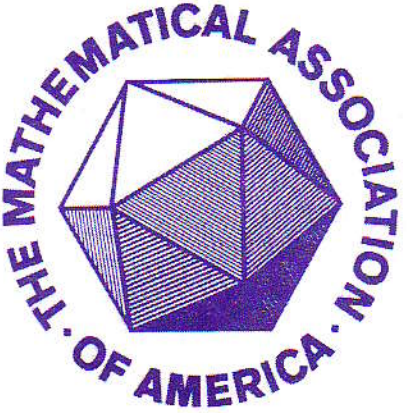
NORTHEASTERN SECTION



NEWSLETTER

FALL 1996

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FUTURE SECTION MEETINGS

November 22-23, 1996: UMass/Boston
Local Arrangements: John Lutts
Program Chair: Joe Witkowski, Keene State College

June 6-7, 1997: Merrimack College
Local Arrangements: Dave Finn and Carolyn Labenski

OTHER SECTION ACTIVITIES

Minicourse: April 1997
TBA

Short Course: Salve Regina University, June 15-19, 1997
Dynamical Systems Across the Curriculum
Robert Devaney, Boston University
Coordinator: William Stout, Salve Regina University
See Page 7

Regional Dinner Meetings: Spring 1997
Coordinator: Larry Braden, St. Paul's School
See Page 5

NOMINATIONS

1997 NES/MAA Award for Distinguished College or University Teaching of Mathematics
Committee Chair: Donna Beers, Simmons College
See Page 20

Election of Section Officers
See Pages 4-5

CHAIRPERSON'S MESSAGE

In my first chair's message for the *Newsletter* last spring I presented to the Section a few announcements and a few questions. I had hoped that a few replies would trickle in to the questions but since none have been forthcoming I am going to assume that those of us on the Executive Committee are managing the Section to everyone's satisfaction. In this issue, then, I cut right to the announcements and finish with a few comments on activities in and around our Section.

Our sincere appreciation is in order for all of the people who toiled on both the Local Arrangements and Program Committees for the Spring 1996 meeting at Hampshire College. Dave Kelly of Hampshire provided us with a beautiful setting and delightful meals while Bob Hayden of Plymouth State chaired the Program Committee.

I suspect that anyone reading this *Newsletter* in enough detail to include this statement has probably already looked at the program for the fall 1996 meeting at UMass/Boston. Jack Lutts has done a masterful job of patiently dealing with his school's myriad administrative offices while serving as our Local Arrangements Coordinator. I hope we reward him by turning out in large numbers. The Program Committee, chaired by Joe Witkowski of Keene State, has put together an attractive package that should be of wide appeal.

The Fall Meeting will mean that my term as Chair is half over! This exciting news reminds us that it's time to elect some new section officers at our Fall Meeting. See Page 5 for details. Also, this coming January, you can expect to receive a ballot from the national MAA for the election of a new Governor of the Section.

News from Seattle: Our Section was well represented on the West Coast. Our 1996 award winner for Distinguished College or University Teaching, Colin Adams of Williams College (see Page 20), teamed up with his colleague Ed Burger to present two tremendously well received sessions in the main auditorium, and a series of highly regarded workshops. I think every section in the country will be inviting them to speak and it made me glad to know that we have Colin and Ed in our backyard as a continuing resource.

The Section Officers Meeting in Seattle proved to be of great interest. A fact sheet compiled by the MAA office and the Committee on Sections revealed the following facts about our Section. Did you know that of the twenty nine MAA Sections: Ours is one of only three with 2000 or more members? We are one of only nine sections that reported two annual meetings last year? There are at least nine Project NEXT scholars in our Section? This much is clear: Our Section is, if not the most active in the country, among the most active. Our calendar is an ambitious one. If we are to maintain this level of activity it is important that we get our young colleagues involved at every opportunity. The Program Committee has gone out of its way to make these young people available for us to meet at the Fall Meeting so let's go out of our way to make them feel comfortable, welcome and needed.

Richard Cleary
St. Michael's College
Chairperson NES/MAA

GOVERNOR'S MESSAGE

First, let me give you an update on the national meeting schedule for the next few years. Next summer's Mathfest will be held in Atlanta from August 2 - 4. This will be the first summer meeting not held in conjunction with the AMS. The MAA has made a commitment to continue to organize summer meetings on a regular basis through the year 2000. After the 1998 meeting, a comprehensive review will be undertaken with the goal of determining whether or not to continue summer meetings after 2000. MAA summer meetings will focus on professional development, exposition of quality mathematics and programs for students. Research sessions will be included to the extent that they fit into the overall plan of the meeting. The 1997 and 1998 meetings will be planned to accommodate 600-900 attendees, the goal being to have high enough attendance and low enough expenses so that the meeting will not lose money. Plans for 1999 will be formulated with the aid of the knowledge gained from experiences with the 1997 and 1998 meetings. The dates and locations of future winter meetings are as follows:

January	8 - 11, 1997	San Diego
January	7 - 10, 1998	Baltimore
January	13 - 16, 1999	San Antonio
January	19 - 22, 2000	Washington, DC
January	10 - 13, 2001	New Orleans

In the near future, a new e-mail service will be available to interested MAA members. This service will be available on a monthly basis and will inform members about the contents of MAA Online. In other news, the MAA has set up a task force to explore the possibility of holding the International Mathematical Olympiad (IMO) in the United States in the year 2001. At the August meeting of the Board of Governors, the Board approved the MAA's initial steps to bring the IMO to the United States. This included seeking funding for the first year of the six-year planning period, organizing a collaborative effort within the mathematical community and establishing a new organization to plan, organize and raise funds for IMO 2001.

The MAA liaison program is going well. If your institution is not already participating, I encourage you to do so. For those of you who plan ahead, the theme of Mathematics Awareness Week is Mathematics and the Internet. As usual, I appreciate your support and look forward to meeting you at a national or Section meeting.

