



UNL MATH DAY 1991

THE SECOND ANNUAL MATH DAY AT UNL WAS HELD ON Thursday, November 14, 1991. Following opening ceremonies in Kimball Hall, where new Chancellor Graham Spanier gave a warm welcome to a nearly packed house, 785 participating students from 92 Nebraska high schools were escorted to the Student Union for PROBE I, a multiple choice 25-question exam. The top fifty scorers (which comprised 54 students, due to ties) then competed in PROBE II, which is a one hour eight question essay exam. The top ten combined PROBE I/PROBE II scorers won 4-year scholarships to UNL: \$8000 for first, \$4000 for second through fifth, and \$2000 for sixth through tenth, for a total of \$34,000.

As in Math Day 1990, there were also two team competitions (the PROBE Team Competition and the Bowl tournament). The teams were divided into 4 classes, A, B, C and D, according to the size of the school. Scores for the PROBE Team Competition were determined by adding the top 5, 4 or 3 scores (depending on class) for each school's team. Plaques were awarded to the first and second place teams in each class. The Bowl tournament proved to be very popular again. This year the tournament expanded to 80 teams (compared to last year's 48) from 80 schools divided into 4 classes. About 10 schools could not enter teams in the Bowl competition due to lack of space. Trophies were awarded to the first and second place teams in each of the classes.

Many of you will probably find familiar names among the results. The top five PROBE teams in each class were: (A) Omaha North, Lincoln East, Omaha Central, Creighton Prep, Bellevue West; (B) Lincoln Pius X, Grand Island Central Catholic, Seward, Norris, Plattsmouth; (C) Bellevue Christian, St. Mary's of O'Neill, Kearney Catholic, Stromsburg, Sutton; (D) Burwell, Dorchester, Nemaha Valley, Diller, Medicine Valley. In the Math Bowl competition, the top two teams for each class were: (A) Omaha North, Creighton Prep; (B) Grand Island Central Catholic, Lincoln Pius X; (C) Bellevue Christian, Nebraska Evangelical Lutheran of Waco; (D) Dorchester, Diller. The top ten PROBE scholarship winners were: Daniel Hanish (second last year), Peter Thorson, Jonathan Grohs (sixth last year), Daniel Holmes, Eric Hu (also fifth last year), Jan Romberg, Tobias Bartels, Peter Nabity, Melissa Chen (third last year), Joseph Kable (fourth last year). The repeat winners are eligible to receive scholarships for both years.

Some interesting footnotes can be mentioned. Among the PROBE scholarship winners this year there are seven seniors, two juniors and one sophomore. Of the 92 schools that brought teams to Math Day 91, 66 participated in 1990 also.

See Math Day, p. 11

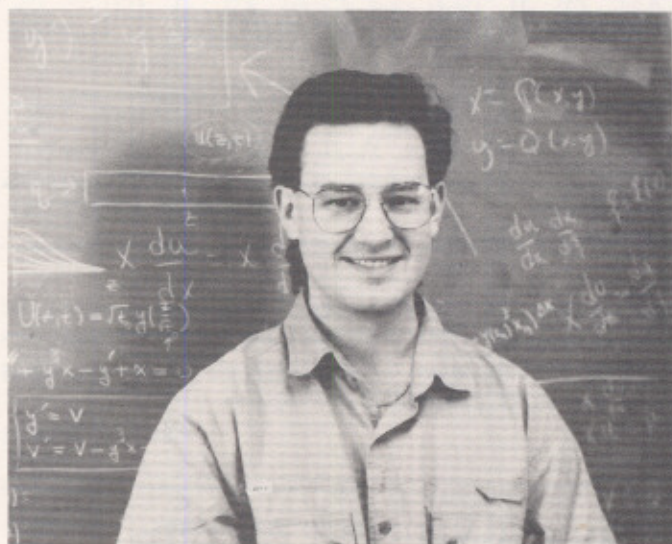
GRADUATE STUDENT AWARDS

AS NOTED IN EARLIER EDITIONS OF THE NEWSLETTER, THE Department of Mathematics and Statistics instituted several awards with monetary prizes for our graduate students. Two students shared the award for writing the best qualifying examinations. Nancy Campbell, who is studying statistics, and Kristin Pfabe, who is studying numerical analysis, both completed the qualifying examination with exceptional performance. Nancy was an undergraduate at UNL, and Kristin was an undergraduate at Concordia College in Morehead, Minnesota.



Best Graduate Exams, Nancy Campbell and Kristie Pfabe

The award for the Best First Year Student for the 1991-1992 academic year was Kurt Herzinger. Kurt was an outstanding undergraduate in mathematics at UNL, and he chose to remain here for his graduate work. During his first year Kurt earned all A's in his courses, and at the end of the year he passed two of the PhD qualifying examinations.



Best First Year Graduate Student, Kurt Herzinger



Emeritus Fellows (from left rear) Jeff Rushall, Robert Jaycay, Tim Huffman, (from left front) David Jorgensen, Shu-Mei Wan and Vesna Kilibarda



Outstanding Graduate TA John Schneider

It is our pleasure to announce that John Schneider has been chosen recipient of our department's Outstanding Graduate Teaching Assistant award. John will receive a \$500 fellowship for his outstanding teaching. John has consistently received outstanding evaluations from his students. A year ago he was recognized by obtaining Honorable Mention status with the College of Arts and Sciences GTA Teaching Award. This year he was nominated for the Alumni Association's 1992 GTA Award. For the past two summers John has served the department as one of the Math Advisors at New Student Enrollment. Currently John is serving as Convenor of Math 100A as well as teaching two sections. The committee that selected John noted that the quality of the teaching of many of our GTA's was outstanding. Receiving honorable mention were Nancy Campbell, Peggy Hart, Kristie Pfabe, Jeff Rushall and Bob Ruyle. We hope to continue this award for future years.

The Graduate Committee selected several students to receive fellowship stipends from the Emeritus Faculty Fund. This fellowship fund was started two years ago by contributions from our faculty, both present and retired, in honor of our emeritus faculty. Awards this year, based upon excellent scholarship, went to Robert Jaycay, David Jorgensen, Timothy Huffman, Vesna Kilibarda, Jeff Rushall, and Shu-Mei Wan. There were many excellent students in the department that qualify for these awards, and the final choice was difficult to make. These awards are in the range of \$300 to \$500, and we certainly wish we could make more of them. Any alumni wishing to contribute to this fund to aid our graduate students can make their contributions through the department or through the University Foundation.

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UNDERGRADUATES IN THE NEWS

WE ARE VERY PROUD TO REPORT THAT FOUR OF THE twenty students recognized as Chancellor's Scholars on April 10, 1992 at the UNL Honors Convocation were Math majors. To be a Chancellor's Scholar, a student must maintain a 4.0 GPA throughout college. The four students were: Tracy Koch (Mathematics and Actuary Science) from Norfolk, NE; Bob Little (Statistics) from Lincoln, NE; Mike Lewis (Mathematics and Physics) (son of Chair Jim Lewis) from Lincoln, NE; and Barry Ostmann (Mathematics) from Waverly, NE.

