979), 35–39.
7. A second look at Descartes' rule of signs, *Math. Mag.* **52** (1979), 237–238.
8. Simplified descriptions of the exceptional bounded symmetric domains, *Geometriae Dedicata* **10** (1981), 1–29.
9. (with Lawrence Brenton and Geert C. E. Prins) Graph theoretic techniques in algebraic geometry II: Construction of singular complex surfaces of the rational cohomology type of $\mathbb{C}P^2$, *Comment. Math. Helvetici* **56** (1981), 39–58.
10. (with Daniel Frohardt) Irreducible root systems and finite linear groups of degree two, *Bull. London Math. Soc.* **14** (1982), 142–148.
11. (with Gary R. Greenfield) On the discriminant of a trinomial, *Linear Algebra and its Applications* **62** (1984), 105–112.
12. (with David Bindschadler and Lawrence Brenton) Rational mappings of Del Pezzo surfaces, and singular compactifications of two-dimensional affine varieties, *Tôhoku Math. J.* **36**, 4 (1984), 591–609.
13. (with Daniel Frohardt) A Euclidean interpretation of Dynkin diagrams and its relation to root systems, *Geometriae Dedicata* **22** (1987), 77–85.
14. (with Maurice Lou, Semyung Wang, and Kenneth A. Kline), A comparison of mode-acceleration and Ritz vector reduced basis procedures in transient analysis, *SAE Transactions* (1988), Section 5, #880908 (P-210).
15. (with Lawrence Brenton) Perfect graphs and complex surface singularities with perfect local fundamental group, *Tôhoku Math. J.* **41** (1989), 507–525.
16. Euclidean hypersurfaces with reflection properties, *Geometriae Dedicata* **33** (1990), 325–329.
17. Reflective Euclidean hypersurfaces, *Geometriae Dedicata* **39** (1991), 361–362.
18. Reflection Properties of Curves and Surfaces, *Math. Mag.* **65** (1992), 147–157. (This was the featured article for the June issue.)
19. A Mathematical Roller Derby, *The Coll. Math. J.* **23** (1992), 396–401. (This article constitutes research in the field of mathematics education.)
20. (with Lawrence Brenton) On the number of solutions of $\sum_{j=1}^{s}(1/x_j) + \cdots + 1/(x_1 \cdots x_s) = 1$, *Journal of Number Theory* **44** (1993), 25–29.
21. (with Phil Locke) A Natural Classification of Curves and Surfaces With Reflection Properties, *Math. Mag.* **69** (1996), 249–256.
22. (with Stephen A. Williams), When Does Water Find the Shortest Path Downhill? The Geometry of Steepest Descent Curves, *Amer. Math. Monthly* **110** (2003), 869–885. (This was the lead article in the December 2003 issue.)
23. (with Stephen A. Williams), A note on Aronsson's equation $(f_x)^2 f_{xx} + 2f_x f_y f_{xy} + (f_y)^2 f_{yy} = 0$, *Rocky Mountain Journal of Mathematics* **39** (6) (2009), 1859–1867.
24. (with John Cuzzocrea, Shlomo S. Sawilowsky, and Claude Schochet), Jacques Salomon Hadamard and the use of symbols in teaching differential calculus, *J. Modern Appl. Stat. Methods* **7** (1) (2008), 358–367. [The date is misleading; it reflects the fact that the editor was behind in issuing volumes of the journal. The article was completed in October 2009. I believe it actually appeared in print in May 2010.] This paper was featured as Digital Commons Paper of the Day on February 26, 2016.
25. A comprehensive Pythagorean theorem for all dimensions, *Amer. Math. Monthly* **122** (2015), 164–168. [ABSTRACT. We use a 200-year-old theorem on determinants to prove a very general version of the Pythagorean theorem. It states that a particular multiple of the square of the n-dimensional volume of an n-parallelotope in $\mathbb{R}^m$ equals the sum of the squares of the n-dimensional volumes of the orthogonal projections of the parallelotope onto the k-dimensional coordinate subspaces of $\mathbb{R}^m$.]

Research by other authors to which I made an acknowledged contribution

- Joseph A. Wolf, Classification and Fourier inversion for parabolic subgroups with square integrable nilradical, *Memoirs of the AMS* #225, 1979.
- Kenneth A. Kline, Dynamic analysis using a reduced basis of exact nodes and Ritz vectors, *AIAA Journal* **24** (1986), 2022–2029.
- Lawrence Brenton and Richard Hill, On the Diophantine equation $1 = \sum 1/n_i + 1/\prod n_i$ and a class of homologically trivial complex surface singularities, *Pacific J. Math.* **133** (1988), 41–67.

Nonrefereed Journals

The following articles, which included TI-59 calculator programs, appeared in PPX-59 (Texas Instruments professional Program Exchange) during 1979–1982:

- Prime Factors of an Integer
- Fractions, Continued Fractions, and Diophantine Equations
- Mantissas and Exponents
- Precise DMS Operations
- Test Averages by Section

D_2. Journal Articles Submitted

- (with Fat C. Lam) Leg-slope generation of Pythagorean triples, submitted to *American Mathematical Monthly* in February 2007 and to *Mathematics Magazine* in April 2008. Revisions were requested, but doubts were expressed as to whether another article on Pythagorean triples, even a well-written one, would be accepted.
- Some questions of interest, submitted to *The College Mathematics Journal*, May 2009. This article derives recursive formulas that enable the interest, principal, and balance on a mortgage or loan to be calculated independently of one another and shows that two successive principal amounts, two successive interest amounts, or three successive principal balances are sufficient to determine all future interest amounts, principal amounts, and principal balances. Despite the fact that these results don't seem to have appeared in print before, the editor suggested that such problems be solved by playing with parameters in a spreadsheet. I continue to find the results in this paper useful, but I have set it aside with the intention of resubmitting it some time in the future.
- Generation of Ritz Vectors by Taylor Series, submitted to *Numerische Mathematik*, October 1990. Due to the lack of time and suitable software to analyze high-dimensional examples as the referee requested, I have set this paper aside.

E. Papers Published in Conference Proceedings

NOTE: In mathematics, papers published in refereed conference proceedings must meet the same standards as papers published in refereed journals. The main difference is that such papers tend to appear with other papers in the same narrow subject area.

Refereed Papers

26. (with Lawrence Brenton and Geert C. E. Prins) Graph theoretic techniques in algebraic geometry I. The extended Dynkin diagram and minimal singular compactifications of $\mathbb{C}^2$, Proc. Conf. on Several Complex Variables, Princeton, 1979, "Recent Developments in Several Complex Variables", edited by John E. Fornaess, *Annals of Math. Studies* #100, Princeton Univ. Press, Princeton, NJ, 1981.
27. (with Lawrence Brenton, David Bindschadler, and Geert C. E. Prins) On global extensions of Dynkin diagrams and singular surfaces of the topological type of P^2, *Proc. Symposia in Pure Math.* **40** (1983), Part I, 145–151.
28. (with Maurice Lou, Semyung Wang, and Kenneth A. Kline) A comparison of mode-acceleration and Ritz vector reduced basis procedures in transient analysis, *Proc. Seventh International Conf. on Vehicle Structural Mechanics*, SAE/P-88/210 (April 1988), 195–204. Subsequently published in 1988 SAE Transactions (see Journal Articles Published; Refereed Journals above).

E_1. In-House Publications

- Calculation of signal-to-noise ratio as a function of range of detection and beamwidth for a 1-watt argon ion laser, Kollsman Instrument Corporation, Elmhurst, New York, 1966.
- Accuracy of the pressure-geopotential altitude equations, Kollsman Instrument Corporation, Elmhurst, New York, 1966.
- An estimate of the loss of transmission due to internal reflections in an optical fiber: worst case analysis, Kollsman Instrument Corporation, Syosset, New York, September 1967.
- (with J. Hanon) Deterioration about the line of sight in an azimuth-elevation sighting device, Kollsman Instrument Corporation, Syosset, New York, September 1967.
- Signal-to-noise ratio of photomultiplier tubes, Kollsman Instrument Corporation, Syosset, New York, September 1967.
- An analysis of the effect of axis wobble on the accuracy of a roll-pitch sighting device, Kollsman Instrument Corporation, Syosset, New York, September 1968.
- Determination of the radiation flux incident on a flat plate in a circular orbit, Kollsman Instrument Corporation, Syosset, New York, September 1968.
- A method of facilitating the computation of the steady state temperatures of the nodes of a network under steady or steady-periodic conditions, Kollsman Instrument Corporation, Syosset, New York, September 1968.

G. Abstracts Published in Academic Journals

- Exceptional Lie algebras and the structure of hermitian symmetric spaces, *Notices, AMS* **23** (1976), p. A-616.
- Simplified descriptions of the exceptional bounded symmetric domains, *Notices, AMS* **25** (1978), p. A-87.
- (with David M. Goldschmidt) Graphical evaluation of sparse determinants, *Notices, AMS* **26** (1979), p. A238.
- (with Daniel Frohardt) Classification of extended Dynkin diagrams without explicit construction of root systems, *Abstracts, AMS* **2** (1981), p. 369.
- (with Daniel Frohardt) A Euclidean interpretation of Dynkin diagrams and its relation to root systems, *Abstracts, AMS* **6** (1985), p. 32.
- Euclidean hypersurfaces with reflection properties, *Abstracts, AMS* **11** (1990), p. 331.
- (with Fat C. Lam) Leg-slope generation of Pythagorean triples, *Abstracts, AMS* **25** (2004), p. 303.

K. Instructional Materials Formally Published

Study Guides/Laboratory Workbooks

(with Daniel Anderson) Student Solutions Manual for Stewart's Calculus, Volume I, Brooks/Cole, Pacific Grove, CA, 1987.

(with Daniel Anderson) Student Solutions Manual for Stewart's Calculus (2/E), Volume I, Brooks/Cole, Pacific Grove, CA, 1991.

(with James Stewart and Daniel Anderson) Student Solutions Manual for Stewart's Calculus: Early Transcendentals (2/E), Volume I, Brooks/Cole, Pacific Grove, CA, 1991.

(with James Stewart and Daniel Anderson) Student Solutions Manual for Stewart's Calculus (3/E), Volume I, Brooks/Cole, Pacific Grove, CA, 1995.

(with James Stewart and Daniel Anderson) Student Solutions Manual for Stewart's Calculus: Early Transcendentals (3/E), Volume I, Brooks/Cole, Pacific Grove, CA, 1995.