Karen J. Schroeder
Bentley College
Governor, NES/MAA

NES/MAA WEB SITE

The Northeastern Section is getting its own web site. The site is currently under construction but will be on-line by November 1. The URL will be

HTTP://SCSU.CTSTATEU.EDU/~MAA_NES/MAIN.HTML

If you have suggestions as to what should be available on our site, please send them to Ross Gingrich at GINGRICH@SCSU.CTSTATEU.EDU.

NOMINATIONS COMMITTEE REPORT

The following is the slate of nominees for Section Officers as proposed by the Nominations Committee. Included is a brief biographical sketch of each. The 1996 election will be held on Saturday, November 23, 1996 during the Business Meeting of our Fall Meeting at UMass/Boston.

VICE-CHAIRPERSON

Frank Ford, Providence College

Frank served as Local Arrangements Coordinator for the Fall of 1991 Section meeting and was on the Local Arrangements Committee for the Fall of 1983 meeting both of which were held at Providence College. He was a member of the Program Committee for the Fall of 1988 Section meeting which was held at Rhode Island College. He served as coordinator for the first two Rhode Island Regional Dinner Meetings. He has been the Director of the Providence College High School Computer Programming Contest (a contest which involves over 40 high schools from Rhode Island, Massachusetts and Connecticut) for the past 11 years and has served as the coordinator for the subregional round of the Interscholastic Computer Programming Contest sponsored by ACM twice. He was a judge for the same contest last year and will be again this year. He has been Department Chair for 6 years, was President of the Providence College Faculty Senate for 2 years, and has been Secretary of the Faculty Senate for 8 years.

Bill Roberts, Plymouth State College

Bill Roberts is a Professor of Mathematics, and in 1986-92 served as mathematics department chair, at a small northern New England college. He was an undergraduate at the University of Massachusetts, has a master's in supervision and administration from the University of Hartford, has a CAS in mathematics from Wesleyan University and earned a doctorate in mathematics education from the University of Massachusetts. He has been active in the Northeastern Section of MAA for over twenty-five years. He has served the Section as host site coordinator for a joint MAA-AMS Spring Meeting, a host for a MAA Dinner Meeting in New Hampshire and as section Program Chair for a Fall Meeting at WPI and a Spring Meeting at Bates College. Bill's professional interests include the mathematical preparation of teachers from K - College, current developments in the teaching of statistics, calculus and geometry.

SECRETARY-TREASURER

Alan Gorfin, Western New England College

Alan is Associate Professor of Mathematics at Western New England College. He received his B. S. from Yale University, and his M. A. and Ph. D. from the University of Massachusetts. In recent years his service to the Northeastern Section included co-chairing the Program Committee for the Fall 1991 Meeting at Providence College and

coordinating a Spring Dinner Meeting in 1994. He served as Treasurer of the Storrs Library Corporation in Longmeadow for ten years and as Treasurer for Sinai Temple in Springfield for seven years. Currently, he is Treasurer of the Longmeadow Baseball Association, a position he has held for two years. At Western New England College he has been Secretary to the Faculty Senate for eight of the last nine years.

Betsey Whitman, Framingham State College

Betsey Whitman has been a member of MAA since 1968, serving on various committees in the Florida Section MAA from 1968-1990 while she was a professor at Florida A&M University. Since coming to Framingham State College in 1990, she served as publishers liaison 1992-96 for the Northeastern Section of the MAA. She is interested in early American women mathematicians and is currently working on a biography of Mary F. Winston Newson, the first American woman to earn a Ph. D. in mathematics from a European University.

TWO-YEAR COLLEGE REPRESENTATIVE

Philip Mahler, Middlesex Community College

Philip Mahler has served as the Section's Two-Year Representative since 1994. He is a Professor of Mathematics and Computer Science at Middlesex Community College in Bedford, Massachusetts. His twenty two years of teaching include 15 years at community colleges in Michigan and Massachusetts. He has created self-paced mathematics courses in arithmetic through precalculus. He has published three mathematics texts, with three more in progress. Phil served as Newsletter editor for the Section from 1984 to 1987 and was on the Program Committee for the Spring, 1989 and Spring, 1993 Section meetings. He was Program Chair for the Section's Fall, 1995 Meeting at Salem State College. He is a past Vice-Chair for the Michigan Section of the MAA, and was on the Program Committee for Summer, 1980 MAA meeting. He has served as program and local arrangements chair for the New England Mathematics Association of Two Year Colleges (NEMATYC) and was in charge of local arrangements for the national meeting of the American Mathematical Association of Two-Year Colleges (AMATYC) in 1993. He has presented at meetings of the Michigan MAA section, AMATYC and NEMATYC.

The Nominations Committee consists of Laura L. Kelleher of Massachusetts Maritime Academy (Chair), Lynne Durkin of Bentley College and Miguel A. Garcia of Gateway Community Technical College.

DINNER MEETINGS: SPRING 1997

If you are interested in hosting an NES/MAA Regional Dinner Meeting in the Spring of 1997, please contact Larry Braden of St. Paul's School, Concord NH 03301; (603-225-9104 or lbraden@sps.edu), Coordinator of the Regional Dinner Meetings. We would be especially interested in having Dinner Meetings in regions not represented last spring: Maine, Connecticut, the Canadian Provinces and Western Massachusetts.

MINUTES OF THE LAST MEETING

The Spring Meeting of the Northeastern Section was held on June 7-8, 1996 at Hampshire College in Amherst, Massachusetts. There were approximately 75 registrants.

Workshops

Fitchburg State College and the Lunenburg School System: A K-12/College Partnership by Richie Bisk, Fitchburg State College and Noreen Berry, Lunenburg School System.
Using Writing in Teaching Mathematics by Thomas Rishel, Cornell University.

Panel Discussions

Statistics in the Schools:
Statistics Materials for the Schools by Anne Sevin, Framingham State College.
The Advanced Placement Test in Statistics by Rosemary Roberts, Bowdoin College.
Statistical Training of Future Teachers by Michelle Lamarre, Plymouth State College.

What Do Math Majors Really Do? chaired by Rick Cleary, St. Michael's College.

Special

The Seventeen Board.

Exhibit of Innovative K-12 Mathematics Materials introduced by Robert A. Rosenbaum, Wesleyan University.