During the summer of 1991 Mike Lewis was a participant in an REU (Research Experiences for Undergraduates) which was held at the University of Oregon. This year Mike wrote an honors thesis in Physics. Mike will pursue an advanced degree in Physics at the University of Michigan. Barry Ostmann wrote an honors thesis in Math as reported elsewhere in this newsletter. Barry actually

quit Waverly High School in 1981 at the age of 16 because he was bored and rebellious. After a couple of years Barry's Aunt Janice Eide convinced Barry that he should take the graduate equivalency test. Even with the graduate equivalency diploma Barry had trouble getting a decent job. So Barry decided to go to college here at UNL. After Barry took his first Calculus class he discovered a great interest in math. He says he loves chemistry, physics, and math. Barry is going to pursue a job in Actuary Science.



Chancellor's Scholars (clockwise from upper left) Tracy Koch, Robert Little, Barry Ostmann and Michael Lewis

We are also pleased with the large number of math majors graduating with honors. Kevin Wright (in August, 1991) and Robert Little, Michael Lewis and Christopher Potter (in May, 1992) graduated with Highest Distinction, and, in May, 1992, Cindy Berrie and Tracy Koch graduated with High Distinction, and Tanya Gieschen and Daniel Vahle graduated with Distinction.

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NEW VICE-CHAIR

BEGINNING IN THE 1992-1993 ACADEMIC YEAR PROFESSOR Steve Dunbar will become the department's new vice-chair. Steve will replace Roger Wiegand, who has served as interim vice-chair this year, replacing Don Miller. Steve joined the department in 1984 after doing a post-doc at the University of Utah; he received his PhD in applied mathematics at the Uni-

versity of Minnesota in 1981. Since coming to UNL Steve has distinguished himself as an outstanding teacher and researcher. In 1991 he won a College of Arts and Sciences Distinguished Teaching Award, and he has been an innovator in the use of computers in the classroom.



New Vice-Chair Steve Dunbar

His organizational skills will be of tremendous value in carrying out the duties of the vice-chair. Typically, the major task of the vice-chair is to be in charge of scheduling classes and making teaching assignments for all the faculty and graduate teaching assistants, about one hundred in number. The vice-chair also sits on the Departmental Executive Committee, which advises the Chair on matters of departmental governance.

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SPECIAL YEAR IN PATH INTEGRATION

A SPECIAL YEAR IN PATH INTEGRATION IS BEING HELD HERE at Math-Stat during the 1991-92 academic year. The activities are centered around eleven distinguished visitors. Math-Stat Professors Jerry Johnson and Dave Skoug are hosting the special year. Also participating are two post-doctoral visitors from Korea, Je Yoon Lee and Il Yoo, and five Math-Stat graduate students, who will be specializing in this area. The visitors for the Special Year were: Albert Badrikian of the University of Clermont-Ferrand, France, April; Brian DeFacio of the University of Missouri, March; Pavel Exner of the Nuclear Physics Institute in Rez, Czechoslovakia, November; Leonard Gross of Cornell University, March; Brian Jefferies of the University of New South Wales, Sydney, Australia, February; Gopinath Kallianpur of the University of North Carolina, February; Dietrich Kolzov of the University of Erlangen, Germany, October; Michel Lapidus of the University of California-Riverside, September; Zhiming Ma,

of the Institute of Applied Mathematics of the Academia Sinica, Beijing, China, April; Pedro Morales of the University of Sherbrooke, Quebec, Canada, April; and David Storvick of the University of Minnesota, November.



Special year participants Pedro Morales, Albert Badrikian, and Il'Yoo, with host Jerry Johnson (2nd from left)

This Special Year, as was the case for the Special Year in Commutative Algebra held here two years ago, provides a nonpareil opportunity for UNL faculty and students to learn first hand about current research, and to advance or develop research projects with world renowned experts. Indeed, a number of projects have been initiated this year as a direct result of the Special Year in Path Integration, the most recent one involving graduate student Troy Riggs and Prof. Albert Badrikian, visiting from the University of Clermont-Ferrand in France. (They plan to use the theory of Markov processes to study R. Feynman's operator calculus for noncommuting operators.)

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WESTERN MATHEMATICS SCHOLARS PROGRAM

A CONTINUATION GRANT OF \$549,000 FROM THE NATIONAL Science Foundation has funded the Western Mathematics Scholars Program for its second and final year. The first year of the project was directed by Don Miller while Mel Thornton taught the Geometric Perspectives course at the Cheyenne site. Mel Thornton will be directing the project during the second year.

This summer, five week instructional sessions for selected middle and secondary school mathematics teachers will be held in Chadron, NE, Cheyenne, WY and Spearfish, SD. At each site there will be 42 participating teachers, four master teachers and

two college/university faculty. This year the morning classes will be Data Analysis and Finite/Discrete Mathematics. The afternoon seminar will be devoted to work on the National Council of Teachers of Mathematics Professional Teaching Standards, learning how to use electronic networks, and the development of leadership in mathematics education. In addition there will be special visitors to work with the teachers on alternative assessment, teaching Native Americans and teaching African Americans.

This is a joint project among Colorado State University, the University of Wyoming, the University of South Dakota, Minot State University (North Dakota) and the University of Nebraska-Lincoln. The entire project is coordinated out of our department. This year 27 of the 126 participating teachers will be from Nebraska. Results from the first year and from four years of the Nebraska Mathematics Scholars Program have shown that this type of teacher enhancement project does have a very positive effect upon the quality of mathematics education in Nebraska.

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VISITOR FROM RUSSIA

THIS YEAR OUR DEPARTMENT HAS BEEN VERY FORTUNATE to have Professor Mark Sapir as a member of our faculty. Professor Sapir has accepted a two-year visiting position at UNL with half support from our department and half support from our Center for Communication for Information Sciences.



Visiting Professor Mark Sapir

He obtained his mathematical training from Ural State University and the Moscow Pedagogical Institute in Russia and held a variety of teaching and research positions in Russia before moving to the United States. Professor Sapir is an internationally known expert in algorithmic problems in algebra — a branch of mathematics that lies at the interface between modern algebra, theoreti-

cal computer science and mathematical logic. While at UNL, Sapir is working in close collaboration with John Meakin of our department and Stuart Margolis and Jean-Camille Birget in the Computer Science Department.

In addition to his stature as a research mathematician, Professor Sapir is widely recognized for his contributions to mathematics education and computer science education. He served as director of the Winter Mathematics School and as director of a school for young programmers at Ural State University in Sverdlovsk, Russia. In collaboration with Eugene Linetsky (who has also recently moved to Lincoln), Sapir has developed a highly rated software package and associated instructional materials that is being used in over 2,000 schools throughout the former Soviet Union. Since his arrival in Lincoln, Professor Sapir has worked in collaboration with Eugene Linetsky, Jim Lewis (Chair of our department) and Chuck Friesen from the Lincoln Public School System, to develop a Young Programmer's School through the Lincoln Public School System. This school makes use of the software developed by Sapir and Linetsky to teach young children in grades 3 through 8 how to program a computer. The school has generated a great deal of enthusiasm since its inception early this spring. Plans call for an expanded summer school and the development of a School for Young Mathematicians next year.