(with Jeffery A. Cole, James Stewart, and Daniel Drucker) Student Solutions Manual for Stewart's Calculus: Early Vectors (Preliminary Edition), Brooks/Cole, Pacific Grove, CA, 1999.

(with Daniel Anderson and Jeffery Cole) Student Solutions Manual for Stewart's Calculus (4/E), Volume I, Brooks/Cole, Pacific Grove, CA, 1999.

(with Daniel Anderson and Jeffery A. Cole) Student Solutions Manual for Stewart's Calculus: Early Transcendentals (4/E), Volume I, Brooks/Cole, Pacific Grove, CA, 1999.

(with Daniel Anderson and Jeffery A. Cole) Student Solutions Manual for Stewart's Calculus (5/E), Volume I, Brooks/Cole, Pacific Grove, CA, 2003.

(with Daniel Anderson and Jeffery A. Cole) Student Solutions Manual for Stewart's Calculus: Early

Transcendentals (5/E), Volume I, Brooks/Cole, Pacific Grove, CA, 2003.
(with Daniel Anderson and Jeffery A. Cole) Student Solutions Manual for Stewart's Calculus (6/E), Volume I, Brooks/Cole, Pacific Grove, CA, 2008.
(with Daniel Anderson and Jeffery A. Cole) Student Solutions Manual for Stewart's Calculus: Early Transcendentals (6/E), Volume I, Brooks/Cole, Pacific Grove, CA, 2008.
(with Daniel Anderson and Jeffery A. Cole) Student Solutions Manual for Stewart's Calculus (7/E), Volume I, Brooks/Cole, Pacific Grove, CA, 2012.
(with Daniel Anderson and Jeffery A. Cole) Student Solutions Manual for Stewart's Calculus: Early Transcendentals (7/E), Volume I, Brooks/Cole, Pacific Grove, CA, 2012.
(with Daniel Anderson and Jeffery A. Cole) Student Solutions Manual for Stewart's Calculus (8/E), Volume I, Brooks/Cole, Pacific Grove, CA, 2016.
(with Daniel Anderson and Jeffery A. Cole) Student Solutions Manual for Stewart's Calculus: Early Transcendentals (8/E), Volume I, Brooks/Cole, Pacific Grove, CA, 2016.

L. Papers Presented

Invited and/or Refereed Internationally or Nationally

Simplified descriptions of the exceptional bounded symmetric domains, AMS annual meeting, Atlanta, GA, Jan. 4, 1978.
Graphical evaluation of sparse determinants, AMS conference, U. of Hawaii, Honolulu, HI, March 31, 1979.
A Euclidean interpretation of Dynkin diagrams and its relation to root systems, AMS annual meeting, Anaheim, CA, Jan. 9, 1985.
Weighted trees, determinants, and Diophantine equations, Illinois Number Theory Conference, Univ. of Illinois, Urbana-Champaign, IL, April 5, 1986.
Euclidean hypersurfaces with reflection properties, AMS summer meeting, Ohio State University, Columbus, OH, Aug. 10, 1990.
Leg-slope generation of Pythagorean triples, Joint Mathematics Meetings, Phoenix, AZ, Jan. 10, 2004.

Invited and/or Refereed Locally/Regionally

Differential geometry and the disk, Colloquium, WSU, Detroit, MI, April 14, 1976.
How to construct the exceptional Lie algebras, Special session of Lie Algebra Workshop, WSU, Detroit, MI, June 11, 1976.
Exceptional Lie algebras and the structure of hermitian symmetric spaces, AMS, Univ. of Michigan, Ann Arbor, MI, Nov. 6, 1976.
Determinants of Cartan (and other) matrices via graph theory, WSU, Detroit, MI, Feb. 13, 1979.
Root systems and Dynkin diagrams, WSU, Detroit, MI, Feb. 19, 1979.
From singularities to Diophantine equations, Colloquium, George Mason Univ., Fairfax, VA, Nov. 14, 1986.
Classifying singularities with perfect local fundamental group, Univ. of Richmond, Richmond, VA, Nov. 17, 1986.
Reflective Euclidean hypersurfaces, Conference on Differential Geometry, Univ. of Windsor, Windsor, Ontario, Nov. 15, 1991.
Smallest solutions of linear Diophantine equations, 1992 Illinois Number Theory Conference, Univ. of Illinois, Urbana-Champaign, IL, April 4, 1992.
Mathematical MacTutor, Fourth Annual Michigan Conference on College Mathematics: Calculus in Transition, Univ. of Michigan at Dearborn, Mar. 20, 1993.
Morphs of polygons, 82nd Annual Meeting of Michigan Section of MAA, Calvin College, Grand Rapids, MI, May 5, 2006.
A generalized approach to polygons and morphing, 83rd Annual Meeting of Michigan Section of MAA, Univ. of Michigan at Dearborn, May 4, 2007.
Leg-slope generation of Pythagorean triangles, 84th Annual Meeting of Michigan Section of MAA, Grand Valley State University, Grand Rapids, MI, May 2, 2008.
The fine line between convergence and divergence and the power of the integral test estimate,

87th Annual Meeting of Michigan Section of MAA, Western Michigan University, Kalamazoo, MI, May 6, 2011.

Volumes and surface areas of n-balls, 88th Annual Meeting of Michigan Section of MAA, Saginaw Valley State University, Saginaw, MI, May 4, 2012.

Introduction to Pythagorean Triples, Undergraduate Mathematics Seminar, WSU, April 6, 2018.

M. Invited Seminars or Lectures Presented Since 1980

Factorization in $\mathbb{Z}[\alpha]$ (4 lectures), Algebra Seminar, WSU, Detroit, MI, Feb. 5, Feb. 26, Mar. 4, and Mar. 11, 1980.

Morse Theory Workshop*, WSU, Detroit, MI, Summer 1981.

Algebraic Geometry Seminar*, WSU, Detroit, MI, Fall 1982.

Differential Topology Workshop*, WSU, Detroit, MI, Summer 1983.

Interpolating Splines and their Extremal Properties (two lectures), B-Splines Seminar, WSU, Detroit, MI, June 25 and July 2, 1985.

B-Splines (two lectures), B-Splines Seminar, WSU, Detroit, MI, July 11 and 16, 1985.

Fast Matrix Multiplication (two lectures), Computational Geometry Seminar, WSU, Detroit, MI, April 14 and 21, 1989.

Generation of Ritz Vectors by Taylor Series Approximations (two lectures), Applied Mathematics Seminar, WSU, Detroit, MI, April 16 and 23, 1991.

Lie algebras, left invariant forms, and the structure equations (two lectures), Geometry and Quantum Field Theory Seminar, WSU, Detroit, MI, May 21 and 28, 2002. I participated in the seminar throughout Summer 2002.

* active participation every week

N. Other Scholarly Work

Meetings Attended

Differential geometry conference, Michigan State University, April 10, 1976.

AMS summer meeting, Univ. of Toronto, Aug. 24–28, 1976.

AMS conference, Univ. of Michigan, Nov. 6, 1976.

AMS annual meeting, St. Louis, MO, Jan. 26–30, 1977.

AMS annual meeting, Atlanta, GA, Jan. 4–8, 1978.

AMS conference, Honolulu, HI, March 27 – April 1, 1979.

AMS Chern Symposium, Berkeley, CA, June 25–29, 1979.

AMS summer conference, including short course on computer algebra and symbolic mathematical computation, Univ. of Michigan, Ann Arbor, MI, Aug. 16–22, 1980.

MAA conference (chaired session), Oakland Univ., Rochester, MI, May 2, 1981.

AMS annual meeting, Cincinnati, OH, Jan. 12–16, 1982.

Differential geometry conference on complete Riemannian manifolds, Purdue Univ., April 29 – May 1, 1983.

Canadian Math. Society Seminar on Lie Algebras and related topics, Univ. of Windsor, June 26 – July 6, 1984.

AMS annual meeting and MAA minicourse on the teaching of applied mathematics, Anaheim, CA, Jan. 9–13, 1985.

Differential Geometry Workshop, Mathematical Sciences Research Institute, Berkeley, CA, June 28 – July 1, 1985.

Illinois Number Theory Conference, Univ. of Illinois, Champaign-Urbana, IL, April 4–5, 1986.

Research Conference on Geometric Design, Wayne State University, May 4–6, 1987. Chaired session on May 6, 1987.

AMS annual meeting, Atlanta, GA, Jan. 5–9, 1988.

Workshop on Differential Geometry, Calculus of Variations, and Computer Graphics, Mathematical Sciences Research Institute, Berkeley, CA, May 23–4, 1988.

AMS Short Course on Chaos and Fractals, Providence, RI, Aug. 6–7, 1988.

Boston Workshop for Mathematics Faculty, Regis College, Aug. 13–16, 1988.

Third Annual International Conference on Technology in Collegiate Mathematics, Ohio State