Invited Papers

Redesigning Precalculus: A Modeling and Exploratory Approach by Marsha Davis, Eastern Connecticut State University.
Women and Mathematics at Cambridge by James J. Tattersall, Providence College.
How to Prove That There Is No Simple Answer by Herb Wilf, University of Pennsylvania.
Industrial-Academic Partnerships: Mutual Benefits by Martha J. Siegel, Towson State University.

Student Papers

Development of the Proof of the Forgione-Olds Theorem by Kevin Forgione and Wesley Olds, Lyndon State College.
So You Want To Do Arithmetic With Infinite Numbers by Rebecca Sparks, Rhode Island College.
The Taj Mahal: A Mathematical Masterpiece by Anuradha Karna and Nathan Gibson, Worcester Polytechnic Institute.

How to Harvest Haddock by Anuradha Karna and Nathan Gibson, Worcester Polytechnic Institute.

Contributed Papers

Helping Mathematics Majors to Build their Communications and Teaching Skills by Irina Peterburgsky, Suffolk University.
A Realistic Approach to Limiting the Length of a Confidence Interval by Tony Julianelle, University of Vermont.
Graphs, Eigenvectors and Communications Networks by John Goulet, Worcester Polytechnic Institute.
Precalculus Mathematics: 1966 versus 1996 by Dominico Rosa, Teiko Post University.
The Uniquely Corrected Method to Compute High Power Functions by Po Kee Wong, Adam Wong and Anita Wong, Systems Research Company.

Numerous items were discussed at the Business Meeting which are discussed elsewhere in this *Newsletter*.

The following exhibited there latest offerings during the meeting and we would like to thank them: Prentice Hall, A.K. Peters, Texas Instruments, Addison Wesley and John Wiley.

Lynne Durkin
Bentley College
Secretary-Treasurer, NES/MAA

SMITH AND MOORE PRESENT DUKE CALCULUS REFORM SHORT COURSE COMPLETES 17TH ANNUAL SESSION

Thirty teachers and professors of calculus worked with David Smith and Lang Moore of Duke University to learn and to understand the ideas of the Duke University reform calculus project. This was the third in the sequence of calculus reform projects sponsored by the National Science Foundation through a grant to Professor Don Small of the United States Military Academy at West Point and formerly of Colby College. Its attendees included a mix of calculus teachers from high schools, technical schools, junior colleges, colleges and universities. It is tempting to use superlatives to describe these short courses because we have been most fortunate in having outstanding presentations and workshops year after year. This year was no exception. Our lecturers guided us through the significant ideas of their calculus teaching techniques in a most enjoyable week of learning and doing.

The weather cooperated well, except for a downpour Friday afternoon to hasten our departure. Interestingly, for the first time, everyone who took the Bar Harbor trip Wednesday afternoon chose to do hiking. Part of the group hiked down from Mount Cadillac; the rest hiked to Great Head by Sand Beach. In past years at least some in the group have chosen to shop in Bar Harbor and some to ride the Park Loop Road.

The short course, held each June at the University of Maine, was instituted in 1979 by Don Small and Grattan Murphy, and has been held each year since then except 1994. Professor Murphy served as its director for the first half of its lifetime, until he became Chairperson of the University of Maine Mathematics Department, at which time he turned it over to me. It

has been a privilege to try to keep things running smoothly, and I heartily thank all those people who have worked to make these short courses so successful. Last year a committee of the NES decided to have the short course rotate among colleges, so it is my turn now to relinquish the directorship. Next year the short course will be held at Salve Regina University in Newport, Rhode Island on June 15-19 and William Stout will serve as coordinator. The topic will be *Dynamical Systems Across the Curriculum* and will be presented by Robert Devaney of Boston University.

Clayton W. Dodge
University of Maine

JOHN W. ROYAL

John W. Royal, Professor of Mathematics at Merrimack College, died March 30th, after a ten year battle with cancer. John earned his M. A. in mathematics from the University of Maine-Orono and his Ph. D. in numerical analysis from Boston University. Since 1959, he taught at Merrimack College where he chaired the Department of Mathematics and Computer Science for 10 years and introduced a co-op program for computer science majors.

He was active in the Northeastern Section of the MAA for 37 years. He served as a member of the Executive Committee and the Nominating Committee and as a program chair. He was Local Arrangements Chair for the section meetings at Merrimack College in 1977, 1980 and 1992.

The Dr. John W. Royal Endowed Warrior Athletic Scholarship has been established in his memory. Donations can be made to Merrimack College, OIA Box A-S, North Andover MA 01845.