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RESEARCH AND PROFESSIONAL ACTIVITY IN THE DEPARTMENT OF MATHEMATICS AND STATISTICS

OUR DEPARTMENT HAS A LONG HISTORY OF ACTIVE participation in traditional research in mathematics and statistics. If one evaluates departmental activity simply by counting published papers, then the last two or three years have been unusually busy. In addition, there has been a dramatic increase in creative activities that go beyond the traditional outlet of publication in professional journals. It is these activities that this article will address.

ACTIVITY IN THE REGION: Our department was well represented at meetings of the American Mathematical Society (AMS) in October (Fargo, ND) and March (Springfield, MO). In Fargo, Math-Stat Prof. Sylvia Wiegand gave a one-hour invited address entitled "Prime Ideals and Decompositions of Modules", and six other faculty members gave invited talks at the Special Sessions in Commutative Algebra, Algebraic Geometry, and Nonselfadjoint Operator Algebras. Twelve people from our department took part in the Springfield meeting, but what was unusual was that six of them were graduate students. Several of our faculty and graduate students will travel to Lawrence, KS, at the end of May, for a Workshop in Commutative Algebra. This is the fourth in a series of such workshops supported by a grant from the National Science Foundation (NSF) and administered by the University of Nebraska.

WORLD TRAVELERS: Many of our faculty have ventured outside the Midwest, to professional meetings and to universities on several continents. This year alone, they have delivered colloquia at Emory University, Florida State University, Georgia Institute of Technology, Idaho National Engineering Lab, Montana State University, Moorhead State University, North Dakota State University, Oregon State University, Reed College and the University of Connecticut. Outside the US, they have given invited lectures in Szekszard, Hungary; Sydney, Australia; Hong Kong; Singapore; Oberwolfach, Erlangen and Munich, Germany; Revella and Luino, Italy; Ottawa, Canada; Kyoto, Japan; and Luminy, France.

SERVICE TO THE PROFESSION: Math-Stat Chair Jim Lewis and Prof. Sylvia Wiegand have both been very active at the national level in the AMS, Lewis as a member of the Science Policy Board and Wiegand as chair of an ad hoc committee to restructure the 100-odd committees of the society. She just completed an 80-page document analyzing the current committee structure and recommending ways to streamline the organizational structure and make the society more responsive to the needs of its members.

EXTERNAL FUNDING: With local sources of funding all but drying up, it is becoming more and more important for mathematicians and statisticians to seek outside funding for research, professional travel and visitors. This has been our most successful period in history, with almost half of our faculty receiving some form of federal support. Graduate student Paul Dawkins is supported half-time on a grant from the Idaho National Engineering Labs, for research under the direction of Steve Dunbar on hydrodynamic interface issues. David Jaffe has a two-year research grant from the National Science Foundation, covering summer salary and other research expenses. Earl Kramer receives research support from a 2-year grant from the National Security Agency. Partha Lahiri has just obtained a three-year NSF research grant, as well as funding for a graduate assistant from the Bureau of Labor Statistics. Jim Lewis, Don Miller and Mel Thornton received a \$927,859 first-year award from the National Science Foundation for The Nebraska Systemic Initiative in Science, Mathematics, and Engineering Education. The grant will total \$4.46 million over its five-year span. John Meakin and Mark Sapir have just received word that their three-year joint NSF research proposal with Stuart Margolis and J.-C. Birget of Computer Science has been approved. Gary Meisters holds a joint NSF-PAN Cooperative Research Grant, continuing through Fall, 1992. Don Miller and Mel Thornton hold a \$550,000 National Science Foundation award for The Western Mathematics Scholars Project. John Orr and David Pitts have obtained a three-year NSF research grant providing summer salary and other research expenses. Roger Wiegand is the principal investigator of a two-year National Science Foundation research grant covering travel and visitors for our commutative algebra/algebraic geometry group consisting of himself, Brian Harbourne, Tom Marley and Sylvia Wiegand. Roger Wiegand and Sylvia Wiegand are co-investigators on a two-year National Science Foundation Grant Midwest/Great Plains Workshops in Commutative Algebra, covering a series of four workshops. Sylvia Wiegand received a research

grant from the National Science Foundation, partially funding her release from one course during the Spring Semester, 1991, and providing funds for travel to meetings and to other universities. She learned recently that she will receive an NSF Visiting Professorship for Women, which will pay most of her salary at Purdue University, where she will spend the 1992-1993 academic year. Several other grant applications are still pending.

RESEARCH CAPSULES: Many areas of mathematical research are represented in our department. The summaries below are by no means exhaustive but give some indication of the breadth of interests of our faculty.

ALGEBRAIC GEOMETRY: Prof. Brian Harbourne has recently shown that any eight distinct points of the plane are in good position. This is of interest since being in good position allows an exact determination of how many curves there are that pass through the points. He is currently working on extending this result. He is also working on a joint project with Prof. A.V. Geramita of Queens University, Ontario, to study the implications of projective normality for comparing powers of intersections of ideals with the intersection of their powers. Prof. David Jaffe has made important progress on the following old question involving space curves: which such curves are the set-theoretic complete intersection of two surfaces? The conjecture is that they all are. Jaffe has recently shown that if a curve is the intersection of two surfaces and if it lies in the smooth locus of one of the surfaces, then there are only a few ways it can fail to be a complete intersection.

ALGORITHMIC PROBLEMS IN ALGEBRA: Professors John Meakin and Mark Sapir are working in collaboration with Professors Stuart Margolis and Jean-Camille Birget from the Computer Science department on a wide variety of algorithmic problems (such as the word problem, the isomorphism problem, etc.) that arise naturally in several areas of algebra. The research is proceeding on three levels: first, searching for theoretical solutions to such problems (i.e. do there exist any algorithms to solve these problems?); second, analyzing the computational complexity of the algorithms found; and third, implementing some of these algorithms in the framework of AUTOMATE, an existing symbolic computation system for finite automata and semigroups. The problems under consideration are primarily algorithmic problems in groups, semigroups and associative algebras. This area of research is at the boundary between algebra, theoretical computer science and mathematical logic.

APPLIED MATH: In the past year Prof. Steve Dunbar has collaborated with faculty in Engineering, Physics, Curriculum and Instruction, and Biology on various research topics. He is currently writing up the results of his research with Prof. Rod Douglass of the Idaho National Engineering Labs on the relationship of high-order eigenvalue problems in differential equations, generalized eigenvalue problems in linear algebra and the discretization error of the Chebyshev-tau method. Prof. Glenn Ledder continues his work with Vitaly Zlotnik (Geology) on mathematical problems in groundwater flow. They hope that the work will eventually lead to a model for the transport of contaminants. For example, they want to know how long it takes for the pesticide sprayed on a farm field

to find its way into the farmer's well. Ledder is also working on a partial analytical solution of a model of a traveling flame. The principal quantity to be determined is a time-dependent function which appears as a coefficient in a pair of partial differential equations (PDEs) in one spatial variable and time. The problem has previously been solved only by direct numerical integration of the PDEs. The new method solves the PDEs analytically to yield an integral equation for the unknown function, with spatial dependence removed from the problem.

COMBINATORICS: Graduate students Robert Jajcay and Tanya Jaycayova are working together on a project involving recurrently enumerable matrix languages. Prof. Earl Kramer is writing up results obtained with Spyros Magliveras on some infinite classes of partitionings of all k -sets into disjoint designs.

