A. DEPARTMENTAL ORGANIZATION

The administrative organization of the department consists of a chairman and an associate chairman, the latter, of course, being unofficial. Major department policy is established by the faculty; the chairman of the department is advised in important interpretations of this policy by an advisory committee consisting of the associate chairman and three elected faculty. There are administrative committees for the graduate program, the undergraduate program, the learning center program, and student advising. Other committees are formed as needed and disbanded when their assignments are accomplished. Faculty meetings are usually held monthly and deal with such matters as department policy, curriculum, tenure, promotion, etc.

B. COLLOQUIA AND FACULTY SEMINARS

Major efforts have been made during the past year to establish a colloquim program which would be stimulating and interesting to the faculty, the graduate students, and the university community. The variety of topics covered is indicated by the titles of the talks listed below. The program this year culminated in a talk given by K. Kuratowski, one of the early workers in modern mathematics.

Charles Vinsonhaler, University of Connecticut: "QF-3 Rings."
Richard Ringeisen, Colgate University: "The Many Facets of Graph Theory."
Robert Osserman, Stanford University: "Some Unusual Results on Area."
Robert Warfield, University of Washington: "Abelian Groups" and "Hereditary Rings and Serial Rings."
Ed Hewitt, University of Texas at Austin: "Some Gaps in the Theory of Lacunary Series" and "Some Funny Fourier Transforms."
Frank Miles, California State College: "Some Theorems on Helson and Kronecker Sets."
William Firey, Oregon State University: "Shapes of Worn Stones."
Edwin L. Crow, U.S. Department of Commerce: "Some Recent Applications of Statistical Methods" and "Robust Estimation of Location and Scale."
Charles E. Murley, University of Victoria: "Generalization of Separable Torsion Free Abelian Groups."
Colin Clark, University of British Columbia: "Mathematical Bioeconomics."
Kazimierz Kuratowski, Warsaw, Poland: "The Origin and Development of the Polish School of Mathematics."
Harry Rosenberg, Fort Lewis College: "The Elementary Teacher of Mathematics Can Be Eliminated."
Robert Wisner, New Mexico State University: "Triangles and Partitions."
David Robitaille, University of British Columbia: "A Mathematics Clinic."
Jim Moser, University of Wisconsin: "Developing Mathematical Processes--The Process Oriented Elementary Mathematics Program."
Philip L. Hosford, New Mexico State University: "The Right to Figure."

Irvin E. Vance, New Mexico State University: "Patterns in Mathematics."
William Fitzgerald, Michigan State University: "The Unified Science and Mathematics in the Elementary Schools (USMES)."

The department continued its offering of regular seminars in abelian groups, constructive mathematics, analysis, Fourier series and harmonic analysis.

With partial support from the National Science Foundation, the Tenth Annual NMSU Holiday Symposium in Mathematics was held during the period December 27-31. The featured lecturer was Professor Errett Bishop of the University of California at San Diego. A total of 87 mathematicians representing 43 universities, including 40 invited guests, attended. This year's symposium was judged by many of the participants to be the most outstanding of the ten held thus far.

C. UNDERGRADUATE SCHOLARSHIPS

E. IMPROVEMENTS

Instruction

All of the faculty use student evaluations and these continue to be very good. These are used to some extent by the department in evaluation of teaching; however, their primary value is still the use by the individual faculty member to improve teaching and communication with students.

The Mathematics Learning Center facilities are now quite complete and efforts are being concentrated in the improvement of technique, efficiency, learning materials, etc. There is a greater degree of faculty involvement in the learning center than there has been in the past. A director and an advisory committee have been appointed and they have worked with considerable success in areas such as improving the completion rate, rewriting and improving the learning materials, and discussing the quality of services in the learning center with the users of the courses offered there. The establishment of the joint Business-Mathematics Committee has resulted in a number of improvements, including the complete rewriting of one of the courses offered in the learning center.