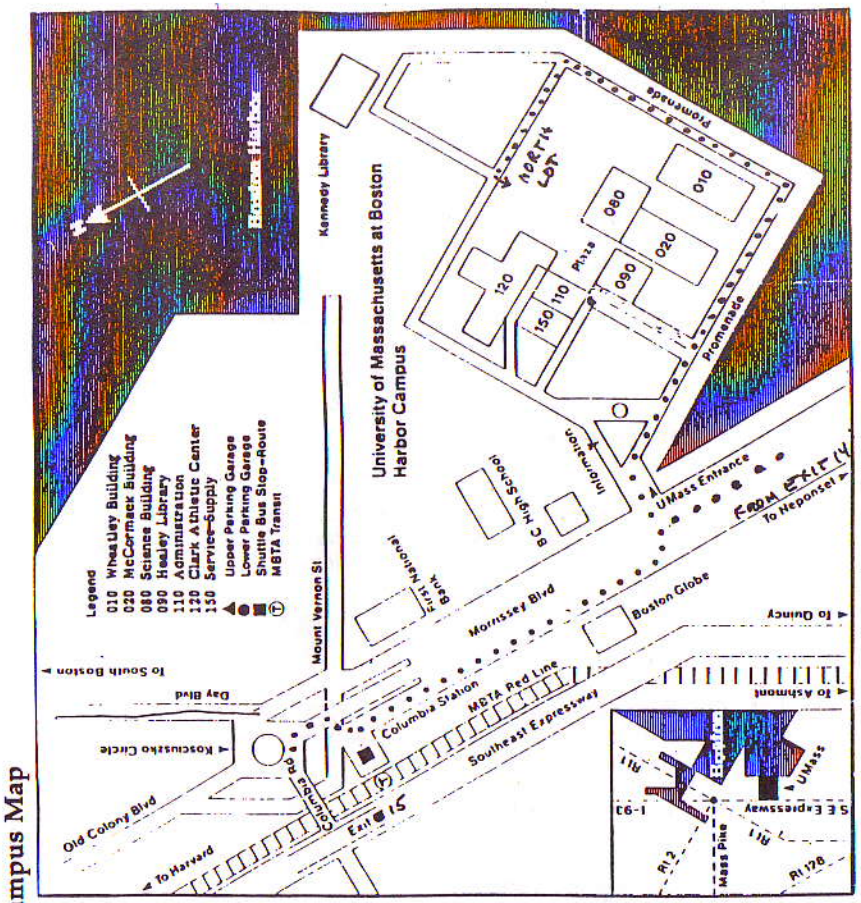
ASSESSMENT IN STATISTICS COURSES

The Boston Chapter of the American Statistical Association is planning a conference on Assessment in Statistics Courses tentatively scheduled for Saturday, April 19, 1997 at Simmons College. Joan Garfield from the University of Minnesota will be the Keynote Speaker. The local organizers of this conference are Robert Goldman, John D. McKenzie, Jr., and Anne Sevin, the same group who organized the March 1996 conference on Trends in Introductory Statistics Courses: Topics, Techniques, Technology.

The conference will address five broad areas of assessment in statistics courses. These include assessing students (summative assessment), assessing the course (formative assessment), assessing software, assessing textbooks, and assessing innovation (i.e., how can an instructor decide if a new innovation in his or her class is successful). In addition to having speakers who address these areas, we envision having small-group, hands-on sessions. Some possible themes for these sessions include sharing favorite test questions, learning how to develop a scoring rubric, doing a portfolio assessment, the AP Statistics exam, evaluating software in a computer lab, and evaluating textbooks.

If you would like to receive a registration packet, please contact Dr. Robert Goldman, Department of Mathematics, Simmons College, 300 The Fenway, Boston, MA 02115-5898; phone (617) 521-2690; e-mail RGOLDMAN@VMSVAX.SIMMONS.EDU.

Campus Map



NORTHEASTERN SECTION OF THE MAA
FALL MEETING: NOVEMBER 22-23, 1996
UNIVERSITY OF MASSACHUSETTS AT BOSTON

Friday, November 22

2:30-6:00	Registration	Sci-2-Lobby
2:30-3:30	Executive Committee Meeting	Sci-1-089
3:30-4:30	**Explorations in College Algebra: Developing Algebra from Data Based Applications** Linda Kime, UMass/Boston	
3:30-4:30	**Using Fermi Problems to Teach Informal Model-Building** George Lukas, UMass/Boston	
4:45-5:45	Student Papers	
4:45-5:45	**Homepage Workshop** Bill Campbell, UMass/Boston	
4:45-5:45	**Explorations in College Algebra: The Physical/Visual Connection** Meg Hickey, Massachusetts College of Art	
6:00-6:45	Reception	
6:45-8:00	Dinner	
8:10-8:15	Welcoming Remarks Christine Armette-Kibel, Dean of Faculty of Sciences, UMass/Boston	
8:15- 9:10	**The Descartes-Fermat Feud** Ed Sandifer, Western Connecticut State University	

Saturday, November 23

7:30-10:30	Registration	Sci-2-Lobby
8:30-3:00	Book Exhibits	
8:00-9:55	**Student Chapter Workshop: Can We Have Proofs Without Axioms in Geometry?** David Henderson, Cornell University	

9:00-10:00	New Faculty Presentations: **Family Groups in the Outback** Sandy Rhoades, Keene State College **A Few of My Favorite Calc III Things** Tommy Ratliff, Wheaton College **How I Explain My Research to Undergraduates** Susan Loepp, Willams College **Solving Linear Systems of Equations and its Relation to Image Reconstruction from Projections** Ed Soares, College of the Holy Cross
10:00-10:30	Coffee Break and Tour of Book Exhibits
10:35-11:30	**Christie Lecture: N.N. Luzin's Notebooks on the Mysteries of Set Theory** Roger Cooke, University of Vermont
11:30-11:55	Business Meeting and Election of Section Officers
12:00-1:00	Lunch
1:00-1:50	**The Algebra of Solving Polynomial Equations** David Cox, Amherst College
2:00-2:50	**Higher Codimensional Geometry and Linear Algebra** Thomas Garrity, Williams College
3:00-3:50	Contributed Paper Session

PROGRAM COMMITTEE
Joseph Witkowski, Keene State College, Chair
Ockle Johnson, Keene State College
Dan Carter, Keene State College
Fredericka Bennett, North Adams State College

LOCAL ARRANGEMENTS
John A. Lutts, UMass/Boston

DIRECTIONS TO THE UMASS/BOSTON, HARBOR CAMPUS

NOMENCLATURE: In Boston, especially near UMass, I-93, Rte 3 and the Southeast Expressway are three names for the same road. Similarly, Rte 128 is the old name for the beltway around Boston; it and I-93 coincide east of where I-95 (from Providence RI) meets Rte 128, while I-95 and Rte 128 coincide west of where I-95 meets Rte 128.

FROM THE NORTH: Take I-93 south into Boston to Exit 15 (marked Columbia Rd.). Turn left at the end of the ramp onto Columbia Rd.. Enter the rotary and take the first right onto Morrissey Blvd. Bear right of the island at the bottom of the overpass, following the UMass/Boston sign. Go past the Boston Globe and its traffic light. At the next traffic light turn left onto the campus. (See the map on Page 9.)

FROM THE WEST: Take the Mass Turnpike (I-90 east) into Boston to the Southeast Expressway going south. Get off at Exit 15 (marked Columbia Rd.). Then follow the directions given above from the North.