COMMUTATIVE ALGEBRA: Professors Roger Wiegand and Sylvia Wiegand recently completed a four-year project in integral representation theory, culminating in the following theorem: Let k be a field of characteristic different from 2, and let R be an integral domain finitely generated as a k -algebra. Assume that there is a bound on the ranks of the indecomposable finitely generated torsion-free R -modules. Then every such module has rank 1, 2, 3, 4, 5, 6, 8, 9 or 12. Moreover, there is an example of such an integral domain that admits indecomposables of each of these ranks. Graduate student Nuri Cimen is trying to eliminate the hypothesis on the characteristic of the ground field. The Wiegands are working with Prof. Christel Rotthaus (Michigan State University) in an attempt to describe the space of prime ideals of the two-variable polynomial ring over the field of rational numbers. Sylvia Wiegand is collaborating with Professors William Heinzer (Purdue) and David Lantz (Colgate) in a study of the primes in birational extensions of polynomial rings.

OPERATOR ALGEBRAS: Professors John Orr and David Pitts are collaborating on an attempt to classify the norm-closed ideals of continuous nest algebras. These algebras are analogous to upper triangular matrix algebras, except that the diagonal is indexed by the unit interval rather than a finite set. The ideals of the upper triangular algebras are easily understood, and it is possible to construct lots of examples of ideals in continuous nest algebras which are analogous to these. Their aim is to extend these constructions.

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NEWS FROM THE DIVISION OF STATISTICS

IN AUGUST 1991, THE DIVISION WAS BACK TO FULL STRENGTH, with Professors Lahiri and Park back from their leaves. Still, the pressures of heavy enrollments in all the statistics courses continued. Professor Park spent academic year 1990-1991 at Pohang Institute of Science and Technology, a research oriented institution in South Korea. At the Institute, he taught an advanced graduate course in reliability theory and helped the Institute estab-

lish a graduate program in statistics. Park also gave several invited talks at other universities and a special lecture on reliability theory at Seoul National University. He was also involved in a quality control project for improving the quality of steel products applying "Taguchi Methods".

Dr. Kuey Chung Choi is visiting the division this year as a guest of Professor Park. Dr. Choi is a professor at Chosum University of Korea and his research interests are in the area of experimental designs and reliability theory.

We are grateful to Professor Colin Ramsey, Director of the Actuarial Science Program, for loaning one of his faculty, Professor Mashayekhi, to teach a 400-level course in the division during the Spring semester. Without this help it would have been very difficult to meet the teaching demands for statistics courses offered in the division.

Use of computer software MINITAB was very much appreciated in an experimental section of Stat 380H. Encouraged by that we have started this usage in two sections of regular Stat 380, with a total of about 70 students. This has put a heavy pressure on our small computer lab, which contains only three Macintosh computers. We hope that the facility will improve in the future.

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RECENT PH.D. GRADUATES

BYUNG MOO AHN WILL FINISH HIS PH.D. IN MAY, 1992. HIS research is done and he is now typing the second draft of his thesis. With advisor Jerry Johnson, Ahn has submitted a joint paper, "Path integrals, Fourier transforms and Feynman's operational calculus" based on part of his thesis.



Finishing student Byung Moo Ahn

Byung Moo will submit another paper himself involving stability theorems, the second topic in his dissertation. He has just

recently proved a further theorem on a subject related to but different from his thesis. Byung Moo and his family are planning to return to Korea in June.

John Schneider is expecting to finish his doctorate degree in December, 1992. He is working in the area of Difference Equations under the direction of Allan Peterson. He already has submitted a paper, "The Green's matrix function and related eigenvalue results for a vector difference equation," which is Chapter 2 in his dissertation and which has been accepted for publication in the Rocky Mountain Journal of Mathematics. John received his BS degree from UNL in 1981. After teaching high school for a year he returned to UNL and finished his MS degree in mathematics in 1985. He then taught at Hastings College, 1985-1989. He will return to Hastings College in January of 1993.

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JUMP UPDATE

IN A CONTINUING EFFORT TO SUPPORT HIGH SCHOOL mathematics instruction, the JUMP Program (JUNior Mathematics Prognosis Testing Program) has produced an extensive 160 page report listing the college level mathematics requirements by college and major for 21 colleges and universities in Nebraska. Professor Walter Mientka, who directs the program, says the publication will be a valuable resource for teachers and counselors as they work to encourage students to study more mathematics. To get a copy of this report, contact Professor Mientka at the address or telephone number listed on the masthead on page 1 of this newsletter.

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LAHIRI PROMOTED

WE ARE PLEASED TO ANNOUNCE THAT PROFESSOR Partha Lahiri has been promoted to Associate Professor with tenure. Partha received his Masters degree in Statistics from Calcutta University in 1982 and his Ph.D. degree in Statistics from the University of Florida in 1986. He has been at UNL since that time. His main areas of interest are Bayes and empirical Bayes inference, finite population sampling and small area estimation. Professor Lahiri spent academic year 1990-1991 in Washington, D.C., as a Senior Research Fellow at the U.S. Bureau of Labor Statistics (BLS) and the Bureau of the Census. During that time, Professor Lahiri and his research associates developed model-based procedures to estimate various characteristics (e.g., unemployment rate, median income, etc.) for many local government areas. These estimates are useful in regional planning and the allocation of governmental resources. He also gave several seminars at the BLS and Census Bureau, and an invited talk at a special session of the Washington Statistical Society in June, 1990. He was the discussion leader at the round table luncheon on

small-area estimation at the annual ASA meeting held in Atlanta in August, 1991.

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Associate Professor Partha Lahiri

OUR COLLOQUIUM PROGRAM

THE COLLOQUIUM PROGRAM HAS BEEN EXTREMELY FULL this year, with an unusually large number of visitors; in fact, we expect 21 visitors altogether. Typically each visitor comes for several days and gives an hour talk which is accessible to all members of the department. Often a visitor will give another more specialized talk of interest to faculty and graduate students who work in the same area. Most important are the research collaborations these visits make possible between the visitors and UNL faculty and graduate students, which greatly enhance our research program.

Part of the reason for the success of this year's colloquium program is that Professors Jerry Johnson and Dave Skoug are hosting a Special Year in Analysis, focusing on Integration Theory—their visitors account for eleven speakers. But while there is no doubt of the renown of these visitors in mathematical circles, few mathematicians come to the attention of the general public. One who has (as evidenced by the article about him which appeared in *The Atlantic Monthly*) is Paul Erdos, who visited Math-Stat in January.

Erdos is regarded as the most prolific mathematician living today. His name is attached to over 1,000 papers and he has had well over 250 co-authors. By definition (as mathematicians are wont to say), co-authors of Erdos have an *Erdos number* of 1. Your Erdos number is 2 if you have not co-authored a paper with Erdos but you have written a paper with someone *else* who has authored a paper with Erdos. Now (again speaking in the local vernacular), more generally, your Erdos number is n if $n - 1$ is the least Erdos num-

ber among your co-authors. Currently, the highest known Erdos number is 7.

Erdos's research covers a wide variety of areas, but mainly includes number theory, graph theory and combinatorics. Nominally his address is the Mathematical Institute of the Hungarian Academy of Sciences, Budapest, Hungary, but his constant travelling might find him at any given position on planet Earth where there might be another mathematician. Professor Erdos gave three lectures while he was here; one on his life and experiences with young geniuses, and the other two on problems in combinatorics, graph theory and geometry. The talks were accessible to undergraduates and were well-attended.