University, Columbus, OH, Nov. 2–4, 1989.
Research Conference on Geometric Design, Wayne State University, May 7–9, 1990.
Chaired session on May 8, 1990.
AMS summer meeting, Ohio State University, Columbus, OH, Aug. 8–11, 1990.
AMS annual meeting, San Francisco, CA, Jan. 15–19, 1991.
Conference on the Use of Calculators and Computers in Calculus, University of Michigan-Dearborn, Dearborn, MI, Mar. 23, 1991.
New Technology Workshop: "How to Integrate Computers Into the Classroom", Schoolcraft College, Livonia, MI, Feb. 7, 1992.
Illinois Number Theory Conference, Univ. of Illinois at Urbana-Champaign, April 3–4, 1992.
IMTP (Interactive Mathematics Text Project of the Mathematical Association of America) Mathcad Workshop, Univ. of Michigan at Dearborn, Nov. 6–7, 1992.
Fourth Annual Michigan Conference on College Mathematics: Calculus in Transition, Univ. of Michigan at Dearborn, Mar. 19–20, 1993.
IMA (Institute for Mathematics and Its Applications) Workshop, "Designing a Course in Industrial Mathematics for Undergraduates", University of Minnesota, May 15–16, 1993.
University of Windsor Mathematics Department Colloquium, Nov. 11, 1993.
AMS/MAA annual meeting, Cincinnati, OH, Jan. 12–15, 1994.
Fifth Annual Michigan Conference on College Mathematics: Strategies for Teaching, Western Michigan University, Kalamazoo, MI, Mar. 11–12, 1994.
Seventh Annual International Conference on Technology in Collegiate Mathematics, Orlando, FL, Nov. 17–20, 1994.
Apple Developer's Forum, Novi, MI, Oct. 23, 1995.
Co-chaired (with C.-S. Houh) special session on Differential Geometry and Its Applications at AMS meeting here at Wayne State University, May 2–4, 1997.
MAA annual meeting, Eastern Michigan Univ., Ypsilanti, May 7, 1999.
Participation in Differential Geometry Seminar at Michigan State University, Winter 1990 – Winter 2001. (Seminar not active during Winter 1997 and Winter 1998. My schedule conflicted with the seminar in Fall 2001.)
MAA annual meeting, Lawrence Technological University, May 10, 2002.
AMS/MAA annual meeting, Baltimore, MD, Jan. 14–19, 2003.
AMS/MAA annual meeting, Phoenix, AZ, Jan. 7–10, 2004.
Teaching and Learning Technology Roundtable, WSU, Mar. 11, 2004.
2004 Learning Technology Expo, WSU, May 5, 2004.
MAA annual meeting (Michigan section), Oakland University, May 7–8, 2004.
Attended talk by Jane Depriester-Morandini from Educational Accessibility Services on "Equal Access in Math", WSU, October 1, 2004.
Teaching and Learning Technology Roundtable, WSU, Mar. 11, 2005.
MAA annual meeting (Michigan section), Alma College, Alma, MI, April 29–30, 2005.
AMS/MAA annual meeting, San Antonio, TX, Jan. 11–15, 2006.
McGraw-Hill Calculus Symposium, Amelia Island, FL, Mar. 23–26, 2006.
MAA annual meeting (Michigan section), Calvin College, Grand Rapids, MI, May 5–6, 2006.
Teaching and Learning Technology Roundtable Conference, WSU, Sept. 22, 2006.
MAA annual meeting (Michigan section), University of MichiganDearborn, Dearborn, MI, May 4–5, 2007.
AMS/MAA annual meeting, San Diego, CA, Jan. 6–9, 2008.
McGraw-Hill Calculus Focus Group, San Diego, CA, Jan. 8, 2008.
MAA annual meeting (Michigan section), Grand Valley State University (Pew Campus), Grand Rapids, MI, May 2–3, 2008.
MAA annual meeting (Michigan section), Central Michigan University, Mt. Pleasant, MI, May 8–9, 2009.
Michigan Undergraduate Mathematics Conference, Wayne State University, Detroit, MI, Oct. 17, 2009. Moderated session.
AMS/MAA annual meeting, San Francisco, CA, Jan. 6–9, 2010.

Michigan Undergraduate Mathematics Conference, Grand Valley State University, Grand Rapids, MI, Oct. 10, 2010. Moderated session.
MAA annual meeting (Michigan section), Western Michigan University, Kalamazoo, MI, May 6–7, 2011.
Michigan Undergraduate Mathematics Conference, Siena Heights University, Adrian, MI, March 3, 2012.
MAA annual meeting (Michigan section), Saginaw Valley State University, Saginaw, MI, May 4–5, 2012.
AGTC Seminar on Elliptic Curves, WSU, Detroit, MI, Summer and Fall 2012.
Meeting of MAA Working Group on Linear Algebra, Washington DC, Feb. 28–Mar. 2, 2014.
MAA annual meeting (Michigan section), University of Michigan at Flint, MI, May 2–3, 2014.
Pearson Great Lakes Navigator Conference VII, Henry Ford College, Dearborn, MI, Feb. 16, 2018.
Seminar on modular forms, WSU, Detroit, MI, Sept. 2018 – May 2019.
STEM Placement & Precalculus Symposium, Chicago, IL, March 15–17, 2018.
Annual Sponsors Day, Mathematical Sciences Research Institute, Berkeley, CA, Mar. 1–2, 2019
MAA annual meeting (Michigan section), University of Detroit Mercy, Detroit, MI, Apr. 25–26, 2019.

Miscellaneous

Working with Owens lecturer Neil Sloane, I contributed nine entries to the Online Encyclopedia of Integer Sequences in April and July 2013.

IV. Service

C. Committee Assignments

University Committees Chaired

Facilities and Support Services Committee of Academic Senate, 1993–1996.

Some issues considered by my committee in 1993-94: (1) Data bases and computer-based student services (especially design of student records and registration system, with assurance of adequate faculty input), (2) hardware, software, site-licensing, and reseller issues, (3) library issues (provision of media equipment to departments at reasonable prices and installation of suitable equipment in classrooms; book renewal policy), (4) parking and grounds issues (e.g., provision of spaces to replace those lost due to building construction and need for windows in parking structure doors to prevent injury to people entering structures).

Some issues considered in 1994–95: (1) instructional technology in the classroom, (2) centralized site licensing, (3) renewal of close ties with Barnes & Noble Bookstore after change in management personnel, (4) software prices at the Barnes & Noble Bookstore as compared with prices at MSU, (5) McGregor Catering Services, (6) single comprehensive ID card for students.

Some issues considered in 1995–96: (1) instructional technology in the classroom, (2) level of satisfaction with McGregor Catering Services, (3) networking and computing issues, including dial-in access, acquisition of software for campus- or college-wide use, high-speed computing, the WSU telephone system, funding of computer services, etc., (4) the need for coordination of efforts by divisions of the university to achieve improvements in delivery of services and cost efficiency that cannot be implemented by any one division, (5) improving student access to information and facilities, (6) renewal of ties with the Barnes & Noble Bookstore after another change in management personnel, (7) software prices at the Barnes & Noble Bookstore as compared with prices at MSU.

Summer 1996: In response to a challenge from Dean Breivik of the University Libraries to back up my committee's request for significant changes in the way instructional technology is funded and used at WSU, I spent most of Summer 1996 reading the recent literature on instructional technology and writing a detailed, 34-page report entitled "Instructional Technology in Higher Education". The report describes the many uses of instructional technology in higher education, its effectiveness in improving learning and retention, how to plan and finance instructional technology programs, and barriers and incentives to faculty use of instructional

technology. It discusses guidelines for classroom design, distance learning, electronic libraries, the use of technology to improve student services, the future of interactive television, trends in instructional technology and its use, and the role of instructional technology in the future of colleges and universities. The bibliography of the report cites over fifty references. It is our hope and belief that this report can provide guidance for the university in its planning of educational technology for the future.

I concluded my term as chairman by writing a comprehensive set of recommendations from my committee dealing with the bookstore, central acquisition of software, computer access, coordination of university units, food services, information systems, improved communications by the administration with the university community, instructional technology, student access to computers and other facilities, the Undergraduate Library, workstations for undergraduates, and issues meriting the attention of the Facilities and Support Services Committee in 1996–97.

Facilities, Support Services, and Technology Committee of Academic Senate, 2001–2002, 2003–2005.

Some issues considered in 2001–2002: WSU's master plan, parking, reorganization and consolidation of libraries, provision of media services, classroom design and facilities, networking of campus buildings, dial-in problems. We met with Meredith Gibbs and Jon Frederick about parking and campus police; H. Stephen McMinn about library research services; Jeff Trzeciak and Sharon Phillips about library computing, media services, and library training; James Sears about facilities and planning; James Johnson about computing and networking issues; and Sandra Yee about the restructuring of the libraries. I wrote an eight-page report on our activities, accompanied by 48 pages of proceedings detailing the information gathered at our meetings. All this is posted in pdf format on the Web at `http://sun.science.wayne.edu/~senate/FSS.html`. I gave a formal oral report on our activities to the Academic Senate on Feb. 5, 2003. Immediately afterward a motion was made and approved commending the FSST committee on its work.

Some issues considered in 2003–2004: Failure of reserve generators to provide power during August 2003 blackout, failure of Parking and Transportation to provide gate cards and hanging tags in time for Fall 2003 semester, exact portions of omnibus fee used for various purposes, degradation of site licenses, detailed review of information technology at WSU, Media Services' improvements in lecture halls and classrooms (I had a separate meeting with Jeff Trzeciak in State Hall on Mar. 26, 2004 to discuss classroom needs), need for campus phones in classroom buildings, food services issues.

Some issues considered in 2004–2005: Optimization of room scheduling, registration problems, parking issues, recommendations on the formulation of medium- and long-term plans for the improvement of WSU's classroom facilities from the faculty perspective, renovation of Purdy-Kresge Library and possible consolidation with the Science and Engineering Library, improvements in WSU's ability to respond to emergencies such as power outages.

University Committee Membership

Academic Senate, 1993–2005.

1993–94: Attended all meetings. Convinced Academic Senate leadership to issue a newsletter informing university community of Senate activities. Urged issuance of picture strips to students so that instructors can create pictorial class lists and learn students' names faster.

1994–95: Attended all meetings. Again raised picture strip issue, but Student Council asked that it be deferred to concentrate on approval for single student ID card.

1995–96: Attended all meetings. Reviewed proposed budget allocations for 1995–96. Recommended changes in format and distribution of proposed student teaching evaluation form. Urged flexibility in format of course syllabi.

1996–97: Attended all meetings. Urged continued operation of Apple Repair Shop (which was in danger of closing). Argued for mechanisms for continuing input from the university community on matters of import, including graduate assistant health insurance and information systems. Explained that focus groups—even committees with members from many parts of the university community—do not achieve this purpose when the people providing input have no

mechanism for communicating with, and truly representing, their constituencies. Participated in selection of Media Services Director (Anthony Semanik).

1997–98: Attended all meetings. Participated in selection of another Media Services Director. Had discussion with Carole McCollough, Associate Dean of University Libraries, about instructional technology, media services, and classroom needs. Proposed to Dean Breivik and Georgia Clark (acting Media Services Director) that all future overhead projectors purchased have fold-down arms and AC outlets. (Proposal was approved.) Proposed changes in format of Academic Senate minutes to make them more accessible to the university community. (The proposals were adopted.) Proposed that recent minutes be posted on the Academic Senate website. (Proposal was adopted.)

1998–99: Missed one meeting due to illness. Proposed changes in Academic Senate elections to eliminate need for multiple ballots during meetings. Urged improvements in dial-in access, site licensing, and long-term financing of computer hardware, software, and maintenance. Arranged for presentation to full Senate of copyright issues under consideration by University Libraries Faculty Advisory Committee.