FROM THE SOUTH: Take I-93 north into Boston. Get off at Exit 14 (marked UMass and Morrissey Blvd.). Continue straight at the end of the ramp onto Morrissey Blvd. Take a right at the first traffic light onto the UMass campus. (See the map on Page 9).

BY PUBLIC TRANSPORTATION: Take the MBTA Red Line to the Columbia/JFK station. Transfer to the free university shuttle bus (run by Crystal Transportation) at the bottom of the stairs outside the MBTA station. This bus stops in front of the Administration Building on campus. After getting off the bus, walk up the stairs to the campus plaza level. Follow the NES/MAA arrow signs to the Science Building. Inside the Science Building, take the stairs or the elevator to the 2nd floor for registration.

PARKING: Space has been reserved for the conference in the North Lot. (Follow the signs to the lot and consult the map on Page 9). Park in the outdoor area. Look for NES/MAA arrow signs in the parking area to direct you to the Science Building elevator in the parking area under the campus plaza and buildings. Take that elevator to the 2nd floor for registration. Note that the normal $3.75 per day parking fee will be waived for paid conference attenders: you will be provided with a parking pass with your registration materials. Should you have to leave the parking area during the day and wish to return, be sure to keep the pass with you.

UNIVERSITY OF MASSACHUSETTS/BOSTON

UMass/Boston is the urban campus of the University of Massachusetts system. It is comprised of five colleges providing undergraduate and graduate education to commuting residents of metropolitan Boston: the College of Arts and Sciences, the College of Management, the College of Nursing, the College of Community and Public Service and the Graduate College of Education. All share in one mission: "to provide challenging teaching, distinguished research, and extensive service which particularly respond to the academic and economic needs of the state's urban areas and their diverse populations." It offers 60 Bachelor's programs, 26 Master's programs and tracks, 7 Graduate-level Certificate programs and 10 Doctoral programs.

The Department of Mathematics and Computer Science offers Bachelor's degrees in mathematics and computer science and Master's and Ph. D. degrees in computer science. It also cooperates with the Graduate School of Education in their teacher certification program in mathematics at both the middle and secondary school levels for both graduate and undergraduate students.

ACCOMMODATIONS

PLEASE MAKE YOUR RESERVATIONS BY CALLING THE CHOSEN MOTEL DIRECTLY.

The following motel is offering special rates in conjunction with our meeting:

Susse Chalet, 800 Morrissey Blvd., Boston 02125 Tele: 617-279-9100
$53.70 for single $58.70 for double
To obtain these rates (which do not include room tax) refer to the NES/MAA conference at UMass/Boston and make your reservations by November 13th.

Other local area motels include:
Adams Inn Hotel, 29 Hancock Street, Quincy 02171 Tele: 617-328-1500
$64.00 for single $69.00 for double
Sheraton Tara Hotel, 37 Forbes Rd., Braintree 02184 Tele: 617-848-0600
$145.00 for single $145.00 for double
Days Inn of Braintree, 190 Wood Rd., Braintree 02184 Tele: 617-848-1260
$70.00 for single $75.00 for double
Holiday Inn, 1374 Main St., Randolph 02368 Tele: 617- 961-1000
$105.00 for single $115.00 for double

ABSTRACTS/SPEAKERS

Explorations in College Algebra: Developing Algebra from Data-Based Applications
Linda Kime, UMass/Boston

A consortium based at the University of Massachusetts at Boston and funded by the National Science Foundation is working to redesign the traditional college algebra course in the spirit of calculus reform and the AMATYC and NCTM standards. The materials were beta tested at 15 institutions throughout the US in 1995-1996 and were published in a preliminary edition by John Wiley & Sons in July 1996.

The materials shift the focus from learning a set of discrete mechanical rules to exploring how algebra is actually used to answer questions in the social, physical, and life sciences. The materials are designed to: develop algebra from data-based applications; actively involve students through small-group explorations of open-ended questions; use graphs, tables and symbolic expressions to explore patterns in data and functions; encourage the communication of ideas through class discussions, and written and oral presentations; integrate technology through the use of computers and/or graphing calculators.

Linda Kime received a B. A. in mathematics from Wellesley College and a Ph. D in mathematics from Cornell University. She has taught at

Boston State College and UMass/Boston. Her interests include reforming the way mathematics is taught and integrating technology into teaching. Scuba diving, hiking, reading, traveling, and sailing are some of her personal interests.

Using Fermi Problems to Teach Informal Model-Building
George Lukas, UMass/Boston

"Given that there is a North Star and no South Star how many stars are visible to the naked eye?" Enrico Fermi posed such apparently unsolvable problems to his physics students to be solved without the use of outside references. One can solve problems which at first seem unapproachable by combining numbers and facts that one already knows. Solving such a problem without use of outside references requires one to marshal an array of possibly relevant facts and concepts and to develop an "informal model" as a framework to combine them. It was precisely the ability to develop such informal models that Fermi was trying to cultivate in his students. Developing and using informal models is a key mathematical ability rarely addressed directly and a critical component of numeracy. By posing and having students pose problems of interest (probably not physics problems) and of appropriate difficulty, the benefits of using Fermi problems can be extended to math classrooms from grades 3 through 16.

George Lukas received a Ph. D. in theoretical physics from Brandeis University. He has taught at UMass/Boston since 1980 and before that was a senior mathematician at Bolt, Beranek & Newman. His major interests include teaching quantitative reasoning, Logo programming as a tool for pre-service and in-service teacher training, applying artificial intelligence techniques to flight training, using technology in the classroom (for middle school mathematics teachers), and the evaluation of educational technology. In addition, George was the founder and director of SERL (Software Engineering Research Lab) at UMass/Boston.

Homepage Workshop (This will not be a hands-on workshop.)
Bill Campbell, UMass/Boston

In this workshop we shall discuss and illustrate ways for creating user homepages for the World Wide Web (WWW). We'll talk about implementing homepages on the cheap, requiring little technical sophistication and no fancy application programs. If you can edit a file and if you have access to a Browser (such as Netscape or Microsoft Explorer), you can create your own homepage. We'll discuss: the purposes of a homepage; guidelines for homepage design; viewing and working from other people's homepages; HTML essentials, and where to go for more information. We'll have lots of examples.