Besides the integration theorists and Erdos, another combinatorist participated in our program: Brian Alspach of Simon Fraser University in British Columbia came in September, invited by Earl Kramer. This year also brought four visitors in Commutative Algebra, invited by Tom Marley, Roger Wiegand and Sylvia Wiegand under a grant from the National Science Foundation. These were: Sam Huckaba of Florida State University, April; Christel Rotthaus of Michigan State University, March; Judy Sally of Northwestern University, April; and Andrei Suslin of the Steklov Mathematical Institute in St. Petersburg, March.



New Faculty Member, John Orr

The Operator Theory group in the department invited two speakers: David Larson of Texas A&M University (March) and Justin Peters of the University of Iowa (April). (David Larson was a faculty member in our department for several years.) Besides Professor Suslin, there were two other visitors from the Soviet Union invited by John Meakin, both in group theory: Sergei Ivanov of Moscow State University (February) and Efim Zelmanov, now of the University of Wisconsin (March). In addition, Gary Meisters invited Arno Van Den Essen of Catholic University in Nijmegen, the Netherlands, to speak about "The exotic world of invertible polynomial maps".

While external grants fund a portion of the costs of maintaining our program of speakers, this exciting and valuable program would not have been what it was without significant support from UNL. Indeed, several of our speakers (Alspach, Erdos, Ivanov, and Zelmanov) received funding from the Center for Communication and Information Sciences, and we also received funding from the University Research Council for Rothaus, Sally, and Suslin and Special Year visitors Leonard Gross, Gopinath Kallianpur and Michel Lapidus. Visitors are especially important for our graduate students, by helping our students become acquainted with the larger community of scientists outside UNL, and as role models. Indeed, Christel Rothaus and Judy Sally spent a good deal of time with our women graduate students. We cannot overstate the inspiration and encouragement such visits can have for our students.

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NEW FACULTY

THIS YEAR JOHN ORR JOINED THE FACULTY AT UNL. Professor Orr comes from Britain and is currently enjoying his first year in the United States. He received his BSc from London University in 1985 and, after studying in Cambridge for a year, returned to London to work with Dr. John Erdos. He completed his PhD in 1989 and joins UNL after two postdoctoral appointments, at Lancaster University in England and University of Waterloo in Canada. Professor Orr specializes in Operator Theory and Operator Algebras.

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PUTNAM EXAM

TWENTY STUDENTS FROM UNL PARTICIPATED IN THE 52ND Annual William Lowell Putnam Examination held last December. This exam was taken by over 2300 undergraduates enrolled in colleges and universities throughout the United States and Canada. This math competition is designed to test the originality and creative abilities of the contestants rather than mere technical mastery of material they have learned in the classroom. Here are two of the simpler questions which were asked on the exam (solutions for which can be found below):

Question 1: Let A and B be different $n \times n$ matrices with real entries. If $A^3 = B^3$ and $A^2B = B^2A$, can $A^2 + B^2$ be invertible?

Question 2: For each integer $n \geq 0$, let $S(n) = n - m^2$, where m is the greatest integer with $m^2 \leq n$. Define a sequence $\{a_0, a_1, a_2, \dots\}$ by $a_0 = A$ and $a_{k+1} = a_k + S(a_k)$ for $k \geq 0$. For what positive integers A is this sequence eventually constant?

The exam is administered in two parts. In each session the students have three hours to attempt six challenging problems. Among UNL students, the top score was achieved by Chris Heckman, and the second highest score belonged to Eric Smith. They

will receive \$75 and \$50 prizes sponsored by the Math-Stat department. Other UNL participants were (in no particular order) Thian-Huat Ong, Scott Annin, Pete Storonskij, Loren Giles, Randy Porter, Daryl Bell, Mark Neeley, Julieanne Campbell, Michael Ryan, Kelley Ramsey, Roxana Omar-Dev, Christy Brown, Joyce Yen, Damon Koski, Jeff McTaggart, Eric Hofman, Chad McQuinn and Bao Long Nguyen. Our team was organized and coached by UNL Math department professors Chris Tiahrt and Tom Marley.



Putnam team members Eric Smith and Chris Heckman (2nd and 3rd from left), with coaches Chris Tiahrt (left) and Tom Marley (right)

Still puzzled by the problems above? Here are some solutions, but note that there may be many other ways to solve these problems!

For question 1, notice that

$$(A^2 + B^2)(A - B) = A^3 - A^2B + B^2A - B^3 = 0.$$

So if $(A^2 + B^2)$ is invertible, then $A - B = 0$, contradicting that A and B are different matrices.

For question 2, we claim that the sequence $\{a_0, a_1, a_2, \dots\}$ is eventually constant if and only if $a_0 = A$ is a perfect square. It is easy to see that if $a_0 = c^2$, then $S(a_k) = 0$ and $a_k = a_0$ for all $k \geq 0$. Now suppose the sequence is eventually constant. Then $S(a_k) = 0$ for all large k . We'll show that $S(a_{k+1}) = 0$ implies that $S(a_k) = 0$.

By induction, this will give that $S(a_0) = 0$ and so a_0 is a perfect square. Now $S(a_{k+1}) = 0$ means that there is an integer $c \geq 0$ such that $a_k + S(a_k) = c^2$. Let $S(a_k) = a_k - m^2$ where m is the greatest integer such that $m^2 \leq a_k$. But $a_k < (m+1)^2$; i.e., $a_k < m^2 + 2m + 1$, so $2a_k < 2m^2 + 4m + 2$. Therefore, $2a_k - m^2 < m^2 + 4m + 2 < (m+2)^2$. Now $c^2 = a_k + S(a_k) = a_k + a_k - m^2 \geq m^2$, and from the previous sentence we obtain $c^2 = 2a_k - m^2 < (m+2)^2$. Thus, there are only two possibilities: $c^2 = m^2$ or $c^2 = (m+1)^2$. But if $c^2 = (m+1)^2$ then $2a_k - m^2 = (m+1)^2$, so $2a_k = 2m + 1$. This is a contradiction, since the left

side is an even number and the right side is odd. Therefore, we must have $c^2 = m^2$. This then gives that $2a_k - m^2 = m^2$ so $S(a_k) = a_k - m^2 = 0$, which is what we needed to show.

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COMPUTER USAGE

THE ROLE OF COMPUTER USAGE IN TEACHING AND research continues to grow every year, and 1991-92 was no exception. Nearly every faculty member uses electronic mail for professional communications. Individual faculty are constantly finding new ways to use computer technology in the classroom. For example, Profs. Lal Saxena and Kun-Liang Lu experimented this year with a computer component in introductory statistics courses; this was made possible by the recent acquisition of Macintosh computers for the Statistics Lab. Profs. Steve Dunbar, Tom Shores and Chris Tiaht used the Math Computer for their coursework (applied math, differential equations, linear algebra, honors calculus and approximation of functions). Prof. David Logan is using computer packages in the applied math sequence. Prof. Steve Cohn has obtained several Macintoshes for the purpose of incorporating more graphics into Calculus III.