1999–2000: Missed one meeting at request of department chair to attend session with Dean on procedure for picking new department chair. Urged C&IT to support minimum computer system capabilities across campus, so that C&IT software acquisitions and releases can actually be used by the people at whom they are targeted. Raised questions regarding administration of student evaluations. When Parking and Transportation announced that the use of debit cards for parking would be discontinued before Summer 2000, I protested this policy on the grounds that it would effectively confiscate the funds remaining on the debit cards of faculty members who pay for parking by payroll deduction during the academic year. The decision was revoked.

2000–2001: Questioned advisability of requiring faculty and staff to use OneCard instead of gate card for parking, since faculty/staff often prefer to store parking card in vehicle rather than dig it out of a pocket-book or wallet each time they park. Supported renewed call for Senate newsletter with university-wide distribution. Participated in strategic planning focus group. Supported President's initiative for undergraduate housing on campus.

2001–2002: Made numerous suggestions regarding Honors Program. Raised questions concerning proposed consolidation of Science/Engineering Library with Purdy-Kresge Library.

2002–2003: Considered General Education requirements. Discussed financial crisis and measures to deal with it.

2003–2004: Considered many problems related to the university budget, including enrollment trends, the development campaign, student scholarships and student housing subsidies, etc.

2004–2005: Discussed NCA self-study, capital campaign, budget and enrollment issues, revision of statute on centers and institutes, revision of general education requirements.

Administrative Systems Steering Committee (Roger Nys, Chair), 1993–1996.

Urged greater faculty and student input into the design of student records and registration systems. Urged greater flexibility in university information systems to eliminate the need for add-on software to access and process data.

Admissions/Readiness-for-Wayne Committee, 2011.

Provost's committee on admissions standards, formed in response to Student Success Task Force report.

Bookstore Committee, 1993–1996.

Arranged for Gary Barber, Manager of Barnes & Noble Bookstore, to address Academic Senate and clarify bookstore procedures and policies. Urged bookstore to issue statement of procedures and policies to all faculty each year, to seek faculty input on bookstore policies, and to sell software at prices competitive with those at MSU and the University of Michigan. Convinced bookstore management to lower calculator prices.

Bylaws Committee of Academic Senate, 1998.

Formulated amendment to provide representation in the Senate for academic staff who have been transferred to divisions not previously represented. Proposed name change for the Facilities and Support Services Committee to explicitly include technology issues in its charge.

Proposed assigning athletics issues to Student Affairs Committee. All proposals adopted by Academic Senate.

C&IT Task Force on Site Licensing, 1994–1995.

Proposed creation of a permanent university site licensing program, with initial emphasis on acquisition of site licenses for software that is (a) useful university-wide, or at least college-wide, or (b) necessary for research, but whose high single-purchase price places it out of reach of individual researchers. NOTE: A site-licensing program was finally started in 1999–2000 under the direction of Molly Gordon, a member of the Task Force from C & IT.

Committee to Review Acceptable Use Policy, 1998–2000.

1998: This committee was formed to reconsider President Adamany's Executive Order 97-1 on the use of computing resources and compare it with policies of other universities in order to recommend an appropriate policy or other course of action to President Reid. My main contribution was to critique 5 documents and 30 policies, then distribute my critiques to the committee members in order to highlight the best and worst features of policies implemented at other schools. I was the only committee member to write comprehensive critiques, and I critiqued all the major policies that the committee considered.

1999–2000: The committee reconvened to approve a new policy. The policy is being reviewed by other groups at the request of the President and will soon be considered by the Academic Senate.

Curriculum and Instruction Committee, Academic Senate, 2000–2001.

At the request of the Academic Senate president, I joined C&I for one year to help with its deliberations on general education (gen ed) requirements and distance learning. I fought hard for the development of an underlying philosophy to guide the gen ed process. I opposed the policy that gen ed classes cannot have any prerequisites, not even fulfillment of competency requirements.

Elections Committee, Academic Senate, 1997–2000.

1998–99: Considered problems connected with fractional-time employees: how their numbers should affect the representation of their units in the Academic Senate, and whether and to what extent they should be allowed to vote in Academic Senate elections. Proposed assigning full representation for faculty members listed as fractional-time employees due to sabbatical leaves. This proposal has been been adopted and is now standard practice.

1999–2000: Proposed new simpler method of determining representation of units in Senate and of determining eligibility to vote in elections of at-large members. All proposals adopted by Academic Senate.

Facilities and Support Services Committee of Academic Senate, 1993–2000.

See the entry under University Committees Chaired for a description of my first three years of service.

1996–97: Reviewed progress report on university's strategic plan; pointed out significant omissions and goals stated too narrowly to serve the future needs of this university. Consulted with Patricia Breivik (Dean of the University Libraries), Lynda Milne (Director of the Office of Teaching and Learning), Anthony Semanik (Director of Media Services), Executive Vice President Roger Nys, John Camp (Asst Vice President, Academic Computing/Customer Services, Computing & Instructional Technology), Tom Sees (Asst Vice President, Enrollment Services, Student Affairs), and others to monitor progress on instructional technology, the Undergraduate Library, centralized acquisition of software, dial-in access, e-mail, telephone systems, student computer access, student information systems, etc.

1997–98: Proposal for overhead projectors in classrooms finally came to fruition. Consulted with Dean Breivik on instructional technology, software installation in the Undergraduate Library, on-line bibliographic software, remote access to supported data bases, and mechanisms for feedback on services provided by the University Libraries.

1998–99: Worked with James Johnson, Vice President and head of C&IT, on improving dial-in access, reducing departmental phone bills, and initiating a site-licensing program. Discussed remote access to WSU data bases with Dean Breivik and Jim Johnson.

On May 19, 1998, I participated in a stakeholder interview with the Albert Kahn Collaborative Team to help them develop a master plan for WSU campus development. I provided the Kahn team with four pages of comments and suggestions, many of which we discussed during the interview.

1999–2000: (1) Committee had extensive deliberations on parking problems, with concern about their negative effect on enrollment and retention. We consulted with Tyrone Mack, Director of Parking and Transportation, and Vice President John Davis. Dissatisfied with lack of progress and lack of relevant data to solve the problems, we brought the situation to the direct attention of the President with the help of the Policy Committee of the Academic Senate. (2) We documented crises caused by the switch to a new FMS (Financial Management System). For example, many researchers can't spend their grant money or determine the status of grant accounts, and consequently lack the means to do their research. We consulted extensively with C&IT and will recommend emergency action by the upper administration. (3) We pushed for improvements in site licensing (now started on a "shoestring" budget), remote access (steadily improving, with higher speed access now being considered), phone systems, and upgrading of computer systems on campus. More funds are needed for progress in these areas.

NOTE: This committee was renamed the Facilities, Support Services, and Technology Committee starting in Fall 2000.

Facilities, Support Services, and Technology Committee of Academic Senate, 2001–2205

2001-2002: See the entry under University Committees Chaired.

2002–2003: We plan to monitor progress on initiatives described to us last year by university officials and to seek input on the success or failure of new facilities such as the Welcome Center and the new Barnes & Noble Bookstore. We will be interested to see what the administration decides to do with the properties acquired in the Detroit Education Building deal. We have met with Dean Sandra Yee of the University Libraries to discuss restructuring, the move from print to electronic media, possible library consolidation, and copyright issues.

2003–2004: See the entry under University Committees Chaired.

2004–2005: See the entry under University Committees Chaired.

Faculty Advisory Group for the Honors Program in the Colleges of Liberal Arts and Science, 1996–2001.

1996–97: Helped draft by-laws for the Honors program. Argued successfully that faculty members who have taught honors courses in the past five years should be part of the Faculty of the Honors Program and thereby be eligible to give advice on matters of general concern to the program. Also argued successfully for a five year cycle for the by-laws.

1997–98: Helped plan the expansion of the Honors Program into a university-wide program that would reach out and enrich the learning experience for all WSU students.

1998–99: Continued to attend Honors Program functions. Discussed increased Mathematics Department participation in Honors Program with Honors Program Director Stanley Shapiro.

1999–2000: Attended Honors Program functions. Pointed out inconsistencies in statements of Honors Program requirements that appear in different places. Proposed change that would allow students to qualify for Honors Program in second semester of freshman year. Pointed out that GPA requirements were effectively raised unintentionally with the advent of +/− grades; suggested a possible remedy. Consulted with Honors Program Director Stanley Shapiro during formulation of my proposal for a Mathematics Department Honors Program. (See Undergraduate Committee listing below.)

2000–2001: We did not meet, despite a request by the Honors Program Director for our schedules.

Parking Advisory Committee, 2002–2005.

Advised Jon Frederick on parking problems and helped set priorities for improvements.

Rumble Fellowship Review Panel, 1993.

Teaching Award Selection Committee, 1991.

University Libraries Poster Program, 2005–2006.

Participated in program to promote University Libraries through posters and on-line photographs with quotes describing library services. Included photo shoot on Aug. 3, 2005.

University Library Committee, 1998–2000.

1998–99: We discussed erosion of the library system's budget, skyrocketing journal costs, copyright issues (should universities continue to allow researchers to transfer their copyright to publishers, forcing the universities' libraries to buy it back from the publishers to make it available to researchers?), and the library's new on-line system (which debuted March 29, 1999).

1999–2000: We have been developing a ULC website to bring copyright and other issues to the attention of the university community at large. We helped the library system to fine tune PowerPoint presentations of library services and issues. These have been presented to the Academic Senate and various Faculty Councils. We are closely monitoring progress and problems with Media Services. The Committee also discussed the relative merits of various proposed uses of the library portion of the student technology fee.

University Research Grant Program Committee, 1999–2000.

As a member of the committee judging grant applications from the Physical and Mathematical Sciences, I not only reviewed the applications and made recommendations but also caught an error that would have resulted in the denial of grant funds to a worthy applicant.

College Committee Membership

College of Science Computer Committee, 1994–1996.

College of Science Elections Committee, Fall 1992.

College of Science Teaching Award Committee, May 2004.

Dean Arthur Marotti's Committee on Academic Computing, Nov. 1985 – April 1986.

Special assignment: preparation of document detailing Mathematics Department computing needs and goals.

Dean John Oliver's Liberal Arts Computing Facilities Planning Committee, July 1988.

Liberal Arts College Salary Committee, 1988 and 1989.

Liberal Arts College Bylaws Review Committee, 1990–1991.