Bill Campbell is an associate professor in the Department of Mathematics and Computer Science at the UMass/Boston. He has also taught at SUNY Brockport, the University of Stirling and the University of St. Andrews (UK). In addition, he has worked for AT&T and Intermetrics, Inc, and has consulted for Apple Computer. Bill's professional areas of expertise are software engineering, object-oriented analysis, design and programming, and programming language implementation. Bill holds a Bachelor's degree in mathematics and computer science from New York University, 1972; an M. Sc. in computer science from McGill University, 1975; and a Ph. D. in computer science from St Andrews University (UK, 1978).

Explorations In College Algebra: The Physical/Visual Connection
Meg Hickey, Massachusetts College of Art

At Massachusetts College of Art, an architect/engineer and an educational software specialist have developed physical class experiences with related visual interactive math software, to help students extract generalized algebraic abstractions from particular, relevant, realities. This work is included in the NSF funded reform course, *Explorations in College Algebra.*

Meg Hickey, Professor of Architectural Design and Chair of the Environmental Design Department at the Massachusetts College of Art, holds degrees from MIT in Architecture and in Mechanical Engineering, and is a Registered Architect. She has taught structural calculation and building technology for 20 years, and has a particular interest in finding ways to help students who have difficulty with, or fear of, mathematics, to become comfortable using it. In addition to collaborating on the *Explorations in College Algebra* project, she has served as a technical editor on the Addison Wesley Interactive project, *Interactive Differential Equations.*

The Descartes-Fermat Feud
Ed Sandifer, Western Connecticut State University

Nineteen ninety-six marks the 400th anniversary of the birth of the French mathematician and philosopher Rene Descartes (1596-1650) and the third anniversary of the announcement of the solution of the problem known as Fermat's Last Theorem, posed by another Frenchman, Pierre de Fermat (1601-1665). Since these two mathematical titans lived in the same time and place, it is natural to wonder what happened when their paths crossed. It is an interesting story of pride, priority claims, and eventually a guarded reconciliation. In the late 1630's, Descartes and Fermat independently discovered ingenious ways to construct tangents to curves. Though neither is much remembered for these particular accomplishments, at the time both were quite proud of their discoveries, and engaged in a bitter priority dispute. Eventually, each apologized, and they ended their battle. We will describe the French mathematical community of the 1630's, compare Descartes and Fermat as people and as mathematicians, and describe the results over which they squabbled.

Ed Sandifer received a Ph. D in 1980, with a dissertation about algebraic geometry. Writing the dissertation did a good job of killing his interest in the subject, but he still likes algebra, number theory and combinatorics. Pursuing these, he came across the work of Leonhard Euler, and fell in love with it, so much that he re-learned his high school Latin so that he could read what Euler wrote. This turned Ed into a History of Mathematics groupie. He goes to talks by Fred Rickey and Bill Dunham, and his wife gives him their books for his birthday. He signed up for two summers of workshops on history with Fred Rickey and Victor Katz in Washington DC, and now history is his favorite kind of mathematics.

Can We Have Proofs without Axioms in Geometry?
David Henderson, Cornell University

This workshop is intended for both students and faculty and will explore new approaches to teaching geometry and geometric proof. The participants will experience hands-on, exploratory, cooperative learning and will explore the following questions:

1. What is geometric intuition? How does it affect and effect our understanding?
2. What role does our imagination have in increasing our knowledge and understanding?
3. How can we be rigorous without axioms?
4. Are precise definitions always desirable in mathematics? Are they always possible?
5. How can we have proofs in geometry without axioms? Do we want to?
6. Is knowledge gained without axioms inferior to knowledge from formal systems?
7. When are we satisfied with our understanding?
8. When are we certain about our mathematical knowledge?

David Henderson went to high school in Ames, Iowa. His undergraduate studies in mathematics, physics and philosophy were at Swarthmore College. He received his Ph. D. from University of Wisconsin under the direction of R. H. Bing. After two years at the Institute for Advanced Study he landed at Cornell University and has been there ever since (30 years). He has taught as a visitor in Wisconsin, Washington, Moscow, Warsaw, Palestine, and South Africa. His research interests have always centered on some aspect of geometry -- currently, his main interests are curricular reform and developing geometric foundations of mathematics. His outside interests include music, walking, carpentry, and philosophy.

Family Groups in the Outback
Sandy Rhoades, Keene State College

All over the world people recognize the concept of mother, but other family relations, like niece or cousin, are not so universal. The concepts of kinship are embedded within us, making it difficult to comprehend other views of kinship. Surprisingly, or not so surprisingly, mathematics provides a framework for understanding kinship. This talk illustrates how the dihedral group of order eight, i. e., the symmetry group of a square, models the kinship structure of the Warlpiri tribe of Australia. We will look at the structure of this group, including its Cayley diagram and the cosets of normal subgroups, and use this group structure to understand the kinship relations of people in the Warlpiri tribe. (Prior knowledge of group theory will not be assumed.)

Sandy Rhoades is a new assistant professor at Keene State College. She spent the previous three years as a faculty member at Smith College. In addition to a Ph. D. in finite group theory from the University of Massachusetts, Sandy has an M. Ed. in counseling from St. Lawrence University. She melds these seemingly disparate interests in mathematics and learning and growth by creating ways to draw people into learning mathematics.

A Few of My Favorite Calc III Things
Tommy Ratliff, Wheaton College

I will talk about "A Few of My Favorite Calc III Things," which really consists of two problems that Loren Larson at St. Olaf showed me while I was there. One of them is a really nice, and surprising, use of double integration, and the other is a simple, but clever, differential equations problem involving constant snow fall and two snow plows.

Tommy finished his Ph. D. at Northwestern University in 1992 in algebraic topology, and then spent two years (92-94) at Kenyon College as a visiting professor before moving to St. Olaf for two years (94-96). Now he is happy to be in a tenure-track position at Wheaton College. Lately Tommy's research has involved the stable splittings of classifying spaces of finite groups. One of his main pedagogical interests is using writing projects in calculus. Tommy is married to Janice Sklensky, who is also a mathematician, and they have a three-year son, Kenny.