The departmental computer acquisitions this year were significant. The first of these was a generous \$17,000 grant from the College of Arts and Sciences Equipment Fund for various computer needs. Some of this money was used to improve the capabilities of both the Statistics Lab and the Math Computer Lab. In addition, a portable PC and screen attachment for overheads was purchased with these funds. This will make it much easier for faculty to do in-class demonstrations with computer programs such as *Mathematica*.

The other major acquisition came from the office of the Vice-Chancellor for Academic Affairs, which awarded the department funds to purchase ten more NeXT computers and to install chalkless boards in the Math Lab. Seven of the computers will be installed in the lab, bringing the total to twenty machines in the lab; the remaining machines will be used by faculty for course development. With these acquisitions the Math Lab in Bessey 105 can rightfully be termed a computer classroom. We expect to see some exciting developments from this facility in the next few years.

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TEACHING AWARDS

AT THIS SPRING'S UNIVERSITY HONORS CONVOCATION, Associate Professor Brian Harbourne of our department was honored with a College of Arts and Sciences Distinguished Teaching Award. He was presented with a certificate, a medal and a \$1000 check, the latter funded by the Nebraska Unicameral. A total of twelve out of our twenty-two tenured faculty members have now won University teaching awards; this is a phe-

nominal record and it clearly shows the department's commitment to good teaching.



Distinguished Teaching Awardee Brian Harbourne

Harbourne, whose research area is algebraic geometry, has recently taught Honors Calculus III and several graduate courses. He has been at UNL since 1986, following a year at the University of North Carolina at Chapel Hill and a three-year instructorship at the University of Texas at Austin. Harbourne, a '77 graduate of the University of Virginia, earned his Ph.D. at M.I.T. in 1982.

We are also proud of our 14 Math-Stat faculty members and teaching assistants who were honored by the UNL Parents Association and the Teaching Council for "having made a significant difference" in the life of a student here at UNL. Those receiving this year's *Recognition Award for Contributions to Students* are: Bo Deng, Steven Dunbar, Stephanie Fitchett, Cheryl Kane, Earl Kramer, Chair Jim Lewis, Aihua Li, Cheryl Olsen, Allan Peterson, Mohammad Rammaha, Richard Rebarber, Jeff Rushall, Tom Shores and David Skoug.

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UNDERGRADUATE SCHOLARSHIPS

LAST MAY WE AWARDED 72 MAJORS A TOTAL OF \$87,700 IN scholarships for academic year (AY) 91-92. Just about all of these students had a math and overall GPA of at least 3.4. We are quite proud that 43% of the awardees were women. Our recruitment of minorities has not been successful, but we keep trying.

Our recently endowed Dean H. and Floreen G. Eastman Scholarship Fund has made quite a difference. For AY91-92, \$83,300 was Eastman money. Of the 72 awardees, four were returning Eastman Scholars and the other eight Eastman Scholars were incoming freshmen, all receiving \$12,000 4-year scholar-

ships. Another seven incoming freshmen received \$1,000 1-year Eastman scholarships. Majors that were sophomores or above in AY91-92 received \$39,300, mostly in amounts of \$1,000 for the year. The remaining \$1,000 of the \$83,300 is the beginning of a happy story. One of our Eastman freshmen is Eric Smith who just happens to be the Math Day 90 first place finisher. He received this extra amount as part of his Math Day prize. Eric and Scott Annin, who also placed high in Math Day 90, both started this year as freshmen in junior-level math courses (310 and 380H). They and the rest of our Eastman Scholars are exceptional students. Here is the full list of our new AY91-92 Eastman Scholars and their high schools: Scott Annin (Lincoln East), Michael Carstens (Minden), Mark Drake (Friend), Tracy Gerking (Nemaha Valley), Kelly Ramsey (Omaha Central), Eric Smith (Omaha Westside), Jerome Wilwerding (Millard North), and Joyce Yen (Hastings).

Our majors did their best yet in the national competition for Goldwater Scholarships. These awards are for full educational expenses (up to \$7,000 a year) for juniors and seniors. We were awarded three: Chris Heckman (Lincoln), Joel Hansen (Wayne), and Kevin Keyes (Norfolk). Adding Sarah Cavel (Omaha), who began her Goldwater last year, gives us four current recipients. This year four of our majors have been nominated for these scholarships. We are very hopeful that all will win, but quite aware that there must be some limit on the number we can receive at any one time. Announcements are made in early May, so we'll know any day now.

The awarding of departmental scholarships for next year is in its final stages. This time we have \$100,500 to give out! (It was a good year for interest.) The Eastman money amounts to \$95,200 thousand, of which \$37,000 is committed to continuing Eastman Scholars and \$18,500 is earmarked for incoming freshmen. This leaves us \$45,000 yet to award to current students. It is becoming increasingly difficult to separate out 50 or so for awards from among the 70 some that apply each year. This year 88% of our upperclass applicants have a math and overall GPA of at least 3.5. They are all excellent students.

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Math Day, from p. 1

The most distant schools are Chadron and Burwell, but in all 11 schools' teams traveled more than 200 miles. We planned for 700 students, 90 schools and 64 Bowl teams, but in the end we exceeded our expectations by having 785 students from 92 schools, with 80 Bowl teams. With this growing popularity, space on campus will be scarce Thursday, November 19, the date of Math Day 92, but we hope to accommodate all schools that want to participate.

Math Day is designed to attract students to science and to mathematics in particular, and also to UNL. Although it is still early, this does seem to be what is happening. The student who placed first in 1990 is attending UNL as a Math major (he started in our junior level math courses) and we hope more of the top finishers will choose to come to UNL this Fall. Professors Earl Kramer

and Chris Tiaht, with the help of a host of others, did an excellent job again this year in formulating questions for all the various competitions. Math Day required the efforts of the entire department, faculty, graduate students and staff to hold Math Day, but none more so than Professors Rao Chivukula and Gordon Woodward, who were co-chairs and organized and coordinated the effort.

Here are a couple of problems from PROBE II you might want to try. (We'd be happy to provide the complete PROBE II exam, with answers, to anyone who asks.)

1. Jack and Jill went up the hill to dig a well. While Jill did work, young Jack did shirk; soon asleep he fell. When she found out, she gave a shout her tone it was quite sour. "Wake up you jerk and get to work! I've already worked one hour!" They then made haste, no time to waste, and worked without delay. To work they fell and dug the well and left to get their pay. If Jack had dug the well alone, three hours would he have spent. Six hours would have been the time had Jill alone been sent. And so at last it's time to ask the question of this rhyme: Can you please say, 'twixt work and play, what was the total time?

2. A 6×6 checkerboard is perfectly covered with 18 dominoes (each covering two squares). Prove it is possible to cut the board either horizontally or vertically into two nonempty pieces without cutting through a domino.

For all of you question-enthusiasts: If you have any suggestions for PROBE II questions, please send them to Rao Chivukula. Volunteers are always welcome.

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UNDERGRADUATE HONORS THESES

DURING THE ACADEMIC YEAR 1990-91, KEVIN WRIGHT worked on an honors thesis under the supervision of Prof. Tom Marley. The subject of his thesis was taken from an area in abstract algebra and was entitled "Hilbert functions of certain ideals in polynomial rings". This project was carried out in three stages. First, Kevin acquainted himself with a substantial amount of algebra which might normally be learned in the second or third year of graduate school. Having done this, he then began to attack some interesting problems in the area of Hilbert functions by computing many examples using the computer algebra program known as MACAULAY. By closely examining these examples, he was able to guess at some relationships and eventually prove some theorems using the theoretical techniques he had learned. On July 15, 1991, Kevin successfully defended his thesis before all interested faculty and graduate students.