Department Committees Chaired

Apprentice Master's Program Director, Jan. – April 1984.

Calculus I Departmental Final Examination, Winter 2000.

I headed a three-person committee (C.-S. Houh, D. Sherry, and myself) that produced three Calculus I examinations together with solutions and grading guidelines within the tight 17-day time period imposed on us by the Undergraduate Committee. We met for 36 hours on campus and each of us worked many more hours at home. To get the exams finished and copied on time, I typeset them all myself. No errors or ambiguities were reported on any of the exams.

Credit by Exam, Sept. 2006 – Sept. 2008.

Departmental Student Advisor, Sept. 1986 – Sept. 1987.

Director, Mathematics Instructional Computing Lab, 2003–2006.

Responsibilities included staffing the lab, creating a schedule of operation compatible with course needs and lab managers' class schedules, maintaining the lab website, managing lab reservations for instructors, and compiling data on lab use to help determine future lab hours and staffing needs.

Elections Committee, Sept. 1988 – Sept. 1989.

Graduate Teaching Assistant and Part-Time Faculty Supervision Committee,
Sept. 2000 – Sept. 2002.

2000–2001: My first action as chair was to assign every GTA to a faculty mentor on the committee so that all GTAs would have immediate access to support and advice as needed. I created a GTA data base for use by the committee, the department chair, and the directors of the PhD and MA programs. We proposed, and received approval for, a 1-credit, pass/fail version of the new GTA training course that Mary Klamo and Patty Bonesteel piloted this year. We evaluated the assignments of all GTAs to protect them from work overloads, and we are considering designing an information sheet to be sent to new GTAs with their offer letters. The teaching of all new GTAs and adjuncts was evaluated, and those with problems were re-evaluated. We nominated Anthony Crachiola for the 2001 Garrett T. Heberlein Excellence

in Teaching Award for Graduate Students, which he won. We also nominated three GTAs and three adjuncts for departmental teaching awards, and proposed a new award for Outstanding Performance in the GTA Training Program. At the request of the Graduate Committee, we rated the teaching of all GTAs, using the ratings A (Above Expectations), M (Meets Expectations), B (Below Expectations), and U (Unsatisfactory). I attended teaching sessions by half the GTAs in the training course.

2001–2002: I again assigned mentors to all GTAs. We evaluated the teaching of all new GTAs, as well as adjuncts who hadn't been evaluated recently. We evaluated the assignments of all GTAs to protect them from work overloads. Much of our work involved classroom visitation and handling of classroom problems. We nominated GTAs, UAs, and adjuncts for departmental teaching awards.

MAA (Mathematical Association of America) Liaison, Sept. 2008 – Sept. 2021.

Master's Program Director, May 1984 – Sept. 1985.

Partial list of duties: Adviser for 50–60 M.A. students, department registrar and admissions officer for the M.A. program, record keeper and file clerk, supervisor of Master's essays and theses, administrator of M.A. oral exams, liaison between Department of Mathematics and Liberal Arts Graduate Office, consultant to and unofficial member of Mathematics Department Graduate Committee.

Special accomplishments: Establishment and maintenance of computerized information and transcript files to monitor students' progress through the M.A. program; establishment of uniform procedures to standardize the handling of M.A. students' paperwork and coordinate it with the handling of paperwork for Ph.D. students and teaching assistants.

Undergraduate Committee, Sept. 2017 – Sept. 2021.

Webmaster, 2017–2021.

Department Committee Membership

Advising of mathematics majors, 2014–2015.

Advising of Majors Committee, Sept. 2018 – Sept. 2020.

Bylaws Committee, Sept. 1976 – Sept. 1977, Sept. 2018 – Sept. 2021.

Calculus text review, April – May 2013.

Wrote detailed review of Taalman-Kohn claculus text fo the Undergraduate Committee.

Calculus text selection subcommittee (two members), Sept. 1981 – Sept. 1982.

This assignment entailed reviewing some 35 calculus texts in detail to determine their appropriateness for use at WSU.

Classroom Observation Corps, Sept. 2014 – Sept. 2015.

Computer Curriculum Development Committee, Sept. 1983 – Sept. 1984, Sept. 1996 – Sept. 2000.

1996-97: Helped plan use of State Hall computer lab with non-remedial courses. Helped determine how to equip lab for the future. Gave advice on acquisition of Macintosh computers and software.

1997-98: Helped plan use of computer lab. Helped facilitate acquisition of Waterloo Maple site license for both Windows and Macintosh computers. Proposed acquisition of site license for MacTutor software.

1998-99: Participated in decisions on acquisition of hardware for State Hall computer lab. Contributed content and design recommendations for a new departmental Web site.

Credit by Exam, Sept. 2006 –Sept. 2008.

Elections Committee, Sept. 1980 – Sept. 1981, Sept. 1984 – Sept. 1989.

NOTE. I invented the department's weighted preference balloting system.

Engineering Liaison, Sept. 2018 – Sept. 2021.

Graduate Assistant Supervision, Sept. 1980 – Sept. 1983, Sept. 1988 – Sept. 1991.

Graduate Committee (ex officio member), Sept. 1984 – Sept. 1985.

Graduate Teaching Assistant and Part-Time Faculty Supervision Committee, Sept. 2005 – Sept. 2007.

Special responsibilities (2005–2006): Liaison to Graduate Committee, Graduate Recruitment Committee, and directors of Master's and PhD programs. Participation as judge in ELI exams for mathematics graduate assistants.

Special responsibilities (2006–2007): Liaison to Graduate Committee, Graduate Recruitment Committee, and directors of Master's and PhD programs. Progressive redesign of form used by committee members to evaluate the teaching of graduate assistants.

Graduation (attended), Winter 1994.

Library Committee, Sept. 2008 – Sept. 2010.

Mathematics-Engineering Joint Committee on the Remedial Program in Mathematics, 1991.

Mathematics-Engineering Task Force on the Basic Sequence in Mathematics, 1991.

Owens Lecture Committee, Sept. 2011 – Sept. 2014, Sept. 2017 – Sept. 2021.

Personnel Committee (Secretary), Jan. – Sept. 1987.

Personnel Committee, Sept. 2018 – Sept. 2019.

Planning and Advisory Board, Sept. 2018 – Sept. 2020.

Precalculus text selection, Sept 1983 — Sept. 1984.

Registration, Sept. 1982 – Sept. 1983, Sept. 1984 – Sept. 1985 (as Master's Director), Sept. 1987 – Sept. 1988, Sept. 1990 – Sept. 1991, Sept. 1992 — Sept. 1993, Sept. 1994 – Sept. 1996.

Review of Taalman-Kohn calculus text for Undergraduate Committee, April/May 2013.

Salary Committee, Winter 2019.

Selected new precalculus text, Sept. 1983 – Sept. 1984.

Special Assignment: Computer Aided Instruction, Sept. 1992 – Sept. 1996.

Accomplishments: I reviewed the two main "supercalculators" (TI-85 and HP-48), practiced using them and programming them, corresponded with people at Texas Instruments and Hewlett-Packard, and gathered lab materials and manuals to support their use. I reviewed more than a dozen technology-based texts and kept up with the relevant literature in MAA publications, conference proceedings, and publishers' newsletters. I wrote a lengthy and detailed report for the department on the potential benefits of incorporating technology into the teaching of specific undergraduate courses, as well as a list of implementation questions that the undergraduate committee used to help me plan a supercalculator-enhanced calculus sequence. I attended calculator workshops, discussed the use of calculators with professors at other schools, and in 1993–94 submitted proposals for two internal grants (a Diversity Project grant and an Educational Development grant) to help defray the startup costs for the calculus project. Both were funded.

In August 1994, I organized two full-day workshops on teaching calculus with calculators, one sponsored by Texas Instruments and the other sponsored by Hewlett-Packard. (Both were partially funded from my Diversity Project grant.) Frank Demana of the Ohio State University and Lynn Garner of Brigham Young University provided advice and hands-on experience with supercalculators to instructors from WSU and nearby schools.

The grants were also used to purchase a small library of reference books and manuals, as well as two state-of-the-art high intensity portable overhead projectors.

During 1994–95, I coordinated a new calculator-enhanced calculus sequence–three sections in Fall 1994 and five sections in Winter 1995.

During 1995–96, I continued to coordinate the calculator-enhanced calculus sequence–six sections in Fall 1995 and five sections in Winter 1996. A total of nine instructors participated in the program. I also provided calculator support (in the form of advice, handouts, software, and office hours) for all students and faculty involved in the sequence.

Strategic Planning Committees, 1996 –1997.

I participated in all the department's strategic planning meetings: algebra, analysis, applied mathematics, geometry/topology, and mathematics education.

Student Prizes Committee, Sept. 1989 – Sept. 1991, Sept. 2011 – Sept. 2012.

Special responsibilities (1990-91): Planning of the annual department reception and awards ceremony, correspondence with award winners, writing biography of Harold (Ted) Slaby for use with Slaby Award.

Undergraduate advising, Sept. 2006 – Sept. 2007.

Undergraduate Committee, 1985–1992, 1993–2000, 2002–2003, 2007–2008, 2017–2019.

Special responsibilities (1989–93): Investigation of ways to incorporate computers into the teaching of calculus; short-term revision and coordination of MAT 095 and 098; long-term overhaul of remedial program; design of new layout for the remedial laboratory; investigation of alternative approaches to the structuring of second-year calculus.

NOTE: These were major undertakings crucial to the long-term health of the department. Years of planning culminated this year in major proposals for change. The Mathematics-Engineering Task Forces mentioned above enabled us to take the needs of the Engineering College into consideration, and to solicit the cooperation of that college in the implementation of our plans.

Special responsibilities (1993–94): Implementation of calculator-enhanced calculus sequence, input into redesign of MAT 150, review of standard calculus sequence, and design of MAT 215 (differential equations with matrix algebra for engineers).

Special responsibility (1994–95) (as member of calculus subcommittee): Consideration of ways to redesign calculus sequence so as to incorporate reforms, solidify core material, and accommodate transfer students.

Special responsibilities (1995–96): Member of subcommittees dealing with (1) MAT 542 (modern algebra)—topical coverage, text, and courses to prepare students for MAT 542, (2) design of uniform first-semester calculus final, (3) redesign of calculus curriculum, and (4) choice of calculus text for use by all students (with programmable graphing calculators required). Reviewed eight texts for (1), wrote a sample template for (2), and made detailed recommendations for (3) and (4). Took over as chair of modern algebra committee when Prof. Brenton was unable to continue due to medical problems. Wrote MAT 542 syllabus.