How I Explain My Research to Undergraduates
Susan Loepp, Williams College

My research deals with completions of rings -- something that the typical undergraduate has not, in general, studied. All undergraduates are, however, very familiar with the rational numbers and the real numbers and after all, the reals are just the completion of the rationals. I will review how to construct the reals from the rationals. Then, I will discuss how this generalizes so that we can complete things such as polynomial rings.

Susan Loepp received her Ph. D. in 1994 from the University of Texas at Austin. Her advisor is Ray Heitmann and the title of her dissertation is *Making the Generic Formal Fiber Local.* She was a post-doc at the University of Nebraska at Lincoln. Her research is in commutative algebra but she is interested in other fields like algebraic geometry. Other than that, she likes to play games like racket sports and card games.

Solving Linear Systems of Equations and its Relation to Image Reconstruction from Projections
Ed Soares, College of the Holy Cross

A goal of SPECT imaging is to obtain an image of the bio-distribution of the radiopharmaceuticals that have been administered to the patient. Using the image, the physician can make decisions regarding the function of the organs within the patient. In this talk, I will discuss how the image reconstruction problem in SPECT is analogous to solving linear systems of equations and show some basic results from practical application of direct and iterative solution methodologies.

Edward J. Soares received his Ph. D. in Applied Mathematics from the University of Arizona in August 1994. From September 1994 to August 1996, he has served as a post-doctoral research associate with the Department of Nuclear Medicine at the University of Massachusetts Medical Center. In April 1995, Dr. Soares was invited as a Visiting Scholar by Macquarie University and Westmead Hospital Sydney, Australia to collaborate on work regarding image reconstruction. He is currently an Assistant Professor in the Department of Mathematics at the College of Holy Cross. Dr. Soares' research work has recently focused on analytical and iterative image reconstruction, attenuation compensation, collimator blur correction, analysis of image noise, and issues regarding image quality.

N. N. Luzin's Notebooks on the Mysteries of Set Theory
Roger Cooke, University of Vermont

Nikolai Nikolaevich Luzin (1883-1950) is best remembered for his epoch-making dissertation on trigonometric series and for his creation of the theory of analytic sets. He was a deeply philosophical mathematician,

however, whose notebooks are filled with material on the mysteries of set theory, especially the two glorious mysteries of the axiom of choice and the continuum hypothesis. These notebooks show that he was obsessed with such questions for more than 20 years, always striving to find an intuitive construction of the set of countable ordinals that would be as satisfying as the Dedekind-Weierstrass construction of the real numbers. This lecture, most of which is accessible at the undergraduate level, presents a sketch of Luzin's life and a glance at some of the highlights of his notebooks, with their many unsuccessful attempts to settle these questions.

Roger Cooke is the 1996 winner of the George V. Kidder outstanding faculty award at the University of Vermont. He received the Ph. D. degree at Princeton University in 1966. From 1966 to 1968 he was Assistant Professor of Mathematics at Vanderbilt University. Since 1968 he has been at the University of Vermont, except for sabbatical leaves in 1974-75, 1981-82, and 1988-89, spent respectively at the Pennsylvania State University, The Institut Mittag-Leffler in Stockholm and University College London, and the Institute for History of Science and Technology in Moscow. He was Vice-Chair of the Northeastern Section from 1977 to 1979 and Chair from 1980 to 1982. He is the author of *The Mathematics of Sonya Kovalevskaya* (Springer, 1974) and the forthcoming textbook *The History of Mathematics: A Brief Course* (Wiley, 1997).

The Algebra of Solving Polynomial Equations
David Cox, Amherst College

Nonlinear systems of polynomial equations in multiple variables arise in many contexts. While numerical methods for solving such equations have been known for a long time, recently there has been renewed interest in algebraic methods. These methods for finding solutions fall into two main categories: Groebner bases and resultants. This talk will concentrate on the former. We will describe some of the basic features of the theory of Groebner bases and discuss some of its strengths and weaknesses. We will then apply these ideas to the problem of solving systems of polynomial equations. In particular, we will show how to reduce to an eigenvalue problem where both the eigenvalues and eigenvectors give important information about the solutions of the equations.

David A. Cox went to Rice University and received his Ph. D. from Princeton University in 1975. After teaching at Haverford and Rutgers, he went to Amherst College in 1979 and has been there ever since (except for a year on leave at Oklahoma State University). His current area of research is toric varieties and mirror symmetry, though he has a long-standing interest in number theory. With two co-authors, he wrote *Ideals, Varieties and Algorithms*, and the same three co-authors are at work on a sequel, which will explore more deeply the algebra and applications of algebraic geometry. Also, he and Bernd Sturmfels of Berkeley are organizing an AMS short course (to be held in January 1997) on this subject.

Higher Codimensional Geometry and Linear Algebra
Thomas Garrity, Williams College

Almost any area of mathematical research can be used to shape and influence undergraduate teaching, starting from at least the level of beginning calculus, if not sooner. Here we will see how the motivating questions for my own work in recent years (which has been in applying classical algebraic

geometry and invariant theory to higher codimensional CR structures in order to construct moduli spaces and to solve Cartan equivalence-type problems) have also touched my teaching at Williams College. While the talk itself will outline how vector-valued forms (n-tuples of matrices) can be used to provide a unifying theme for various higher codimensional geometries, such as Riemannian submanifolds and CR structures, the true goal will be to see how an almost random area of current research can be used in teaching undergraduates.

Tom Garrity was an undergraduate at the University of Texas at Austin, receiving degrees in mathematics and philosophy in 1981. He attended graduate school at Brown University, receiving his Ph. D. in 1986 under the direction of William Fulton. For the next three years he was a G. C. Evans Instructor at Rice University. In 1989 be joined the faculty at Williams College, where he is currently an associate professor of mathematics. He spent the 1992-93 academic year at the University of Washington in Seattle.