Also during the academic year 1990-1991, Mark Mills wrote a senior honors thesis under the direction of Prof. Thomas Shores in partial fulfillment of the requirements for graduation with highest distinction. The title of his thesis was "The theory of singular value decomposition and the development of a one-sided algorithm for complex matrices". Although Mark did most of the background research and writing in his senior year and the preceding summer, his involvement in the subject really dates back to Spring 1988, when

he took Honors Linear Algebra from Shores. The class project of the semester was to put the equivalent of a linear algebra program called MATLAB on an HP28S calculator. One job that was left unfinished was finding a compact way of calculating the singular values of a complex matrix. Mark finished this job by developing such a method, based on previous work of other researchers with real matrices. He gave a presentation of his thesis in March 1991 and has spent the 1991-92 academic year pursuing graduate studies in mathematics at Iowa State University, where he plans to work towards a doctorate in mathematics.

During the academic year 1991-92, Barry Ostmann worked on an honors thesis under the supervision of Professor Richard Rebarber. His thesis entailed a precise analytical and numerical analysis of the spectrum of a partial differential equation modeling a supported beam with feedback. This research may lead to the examination of adding time delays into the feedback group.

Mike Lewis, a math-physics major, wrote a senior thesis during the 1991-92 academic year entitled "Kerr ellipticity measurements in rare earth-transition metal thin film multilayers". His thesis advisor was physics Professor Roger Kirby. The thesis is concerned with the testing of new materials which may be used as a storage medium for magneto-optic computer storage systems.

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MATH-STAT B-BALL TEAM FIELDLED

IT WAS ANOTHER EXCITING AND SATISFYING SEASON FOR THE Eulers, the department's faculty and staff intramural basketball team. Bouncing back from a sub-par performance the previous year, the Eulers posted a 5-3 record (good for third place among seven teams) and made it to the semifinals of the post-season tournament. All three losses were by five points or less. Once again, the team was captained by graduate student Bob Ruyle. Also participating were faculty member Tom Marley, graduate students John Drew, Peggy Hart, Alan Hartford, Sandeep Holay, Tim Huffman, Mike Ira, Dave Jorgensen, John Reimnitz, Tony Verbsky and night instructor Kent Vollenweider.

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GPOTS

OUR DEPARTMENT HOPES TO HOST THE ANNUAL GREAT Plains Operator Theory Symposium (GPOTS) in Spring of '94. Since its first meeting, which was held at UNL and which drew about thirty people, GPOTS has grown into one of the main North American conferences in Operator Theory (a branch of pure mathematics with applications in theoretical physics and engineering), with wide international participation. This year's four-day meeting, in Iowa City, was attended by over 160 mathematicians from 15 countries. Speakers at GPOTS conferences range from internationally known mathematicians to graduate students.

Indeed, throughout its history, GPOTS has always aimed to showcase new research by graduate students and recent PhD's. This year talks ran from 8:00 a.m. to 6:00 p.m., in two parallel sessions. With 7 featured one-hour talks by leaders of the field and 70 shorter 20 minute talks, it was a busy 4 days. In two years, we expect it to have grown even larger.

GPOTS has always drawn Federal funding, with a current NSF grant of \$7,500 which is expected to be increased to allow for the conference's growth and importance. However, most of the NSF money is earmarked to support graduate students and the organizers are expected to raise matching funds locally for the meeting.

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NEBRASKA RECEIVES 4.47 MILLION DOLLAR GRANT TO SUPPORT SYSTEMIC CHANGE IN MATHEMATICS EDUCATION

ONE YEAR AGO NEBRASKA WAS CHOSEN AS ONE OF TEN states to receive a grant under an NSF program called Statewide Systemic Initiatives (SSI) in Science and Mathematics Education. The Nebraska grant, which totaled \$4.47 million dollars over a five year period, was the result of a year's work by UNL mathematics professors Don Miller, Melvin Thornton and Jim Lewis who together wrote the proposal and who are serving as principal investigators (or PI's) for the grant.

The purpose of the SSI grant is to bring about significant and systemic changes in mathematics education in Nebraska. Stated in perhaps grandiose terms, the grant seeks to achieve in Nebraska Goal 4 of the National Education Goals; i.e., to be first in the world in math and science. In particular, there is a need to promote change that leads to much larger numbers of students successfully learning a lot more mathematics. While the original proposal was restricted to activities in support of mathematics education, the three PI's are joining with other colleagues on campus to develop an augmented proposal that would support efforts to change science education. Additionally, a number of the current projects have been restructured to support change in both mathematics and science education.

Promoting systemic change will involve many people and organizations including mathematics teachers and administrators from across the state, school boards, the Nebraska Department of Education, all the colleges and universities of the state, parents, public policy leaders, and business leaders. It quickly became clear that coordinating the project was a substantial task. As a step in the right direction, the PI's hired Karen Ward, an alumna of the department, to work as Managing Director of the Nebraska SSI. Also, alumnus Matt Larson is on leave from Lincoln High to work as a curriculum writer for a 12th grade math class that will be broadcast

over Nebraska ETV.

Another major step was the establishment of the Nebraska Mathematics and Science Coalition and the opening of offices for the Coalition in the First Commerce Building at 11th and P Streets in Lincoln. The Coalition is designed to bring together leaders from the education, public policy and business worlds in support of greater achievements in mathematics and science. Many math and science teachers are involved as part of advisory committees of the Coalition. In addition the Board of Governors includes such notables as Governor Nelson, Senator Kerry, Senator Withem, President Massengale and Herman Cain, CEO of Godfather's Pizza.



SSI curriculum writer Matt Larson with SSI PI Professor Mel Thornton.

To give you some idea of the scope of the SSI grant, we present a synopsis of some of its projects:

K-12 Teacher and Curriculum Enhancement Project: The K-12 Project is designed as a change movement around a teachers-teaching-teachers model. Over the past six months we have gone through a selection process which has identified eleven school districts or consortiums of school districts which will be our partners in this project. The districts range from the ESU (Educational Service Unit) that includes Scottsbluff to ESU 1 in the northeast corner of the state. Both the Lincoln and Omaha School Districts are involved.

Each of our partners has identified eight teachers (two each from grades K-3, 4-6, 7-8, 9-12) who will be the Lead Teachers for their consortium. These teachers will participate in two 5-week in-residence summer institutes designed to increase their knowledge of content, pedagogy, and use of technology in teaching, while also developing their leadership skills. The first institute for K-3 teachers will begin this summer. The intermediate and middle school institutes will begin in the summer of 1993 while the high school teachers will begin in the summer of 1994.

Following participation in the summer institutes, Lead Teachers are expected to become active leaders in a teacher developed

and teacher led change movement to improve math and science education. In particular, these teachers will be expected to conduct at least two, two-week summer workshops to disseminate what they have learned and how they have changed their own teaching. They will also invite teachers into their own classrooms to observe their teaching, and participate on a state and national level in meetings to help set the agenda as to how math and science should be taught. Eventually, the participants in the two-week workshops will be asked to lead two-day workshops to continue to enlarge the number of teachers participating in the math and science reform effort.