Special responsibilities (1996–97): Designed syllabus for MAT 543 (second semester of modern algebra). Critiqued syllabi for MAT 201 and 202 (Calculus 1 and 2). Member of subcommittee to consider redesign of MAT 225 (elementary linear algebra).

Special responsibilities (1997–98): Design of undergraduate program information booklets. Wrote a formal proposal on the revision of undergraduate courses. Wrote proposals for changes in department By-Laws needed for the smooth operation of the undergraduate program. Actively participated in meetings to revise undergraduate analysis sequence.

Special responsibilities (1998–99): During Summer 1998, created (with P. Malcolmson) Web pages containing extremely detailed course descriptions and undergraduate degree program descriptions, together with general information useful to students and faculty. Formulated proposal to increase Mathematics Department involvement in the Honors Program. Wrote document clarifying departmental policy on the use of calculators in the calculus sequence. At request of department chair, wrote document describing our text selection process. The document was to be used by the College of Engineering as part of their accreditation review. Member of subcommittee to design new MAT 1860 course for math education majors. Formulated proposal to restructure the undergraduate curriculum in an attempt to (1) increase enrollment in upper division courses, (2) enable math majors to take more upper division courses, (3) expose math majors to more branches of mathematics, (4) ensure that math majors are taught necessary foundational material in time for it to be used in upper division "core" courses, (5) reduce long-standing problems with certain undergraduate courses, and (6) eliminate gaps in students' knowledge and understanding that cause them problems in later mathematics and science courses.

Special responsibilities (1999–2000): (1) Wrote proposal for a departmental honors program in consultation with Honors Program Director Stanley Shapiro and his staff. The Committee approved the proposal. (2) Contributed 16 pages of problems and solutions for Fall 1999 Calculus I departmental final exam. Headed committee to construct Winter 2000 Calculus I departmental final exam. (3) Evaluated many requests for credit based on math courses taken elsewhere. The cases referred to me were those in which WSU provided our department with inadequate information, so I had to use the Internet to determine the nature of the other schools' courses and programs in order to make an informed decision.

Special responsibilities (2002-2003): Submitted proposal to restructure undergraduate curriculum. Reviewed texts by Buck and Kosmala in conjunction with review of MAT 5070

syllabus and text. Contributed information on new edition of Stewart's calculus text for use in reviewing text for calculus sequence. Proposed changes in prerequisites for service courses and courses above MAT 2010.

Special responsibilities (2007–2008): Update detailed course descriptions of all undergraduate courses for new departmental web site under construction.

Unofficial responsibilities since 2003: I continue to (1) review requests for credit based on math courses that students take elsewhere, (2) meet with editors and publishers' representatives to keep up with changes in mathematics text offerings, (3) serve as the department's advisor on matters concerning graphing calculators, providing help for students and faculty when the calculators don't work as expected and when advice is needed on how to use them for specific tasks, and (4) participate whenever possible in activities and deliberations relating to the University Honors Program.

Undergraduate Program Booklets, 1997–1999.

Undergraduate Mathematics Seminar, organizer and director
with L. Brenton, 2013–2014.
with T. Bosley, 2014–2015.

Webmaster, 2017–2019.

Workload Committee, Winter 1991.

D. Positions Held in Professional Associations

Michigan Calculus Network Steering Committee, 1993–1996.

This is an official six-member committee of the Michigan Section of the Mathematical Association of America whose function is to provide information to Michigan college instructors about calculus reform, technology, and related issues. For example, it submits articles to the MAA newsletter, selects a speaker for the spring Michigan section meeting, and organizes a one-day conference on calculus reform in early spring.

Mathematical Association of America, Michigan Section, Wayne State University Liaison, Sept. 2008 – Sept. 2019.

Mathematical Association of America, Michigan Section, member of two-person Audit Committee, Sept. 2011 – Sept. 2017.

Mathematical Association of America, member of ten-member MAA Working Group on Linear Algebra, 2013–2014.

F. Professional Consultation

Consultation within WSU (partial list)

For Michael Donovan of WSU's Center of Health Research (1980): assistance in the assignment of numerical measures to certain survey responses that were of a geometric nature.

For Mazin Y. Bata, an M.S. student in Geology (1982): assistance in the application of linear algebra to the determination of strain in field samples of deformed pisolitic limestone.

For Prof. Arthur Park of Art Education (1983): determination of shapes of flat pieces to be assembled into an inflatable sculpture of prescribed shape.

For a university cardiologist (1983): estimation of cardiac output from measurements on silhouettes of a heart in systolic and diastolic phases.

For Prof. Phillip Fike of Art (Nov. 1984): formulation of correct mathematical description for the official WSU ceremonial mace that he had created from various geometrical solids over a period of three years.

For Prof. William Grosky of Computer Science (Mar. 1985): determination of parametric description of all triangles having pre-assigned perimeter and area.

For Prof. Horst Wedde of Computer Science (Feb. 1986): constructed number-theoretic proof needed to explain operation of RSA public-key encryption method.

For Prof. Ernst Rodin of Neurology (Jan. 1989): explained the meaning and role of eigenfunctions in the solution of Sturm-Liouville problems.

For Prof. Peter Johnson of Mathematics (April 1989): computed eigenvalues and condition number of 41 by 41 real matrix.

For Prof. Ramon Berguer of Vascular Surgery at Harper Hospital (1989–1990): investigated various mathematical measures of the irregularity of curves to determine the roughness of cross-sections of plaque deposits in the carotid arteries of patients who are candidates for elective surgery to prevent strokes. (High irregularity correlates with high risk of stroke.)

For Prof. Rick Cooper of Finance and Business Economics (Oct. 1992): supplied the statement and proof of a fact from linear algebra that was used in a research article on business economics, but was carelessly ascribed to an unnamed and uncited "famous theorem".

For Richard Weinand of Computer Science and his student Matthew Benjamin (Nov. 1994): solved navigational geometry problems on the sphere.

For Adj. Asst. Prof. George Dombi of Internal Medicine at Harper Hospital (Jan. 1995): solved problem of accurately determining areas of wounds (modelled as quadrilaterals) so that errors due to inaccurate measurements can be estimated easily. Wrote HP 48 calculator program to implement solution.

For David Cole, WSU Engineering student (June 1996): analyzed and wrote critiques of his attempted proofs of Fermat's Last Theorem.

For Prof. Gisela Labouvie-Vief of Psychology (March–August 1998): Through background reading and regular meetings, provided advice on the application of the theory of dynamical systems to developmental psychology.

Participated in selection process for new Honors Program Director as member of panel that interviewed and evaluated the candidates, April 2002.

For Manmohan Moondra, graduate student in Mechanical Engineering (Winter/Fall 2004): Discussed use of applied linear algebra and statistics to position microphones for analysis of sound transmission in cars.

For Dr. Eishi Asano, Assistant Professor of Pediatrics (November 13–15, 2006): Responded to request for advice on how to learn to use the mathematical software program Matlab and listed references to online tutorials and documentation.

For Johnathan Drews, Computer Science student (November 2007 – February 2008): Read and critiqued his proof of a theorem on what is now called the linear Diophantine problem of Frobenius.

For John Burton, Mathematics student (2011–2013 and 2015): Read and critiqued his attempts at proving the Goldbach conjecture and his numerous attempts at proving that there are no odd perfect numbers.

Consulted with engineering students Ahmad El-Bkaily and Zahraa Bazzi in September 2013 about testing a sensor that outputs the axis angle representation of its position.

In April 2014, helped Professor John Klein find a published proof of a result on projections and generalized inverses that he conjectured was true.

In July–August 2016, I gave Catherine Lebiedzik, Faith Celiker, and Pei-Yong Wang detailed information about the MAA's Course Community in Linear Algebra for them to consider for use in their revision of our elementary linear algebra course, MAT 2250. I also reviewed the text they chose, by DeFranza and Gagliardi.

Consultation outside WSU

During 1981–82, I served as a member of MATHCAP, a subcommittee of the Michigan MAA concerned with mathematics education in Metropolitan Detroit. In answer to requests from high school teachers, I wrote a packet of applied problems dealing with topics for which current texts do not supply applied problems.

On March 30, 1985, I served as an official judge of the mathematical "Chalk Talks" given by high school students in the Science Olympiad at the University of Michigan in Dearborn.

On May 4, 1985, I served as moderator for the Science Bowl at the Southfield Public Schools Talented and Gifted Program Science Olympiad at Stevenson Elementary School in Southfield, Michigan.

During February, June, and August of 1989, I helped H. Sonneborn III, past President of Witco Chemical Corporation and now a member of its Board of Directors, to optimize a computer program to generate the complete list of 4 by 4 magic squares.

During April 1992, I helped Frederick Gass and his colleagues in the Mathematics Department at

Miami University in Oxford, Ohio to select a calculus text appropriate to their needs. (A publisher's representative, aware of my extensive review work, had given them my name.)

On Sept. 20, 1994, I met with Burnis Calvin Day (a Detroit artist who calls his style "neo-geometric") to discuss opportunities for him to apply his talents to the production of mathematics-oriented educational programs for children.

On March 13, 1995, I advised Professor Janina Udrays of Schoolcraft College on the selection of a calculus text appropriate for use with calculators.

In March 1995, I advised Professor Russell Blyth of St. Louis University on the selection of a calculus text for use in his department.

On Oct. 28, 1998, I advised Gerald Stauffer of Oakland Christian Schools in Auburn Hills on the use of calculators in the teaching of calculus.

On Oct. 30, 1998, I allowed a former student, Dominick Baffo (now a teacher), to interview me on tape for two hours concerning my teaching philosophy, methods, and suggestions regarding public school teaching.

On Aug. 6–7, 2006, I carried on a correspondence with Shaun Fitch of Hillsboro, OR, who found my website on the web and requested information concerning the relative merits of different calculators. Mr. Fitch is involved in the programming of metal fabrication equipment.

In Nov. 2008, I prepared and sent John Oprea an errata list for his text *Differential Geometry and its Applications*.

In Sept. and Oct. 2010, I reviewed a pre-publication version of a survey article on methods of evaluation of determinants for Professor Gary Greenfield of the University of Richmond.