CALL FOR STUDENT PAPERS

Students (and recent graduates) from the Northeastern Section are invited to present papers at the Fall Meeting on topics in mathematics, statistics, or computer science. The presentations will be 15 to 20 minutes in length, on either expository work, research projects, employment experiences, or problems from mathematical periodicals. Prizes will be awarded and the registration fee and cost of meals will be waived for one student presenter per paper at the Fall Meeting.

Almost every college/university has students working on projects, problems, and mathematical research. The success of a student paper session depends primarily on faculty members identifying prospective papers, encouraging their students and arranging departmental financial support when possible. If there are no potential student papers on your campus for the Fall Meeting, we urge you to initiate student projects now for presentation at the Spring Meeting. Interested students should send an abstract and current address, with phone number, by October 31 to: Dan Carter/Ockle Johnson, Department of Mathematics and Computer Science, Keene State College, Keene NH 03431. Telephone (603)-358-2555. All proposals will be reviewed by department faculty members.

CALL FOR CONTRIBUTED PAPERS

Participants are invited to submit contributed papers for either the Spring or Fall Meeting. We are particularly interested in papers which will appeal to a variety of participants. Your presentation should be approximately 15 minutes in length. Please send a typed abstract together with a list of any special equipment you may need to Ed Sandifer, Department of Mathematics and Computer Science, Western Connecticut State College, Danbury CT 061810 (203) 837-9351, or via Internet at Sandifer@wcsu.ctstateu.edu. The deadline for the Fall Meeting is October 27 and for the Spring Meeting is May 15.

STUDENT CHAPTERS

Renewal materials for students in active MAA student chapters should be sent to the chapter's advisor this fall. New students can be added at that

time. If your chapter has changed advisors, please notify both the national office and Ross Gingrich, the Northeastern Section Student Chapter Coordinator. If your school does not have a student chapter but you are interested in starting one, you can contact Ross Gingrich for information and help in the application process. Ross can be contacted by e-mail at GINGRICH@SCSU.CTSTATEU.EDU, by phone at 203-392-5581, or by regular mail c/o Department of Mathematics, Southern Connecticut State University, New Haven, CT 06515.

1996 DISTINGUISHED TEACHING AWARD

As announced in the Spring 1996 Newsletter, Professor Colin C. Adams of Williams College was awarded the Northeastern Section MAA Award for Distinguished College/University Teaching. As was written in one of his letters of support: "It is truly difficult to get a complete picture of Adams since there are so many sides to him: an important mathematician, a successful undergraduate research advisor, a brilliant instructor and an amazingly popular and entertaining speaker, just to name a few. Perhaps the best way to understand how he works is to observe him close-up. He is constantly thinking about new and innovative means of making mathematics more exciting and interesting for everyone. These ideas lead to new courses, new programs, new books, new lectures, and new mathematics. His students are not the only ones who learn from Professor Adams; the mathematical community has much to gain by taking note of Adams and his accomplishments."

Professor Adams received his Ph. D. in 1983 from the University of Wisconsin. After teaching for two year at Oregon State University he arrived at Williams College. He has been a visiting professor at U. C. Santa Barbara, U. C. Davis, and the Mathematical Sciences Research Institute at Berkeley. He is the author of over 25 research papers in topology, geometry and knot theory as well as the author of the acclaimed text, *The Knot Book*, which recently made the Top Ten List of the Scientific Book of The Month Club. In his hilarious character of Mel Slugbate (well, actually Mel is Colin's brother-in-law, but the resemblance is uncanny), a seedy salesman who is constantly pitching something, such as real estate in hyperbolic space, he allows his audiences to laugh while learning serious mathematics. In the 1996 MathFest conference in Seattle he created and co-starred in the first-ever mathematics play which left both mathematicians and theater goers in awe. Simply put, Professor Adams brings thousands of people to mathematics and invites them to make it their own. We all celebrate his tremendous achievements. Watch for the next call for nominations and plan to submit a nomination for a deserving colleague for the next award.

EDITOR'S MESSAGE

Wednesday, March 12, 1997 is the date when all information for the *Spring Newsletter* must be received by the editor (address on inside front cover). Thanks to all for their assistance on this issue!

Congratulations to James J. Tattersall of Providence College and the Section's Historian/Archivist on being elected Vice-President of the Canadian Society for History and Philosophy of Mathematics. Congratulations also to Laura L. Kelleher of Massachusetts Maritime Academy, a past Chair of the Section, who received a **Commonwealth Citation for Outstanding Performance** on October 3, 1996 from Governor Weld.

PRE-REGISTRATION FORM

FALL MEETING OF THE NORTHEASTERN SECTION-MAA

NOVEMBER 22-23, 1996 **UMASS/BOSTON**

Mail Registration Form to: NES/MAA c/o Prof. John A. Lutts
Dept. of Mathematics and Computer Science
UMass/Boston, Harbor Campus
Boston MA 02125-3393

Checks should be made out to: **NES/MAA**

PLEASE PREREGISTER! You may register at the meeting if you wish; however, it would facilitate the organization of the meeting if you pre-register by mail and it will save you money in that on site registration fees are five dollars more than pre-registration fees. In any case, meals cannot be guaranteed unless reservations are received by Wednesday, November 13, 1996. **It may not be possible to buy tickets to the banquet or lunch at the meeting**. Spouses and guests are welcome at all meals.

REGISTRATION:

Name:_____

Institution:_____

Institution Address:_____

Correspondence Address (if different):_____

_____

Telephone: ( )_____

E-MAIL:_____

PRE-REGISTRATION FEE:

MAA Member ($20.00)
Non-member ($25.00)
Student or unemployed ($5.00) } $_____

MEALS

(If you wish vegetarian meals, please check:_____)

Reception and Banquet (Chicken Marsala)
6:00 p. m. Friday: Number ( ) x $20.00 $_____

Luncheon 12:00 p. m. Saturday: Number ( ) x $12.00 $_____
(Sandwiches, salad, pasta, etc.)

TOTAL: $_____

Northeastern Section MAA
Department of Basic Science
Massachusetts Maritime Academy
101 Academy Drive, Buzzards Bay MA 02532-3400

November 22-23, 1996: UMass-Boston