Distance Learning Project: The goal of the Nebraska SSI Distance Learning Project is to harness the power of Nebraska ETV and MIDnet, the regional electronic network that is part of the national network, Internet, to support mathematics education in rural Nebraska. Certainly we hope that the products developed in this initiative are valuable to all teachers, but the project was developed in response to the many demands placed on the math teacher at small rural schools where one person may teach as many as six different courses. This project will have at least four distinct components.

A middle school math course will be built around a series of video tapes that seek to promote the importance of mathematics in all our lives as it also seeks to prepare students for first-year algebra. At its best this course will minimize teacher preparation time while supporting student centered learning activities and encouraging students to take a greater interest in learning math.



SSI's Prof. Don Miller, Deb Romanek, Lee Peterson, Karen Ward, Sylvia Huntington and Prof. Jim Lewis

The second project is a 12th grade "transition to college math" class that will be broadcast live over NEBSAT, Nebraska ETV's closed circuit television network. This is intended to be a two-way audio/interactive broadcast similar to the Japanese language course currently being broadcast by Nebraska ETV. It will also use electronic networks as another means of communicating with students.

The prime audience for the course may be students who currently might feel they are not ready for a solid precalculus course and thus might currently opt to not take math at all during their senior year. It has been the experience of the math faculty at UNL that for this group of students to be successful in college, they need to take and be successful in a 12th grade math class.

A geometry for elementary school teachers is the third project. UNL has recently revised its requirements for a major in elementary education to include three math courses, one of which will be a geometry class. We seek to create a geometry course that can be broadcast over NETV in order to assist current elementary school teachers who want to upgrade their math knowledge to the level recommended by the NCTM.

Teaching teachers to use technology in the classroom is the fourth project. Four different series of video tapes will be produced built around the themes of graphing calculators, calculators in elementary school, geometry software like the Geometry Sketchpad, and software such as spreadsheets. The first series on graphing calculators has already been produced.

Complementary Activities: In addition to the activities described above, the Nebraska SSI seeks to integrate the themes of public awareness, gender equity, and cultural diversity into all of our activities.

The need for a public awareness effort is fairly obvious. It is

far too socially acceptable to be poor in mathematics. Some people wear it like a badge of honor. Both parents and teachers can send messages to students that math is hard, math is unpleasant, and math is not really all that important to their lives. Countering these tendencies and promoting the importance of mathematics education for all students will be an important part of our initiative.

Gender equity and cultural diversity must also be reoccurring themes throughout all our activities. We must promote a future in which female and minority students not only have access to math and science education but they are also encouraged to achieve. In addition to promoting an understanding of these issues as part of all our efforts, we have supported two activities centered around these issues. This spring we became a contributing sponsor for the Expanding Your Horizons Conference for young women held at Nebraska Wesleyan University and we sponsored a Conference on Equity and Diversity in Math and Science.

If we are to make significant strides in math and science education in Nebraska, many people will have to care enough to get involved. If you would like to know more about the Nebraska SSI or would like to know how you can become involved, we urge you to contact either Don Miller or Karen Ward at the Nebraska SSI office (472-8965) or write to them care of the Department of Mathematics and Statistics at UNL.

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LETTER FROM THE CHAIR

WE HOPE YOU HAVE ENJOYED READING THIS ISSUE OF THE Math-Stat Newsletter and that it has given you a feel for the significant achievements of our faculty and students. These are truly exciting times but they have also been trying times.

You may be aware that UNL suffered a 3% budget cut this year and that the process of identifying those cuts was difficult for the university. When a proposal was made to completely eliminate the Departments of Speech Communication and Classics, our faculty took a strong stand against that recommendation and eventually it was rejected. Our new Chancellor, Graham Spanier, led the process of identifying how the cuts would be made and the campus has set about to try to heal itself.

While our department did not suffer a permanent budget cut, it was required to make a temporary cut of \$46,000 this year. We learned of this cut shortly before the start of the fall semester and long after most of our money had been committed. Eventually we lost the ability to hire three more GTAs and as a result had to run a number of our courses at much higher levels than we consider appropriate in an effort to accommodate as many students as possible. The budget cut also eliminated all flexibility in our operating budget and we were forced to "ration" the use of our copy machine and long distance privileges. Additionally, many faculty volunteered to share phone lines in an effort to control costs.

As Chair, I can only say that the faculty have been extremely

cooperative as we have attempted to cope with our budget cut. Wherever possible they have cut down their use of supplies. Many are paying for some of their professional calls out of their own pocket. Electronic mail ("email") have become an alternate form of communicating with colleagues in other cities. Professor Thornton found an old second hand copy machine which he bought for a few hundred dollars to use in support of his Western Mathematics Scholars project and then made the machine available to the department, thereby permitting nearly cost free copying. Fortunately, we are within a month of the end of this fiscal year and we can look forward to more normal, although minimal, resources being available to support the work of our faculty.

This year alumni donations to the Math-Stat Fund have been particularly important to the department. Your support made it possible to provide start-up support for our newest faculty member, Professor John Orr, and thus helped attract him to UNL. Professor Orr has already begun to distinguish himself as a teacher and recently he received a 3-year NSF grant to support his research. Your donations have also supported faculty travel, visiting speakers, computing services, and will even be used to pay for this newsletter which is sent to all our alumni.

The past year has been a banner year for faculty when it comes to success with the National Science Foundation, the primary federal agency that supports mathematics. In addition to the Nebraska SSI grant which I am pleased to be a part of together with Pro-

fessor Miller and Thornton, a number of faculty have received word that they will receive grants to support their summer research. This group includes David Jaffe, John Meakin, Mark Sapir, John Orr, David Pitts, Richard Rebarber, and Partha Lahiri. In addition, Sylvia Wiegand has received a Visiting Professorship for Women grant that will allow her to spend a year at Purdue University concentrating on her research. Additionally, Roger Wiegand was the lead principal investigator on a visitor and travel grant that supports Roger, Sylvia, Brian Harbourne and Tom Marley.



Math-Stat Chair Jim Lewis

New to the department during the past year were the Undergraduate Student Advisory Board and the Graduate Student Advisory Board for the department. The undergraduate group was led by Angie Hoins and leadership for the graduate group fell to Jeff Rushall. Both groups have been quite helpful in bringing to me issues of interest to our students. Over time I believe both groups will become very important to efforts to improve our instructional program.

Computing is another area where we continue to make progress. In particular, the department has been awarded over \$50,000 this year to expand and upgrade our NeXT computer lab. Professors Shores, Dunbar and Tiahrt have taken the lead in using this lab in their instruction. Funds have also been obtained from the College of Arts and Sciences to begin developing a Macintosh Lab for use by our statistics faculty in the teaching of Stat 380.

Finally, let me invite you to write or to visit the department. We enjoy learning about our alumni and their successes. We appreciate your advice as to how we can improve our instructional program. Indeed, it is one of my goals during the next year to develop an Alumni Advisory Board because we need your help identifying what we need to do to help make our graduates employable. Again, we appreciate your support and would like to hear from you.

Have a good year.

Jim Lewis
Jim Lewis

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