In September and November 2011, I sent lists of errata to Prof. James Pommersheim for his new text *Number Theory: A Lively Introduction with Proofs, Applications, and Stories* (coauthored by Tim Marks and Erica Flapan) and the associated Instructor's Resources.

Throughout much of Fall 2011, I corresponded with Prof. Thomas Banchoff about his new text *Differential Geometry of Curves and Surfaces* (coauthored by Stephen Lovett). I sent him suggestions for improvements in the text and its problems, and suggestions regarding the online software associated with the text. In February 2013, I sent him a comprehensive nine-page list of errata for the text.

In 2013–14, I provided feedback and editorial suggestions to Gilbert Strang of MIT on drafts of his book *Differential Equations and Linear Algebra*, Wellesley-Cambridge Press, 2014.

In December 2015, I sent John J. Watkins a proof for a result that was stated in his number theory text but for which he didn't have a proof.

In April 2019, I sent corrections and editorial suggestions to Gilbert Strang of MIT for his new book *Linear Algebra and Learning From Data*.

Consulting to Private Enterprises

For Robert Oppelt, director of an association of Suzuki method string instrument teachers (Sept. 1983): determination of fret placement on string instruments as a function of the distance from nut to bridge.

On May 10, 1993, at the request of Christopher Wathen of the URGE Prevention Program (for the prevention of substance abuse), I made recommendations on how to bill organizations for URGE services in a way that is fair both to URGE and to the organizations receiving service.

On Nov. 10, 2000, I served as expert witness on geometry in a telephone conference with attorney Mike Acosta of Plunkett & Cooney to discuss aspects of patent claim language, construction of accused device, and geometric relationship of cutter wheel axis and axis of tube being cut. I also reviewed materials faxed by Mr. Acosta and had a second telephone conference with him.

On Feb. 6, 2001, I advised Mike Levi of Iverson Industries on how best to apply rotations to three intersecting surfaces so as to make them meet at right angles.

On Jan. 12, 2006, I served as a member of a Multivariable Calculus Focus Group formed by Freeman and Co. at the AMS/MAA meeting in San Antonio, TX for the purpose of determining trends in the teaching of the latter portion of the calculus sequence.

In Feb. 2006, I suggested to John Grafton, the Dover editor, that he reissue the text *Elementary Linear Algebra with Applications* by Marc Konvisser.

I was one of the fifteen participants in a Calculus Symposium held by McGraw-Hill Mar. 23–26,

2006 in Amelia Island, FL. I was chosen on the basis of my expertise in teaching calculus and my knowledge of calculus texts.

I served as a member of a McGraw-Hill Calculus Focus Group that met in San Diego on Jan. 8, 2008.

In Feb. 2008, I prepared an errata list for the book *An Adventurer's Guide to Number Theory* by Richard Friedberg, and sent it to Dover's editor, John Grafton, along with a suggestion that he reissue Underwood Dudley's book *Elementary Number Theory* (2nd edition). He did.

In Oct. 2008, I suggested to Dover's editor, John Grafton, that he reissue the elementary number theory text by Uspensky and Heaslet.

In Feb. 2012, I sent a list of errata for Dudley Underwood's number theory text to Dover's editor, John Grafton.

In 2014, I did an extensive review for Springer-Verlag of a manuscript by Gary Knott for a textbook on linear algebra.

Numerous reviews of textbook manuscripts and some reviews of software. Publishers that have solicited my reviews since 1978 include:

Academic Press
Addison-Wesley
Allyn & Bacon
Brooks/Cole
Wm. C. Brown
CRC Press
Elsevier
Freeman and Co.
Harcourt Brace Jovanovich
Harper and Row
D. C. Heath
Holt, Rinehart, & Winston
Houghton Mifflin
Richard D. Irwin
Macmillan
McGraw-Hill
Open Textbooks Network
Prentice Hall
PWS (previously Prindle, Weber, & Schmidt)
Random House/Birkhäuser
Saunders College Publishing
Springer-Verlag
Wadsworth
Wellesley-Cambridge Press
West
John Wiley & Sons
Worth

Texts in which my contributions are formally acknowledged include:

N. R. Blachman & M. J. Mossinghoff, *Maple® V Quick Reference*, Brooks/Cole, 1994

D. Burton, *Elementary Number Theory* (4th, 5th, 6th, and 7th editions), McGraw-Hill, 1998, 2002, 2007, and 2011.

C. H. Edwards, Jr. & D. E. Penney, *Calculus with Analytic Geometry*, Prentice Hall, 1994

R. Ellis and D. Gulick, *Calculus with Analytic Geometry*, Harcourt Brace Jovanovich, 1978, 1982, 1986, and 1990 (also the Alternate Edition, 1988)

H. Flanders, *Calculus*, Freeman, 1985

J. Fraleigh and R. Beauregard, *Linear Algebra*, Addison Wesley, 1987, 1990, and 1995

G. Freilich and F. Greenleaf, *Calculus: A Short Course with Applications*, Harcourt Brace Jovanovich, 1985

A. Gray, *Modern Differential Geometry of Curves and Surfaces with Mathematica®* (3rd

Edition by E. Abbena and S. Salamon), 2006
S. Grossman, *Calculus*, Academic Press, 1984
B. Gulati and H. Bass, *Precalculus*, Allyn and Bacon, 1988
D. Gulick, *Encounters With Chaos*, McGraw-Hill, 1992
G. J. Janusz, *Calculus*, Wm. C. Brown, 1994
T. Koshy, *Elementary Number Theory with Applications*, Harcourt/Academic Press, 2002 and 2007
R. Larson, R. P. Hostetler, and B. H. Edwards, *Calculus: Early Transcendental Functions*, Houghton Mifflin, 2006
J. L. Nanney and J. L. Cable, *Developing Skills in Algebra* (5th Edition), Wm. C. Brown, 1992
J. Oprea, *Differential Geometry and Its Applications* (2nd Edition), Pearson Prentice Hall, 2004 and Mathematical Association of America, 2007
J. Rogawski, *Calculus and Calculus: Early Transcendentals*, Freeman, 2008 and 2012
J. Rogawski and C. Adams, *Calculus* and *Calculus: Early Transcendentals*, Freeman, 2015
K. Rosen, *Elementary Number Theory and Its Applications*, Addison Wesley, 1988, 1993, 2000, and 2005
R. Seeley, *Calculus*, Harcourt Brace Jovanovich, 1990
R. Silverman, *Calculus with Analytic Geometry*, Prentice Hall, 1985
K. Smith, *Precalculus Mathematics*, Brooks/Cole, 1983, 1986, and 1990
R. T. Smith and R. B. Minton, *Discovering Calculus with the HP-28 and the HP-48*, McGraw-Hill, 1992
S. Stein, *Calculus and Analytic Geometry*, McGraw-Hill, 1982, 1987, and 1992
J. Stewart, *Calculus*, Brooks/Cole, 1987, 1991, 1995, 1999, 2003, 2008, 2011, and 2015 (also *Calculus: Early Transcendentals*, *Single Variable Calculus*, and *Single Variable Calculus: Early Transcendentals*, all published in 1991, 1995, 1999, 2003, 2008, 2011, and 2015; and *Calculus: Early Vectors*, Preliminary Edition, 1999)
G. Strang, *Linear Algebra and its Applications*, Harcourt Brace Jovanovich, 1988
G. Strang, *Calculus*, Wellesley-Cambridge Press, 1991
G. Strang, *Differential Equations and Linear Algebra*, Wellesley-Cambridge Press, 2014
("Daniel Drucker watched over the text of Chapters 1–3, the best mathematics editor I know. My writing tries to be personal and direct—Dan tries to make it right.")
G. Strang, *Linear Algebra for Everyone*, Wellesley-Cambridge Press, 2020
("Another good fortune has been help from Daniel Drucker. He is the most careful reader I know.")
E. W. Swokowski, *Calculus*, PWS-Kent, 1991
E. W. Swokowski, M. Olinick, & D. Pence, *Calculus*, PWS, 1994
G. Thomas and R. Finney, *Calculus and Analytic Geometry*, Addison Wesley, 1984
D. Trim, *Calculus and Analytic Geometry*, Addison Wesley, 1983
C. F. Van Loan, *Introduction to Scientific Computing: A Matrix-Vector Approach Using MATLAB®* (2nd Edition), Prentice-Hall, 2000

NOTE: Reviews of manuscripts for publishers are related to university and departmental service in the following ways:

1) My affiliation appears in the acknowledgments of various popular and well-distributed texts.
2) My reviews reflect departmental needs and influence the content of texts under development. By maintaining personal contact with many of the college mathematics editors, I am able to ensure that publishers regularly consider our needs.
3) Publishers' representatives regularly request my opinions of recent and forthcoming books. By meeting with them (as well as by reviewing manuscripts), I keep up with new and forthcoming books on mathematics. For this reason, the department regularly calls upon me to help evaluate competing books when we select texts for our courses. In fact, before evaluating books for use in a course, department members often consult me to find out which books are worth evaluating.
4) Professors at other universities sometimes seek help in selecting texts for use in their departments. On several occasions, my name has been suggested by editors, publishers'

representatives, or other professors. Some such instances are listed above under **IV. F. Consulting to Public Agencies, Consulting outside WSU**.

G. Journal/Editorial Activity

Refereeing of Proposals

Refereed proposal for Cooperative Grants Program of the U.S. Civilian Research and Development Foundation (CRDF), May–June 2003. The proposal concerned the application of modern differential geometric methods to problems in economics.

Refereeing of Papers

Referee for:

American Journal of Undergraduate Research
- "Characterization of Rectifying and Sphere Curves in $\mathbb{R}^3$" by Julie Logan and Yun Myung Oh, November 2016 and May 2017.

American Mathematical Monthly
- "A determinantal factorization" by L. R. Fletcher, 3/7/80–6/13/80
- "Hyperbolic and trigonometric crossing points" by J. B. Wilker and P. J. Leah, 1/26/87–3/10/87
- "Descartes Rule of Signs—How hard can it be?" by Stewart A. Levin, 2/24/99–4/10/99
- "New Designs for Descartes' Rule of Signs" by Michael Schmitt, 9/29/02–10/06/02.
- "Equiaffine Geometry of Curves" by Steven Wilkinson, 11/03.
- "The Nonholonomy of the Sphere" by Brody Dylan Johnson, 7/29/05–7/30/05.
- "Descartes' Rule of Signs by an Easy Induction" by R. D. Arthan, 1/19/08.
- "Fermat's Little Theorem and Gauß Congruence: Matrix Versions and Cyclic Permutations", two versions, July–September 2016.
- "The turning number of a planar closed curve and height functions", February–April 2019.
- "Reflections on equidistant sets", November–December 2020.

The College Mathematics Journal
- "A graphical approach to the first and second derivative tests" by Pulskamp, 10/14/93–10/27/93. Computer Corner (Richard Johnsonbaugh, Editor)
- "The integral is a limit of what?", 5/23/95–6/6/95. Computer Corner (Richard Johnsonbaugh, Editor)

Geometriae Dedicata
- "Holomorphic Legendre Curves in the Complex Heisenberg Group" by C. Baikoussis, D. E. Blair, and F. Gouli-Andreou, July 1996-April 1997.

Journal of Mathematics and the Arts
- "Sand drawing and Gaussian graphs" by M. L. Demaine, P. Taslakian and G. T. Toussaint, Jan. 2007.

Journal of Mathematics and Music
- "Transfer matrix methods for linear musical transformations: consonant triads", July–December 2016 and September 2017.

Kyungpook Mathematical Journal
- "Decompositions and the Complex Contact Structures of $\mathrm{SL}(2,\mathbb{C})$" by Brendan Foreman, 8/01-10/01.

Linear Algebra and Its Applications
- "On the discriminant of a trinomial" by Gary Greenfield, acknowledged Nov. 1982.

Mathematics Magazine
- "Reflection Properties of Curves and Surfaces Through Vector Analysis" by Phil Locke, U of Maine, Orono, 7/13/92–8/6/92. (Martha Siegel, Editor)
- "Geodesics on the Ellipsoid from the Greeks to the Present" by Andrew Izsak, MIT, 11/19/92–2/9/93.

Nova Journal of Algebra and Geometry
- "Normal Forms in Lorentzian Spaces" by David A. Singer and Daniel H. Steinberg, Case Western Reserve, 12/7/92–10/27/93. (Joseph A. Wolf, Editor)

Pacific Journal of Mathematics

"Anti-Commutative Algebras and Homogeneous Spaces with Multiplications" by Arthur A. Sagle, Jan.–Mar. 1976.

"Power-Associative Algebras and Riemannian Connections" by Arthur A. Sagle, Jan.–Mar. 1976.

Pi Mu Epsilon Journal

"From Graphs to Determinants to Matrices" by Samantha Campbell, Yiran Duan, Hristiyan Hristov, and Max Grinchenko, Sept.–Oct. 2010.

Proceedings of the AMS

"Representations and graphs" by John McKay, returned 8/27/79.

H. Other Professionally Related Service

Talks for high school students

Talk on careers in mathematics, Girl Scout meeting, Southfield, MI, Spring 1978.

Talk on congruences in number theory, Western H. S., Detroit, MI, March 4, 1982*.

Talk on congruences in number theory, Lawrence Institute of Technology, Southfield, MI, March 3, 1983*.

Talk on number theory, Lawrence Institute of Technology, Southfield, MI, May 7, 1987*.

The Fine Line Between Convergence and Divergence and the Power of the Integral Test Estimate, AP Miniconference, WSU, Detroit, MI, April 26, 2005.

* arranged in cooperation with Liberal Arts Speakers Bureau

Attended "meet-and-greet for mathematics undergraduates, Sept. 27, 2013.

Research Experiences for Undergraduates (REU)

Participated in REU days, WSU, July 22, 2011; July 20, 2012; July 19, 2013; and July 24, 2014.

Consulting to individuals in Metropolitan Detroit

I receive numerous calls for mathematical assistance from parents of elementary and secondary school students, from high school students, from former students of mine, and from businessmen and engineers. I have never turned anyone down. I have helped with "new math", explanations of bacterial growth, advice on mathematical science fair projects, calculation of the amount of filler needed for the balls in a circus seal act—everything up to and including recommended reading on topics in advanced mathematics.

Graduate Examiner for oral examinations in other departments

(Student's name unavailable), Master's exam in Economics, Oct. 18, 1976.

Khodubhai S. Patel, Ph.D. oral qualifying exam in Mechanical Engineering, Dec. 17, 1981 and Dec. 13, 1982.

Jae H. Yoo, Ph.D. exam in Computer Engineering, Feb. 15, 1985.

Michael Higgins, Ph.D. oral qualifying exam in Physics, Sept. 5, 1989.

Stamatina Ziemba, Ph.D. oral qualifying exam in Biological Sciences, Dec. 9, 1992.

Christopher P. Griffin, Masters Thesis Defense in Mechanical Engineering, Mar. 2, 1993. (I served as examiner and moderator.)

Allen P. Kovacs, Ph.D. oral qualifying exam in Mechanical Engineering, Apr. 19, 1994.

Zhuoran Huang, Ph.D. oral qualifying exam in Instructional Technology, Dec. 7, 1994.

Mehmet Balcilar, Ph.D. oral qualifying exam in Economics, Aug. 2, 1995.

Janice Fries, Ph.D. oral qualifying exam in Nursing, Mar. 8, 1996.

Janice Fries, defense of Ph.D. dissertation in Nursing, Health and Social Support of Older Adults, Aug. 11, 1998.

Joong-Sub Han, oral qualifying exam in Mechanical Engineering, Dec. 10, 2001.

Joong-Sub Han, (unsuccessful) thesis defense, Feb. 17, 2003.

Joong-Sub Han, defense of Ph.D. dissertation in Mechanical Engineering, Characteristics of Advanced

Diesel Fuel Injection Systems and Their High-Pressure Diesel Sprays, Oct. 10, 2003.

Miscellaneous

During 1976–77, I formulated the weighted preference balloting system used in all Mathematics Department elections since September 1977.

During 1983–84, I helped to write and edit various proposals for the acquisition of computer equipment by the Department of Mathematics. These included proposals to Radio Shack (March 1983), WSU (October 1983), Burroughs (December 1983), FIPSE (January 1984), and Ridge (May 1984).

During 1987–88, I helped to evaluate computer hardware/software combinations for use in remedial mathematics courses. The evaluation process led to the establishment of a remedial mathematics laboratory featuring WICAT software and both WICAT and Zenith hardware.

During December 1988, I co-authored (with B. Eisenstadt) an internal proposal for an undergraduate mathematics laboratory to be used in regular (non-remedial) courses. We called for the adoption of an inexpensive coordinated set of software packages that would have upgraded instruction in a wide range of courses. The proposal was rejected due to lack of space for a computer room.

During 1988–89, I served as Faculty Adviser for the COMAP Competition. A team of WSU mathematics students prepared for and participated in a nation-wide problem-solving competition in applied mathematics sponsored by the Consortium for Mathematics and its Applications (COMAP) in Arlington, Massachusetts.

During November 1989, I wrote (with the help of A. Kozlowski) an internal proposal for matching funds to facilitate the acquisition of Macintosh equipment and software by the Mathematics Department.

During Fall 1991, I volunteered to be one of the two people designated to implement and run an experimental program in teaching industrial applications of mathematics at WSU. The program, coordinated by the Institute for Mathematics and Its Applications in Minnesota, was to be initiated at five schools across the country. The Department of Mathematics submitted a proposal (in August 1991) that we hoped would result in WSU being chosen as one of those five sites. We *were* chosen, but NSF decided to restrict the program to just one site for the 1992–93 academic year.

In May 1993, I attended the IMA Workshop, "Designing a Course in Industrial Mathematics for Undergraduates".

In April 1995, I wrote a proposal for the acquisition of some outdated Macintosh computers from the Dean's Office in the College of Science. The Mathematics Department received two Macintosh computers.

On June 23, 1997, I participated in the WSU Orientation Program by delivering a talk to incoming freshmen entitled "Making the Most of College". After a question session I met with Chris Cook of University Advising to suggest improvements in future orientation sessions.

On August 13, 1998, I again participated in the WSU Orientation Program by delivering a revised version of my talk, "Making the Most of College".

On July 14, 1999 and August 17, 2000, I participated in the WSU Orientation Program by delivering a more interactive version of "Making the Most of College" at which I distributed handouts to attendees. At the request of the director of the Mathematics Resource Center in our department, I have given permission for my handouts to be distributed to students using the Center.

For several years, I attended the graduation ceremony for Honors students in the colleges of Science and Liberal Arts. I also attended the welcoming reception for honors students and, whenever possible, other Honors Program functions during the year.

On April 15, 2004, I attended the Fourth Annual Student Athlete Recognition Ceremony at St. Andrews Church at the invitation of Faith Kejbou, one of my Winter 2004 Calculus I students. (She and Leah Steinke, another student in my class, were honored that day.)

On April 14, 2005, I attended the Fifth Annual Student Athlete Recognition Ceremony at St. Andrews Church at the invitation of David Lucas, one of my Winter 2005 Calculus I students.

I. Service Honors

FY 1995 Presidential Bonus Award for Extraordinary Service to the University (for enabling use of graphing calculators in calculus courses).

J. Creative Performances

Detroit Metropolitan Area

Concerts as first violinist in Scandinavian Symphony (approximately 4–5 per season), 1983–1992.
Violin duet concert (with Nancy Downie), Border's Bookstore, Dearborn, MI, Sept. 29, 1995.
Violin duet concert (with Nancy Downie), Tel-Twelve Mall, Southfield, MI, May 7, 1996.
Concerts as first violinist in Southfield Symphony Orchestra (approximately 4–7 per season), 1991–2000.
Concerts as assistant concertmaster in Royal Oak Community Orchestra (4 per season), 2000–2004.
Soloist in Corelli's Christmas Concerto, Royal Oak Community Orchestra concert, Dec. 12, 2003.
Concerts as assistant concertmaster in Royal Oak Symphony Orchestra (4 per season), 2004–2005.
First violinist in performance of Mozart's "Dissonance" string quartet (K. 465) as part of Collage Concert at Shrine Church of the Little Flower, Royal Oak, MI, May 23, 2004.
Concerts as first violinist in Southfield Philharmonic (3 in first season, 2–6 per season thereafter), 2001–2006.
Concert as first violinist in clarinet quintet, Grosse Pointe Chamber Music Series, June 6, 2010.
Violinist in violin-clarinet-bassoon trios at Barnes & Noble Bookstore, Troy, MI, December 3, 2016.
Concerts as concertmaster of Royal Oak Symphony Orchestra (approximately 4 per season), 2005–present.