Curriculum

The department is currently examining both its graduate and undergraduate programs with a view toward more efficiency in course offerings, new direction in curriculum, and a re-evaluation of the needs of the academic community. In particular, a departmental committee is actively considering preparing a series of "suggested curricula" constructed to help mathematics majors and others design a program of study leading to a career in the applications of mathematics

in a wide variety of fields. A five-year program of such studies leading to a master's degree is also being considered, as well as a master's degree program especially designed for students whose undergraduate major was in a field other than mathematics but, nevertheless, one making significant use of mathematics.

Strong emphasis has been placed on communication with all departments served by the Department of Mathematical Sciences. Discussions of this nature have recently initiated a number of changes in the service areas of the department.

Advisor-Advisee Relations

Undergraduate advising is done by a committee of ten members of the department. Student records and advising materials have been collected and put into a new advising office. The materials sent out by the Arts and Sciences Advising Center are a great help here. This office is manned continually during advising and preadvising periods, and student majors are mailed the schedule the advisors will follow. This office is used for advising and tutoring throughout the semester.

F. MAJOR STEPS TAKEN TO INCREASE AND UPGRADE MAJORS

It is intended that the "suggested curricula" in applied mathematics will form the subject of a brochure informing high school students of the importance of mathematics as a foundation for a career in many areas--from linguistics to systems engineering. Such information should increase and improve the number of majors in mathematics as well as user-service courses in mathematics. The high school visitation program, workshops, etc. have also been effective and are being continued as resources permit.

G. PROFESSIONAL SERVICE

During the past year members of the department have served as president of the Rocky Mountain Mathematics Consortium and president of the Southwest Section of the Mathematical Association of America. The department is represented on the Board of Governors of the Mathematical Association of America, the Rocky Mountain Mathematics Consortium, and the Pacific Journal of Mathematics. A member of the department is the next annual chairman of the National Operations Research Society Meeting. The department is well represented on most important committees of the College of Arts and Sciences, on the university and college Faculty Affairs Committees, the Faculty Senate, and the University Statistics Committee.

The department is involved in service to local and State elementary and secondary schools, extra-curricular classes, workshops, visitation, etc. It is the feeling of those involved that the workshop program should receive wider university support. Besides exceeding the

resources the department can profitably expend, the need for workshops is equally great in many other academic areas.

David Arnold
Referee for Pacific Journal of Mathematics.
Referee for Proceedings of the American Mathematical Society.
Referee for Rocky Mountain Journal.
Departmental Library Committee.
Departmental Committee for Undergraduate Scholarships.
Departmental Committee for Review of Mathematics Education.
Departmental Tenure Procedures Committee.

Richard Bagby
Supervisor, Putnam Examination, Mathematical Association of America.
Departmental Committee for Undergraduate Scholarships.

Eldon Boes
Director, Mathematics Learning Center.
Joint Business-Mathematics Committee.

Henry Cheng
Faculty Advisor, Chinese Students Association.

John DePree
Member, Board of Directors, Pacific Journal of Mathematics.
Referee for Pacific Journal of Mathematics.
Reviewer for Mathematical Reviews.
Reviewer for Zentralblatt fur Mathematik.
Departmental Graduate Committee.
College Faculty Affairs Committee.

Edward D. Gaughan
Departmental Learning Center Advisory Committee.
Departmental Advisory Committee.
President, Southwest Section, Mathematical Association of America.

Donald G. Johnson
Chairman, Departmental Workshop Program.
Chairman, Departmental Mathematics Education Committee.

William Julian
Reviewer for Mathematical Reviews.
Departmental Applied Mathematics Curriculum Review Committee.

John B. Giever
Departmental Graduate Committee.
Joint Business-Mathematics Committee.
Departmental Applied Mathematics Curriculum Review Committee.

Departmental Advisory Committee.
Associate Department Chairman.

Joseph Kist
Referee for National Science Foundation.
Referee for Pacific Journal of Mathematics.
Referee for Canadian Journal of Mathematics.
Referee for Australian Mathematics Society.
Referee for Mathematical Reviews.
Referee for Mathematische Annalen.
Reviewer for Zentralblatt fur Mathematik.
Departmental Advisory Committee.

Warren Krueger
Reviewer for Zentralblatt fur Mathematik.
Chairman, Departmental Undergraduate Scholarship Committee.

Wolfgang Liebert
Reviewer for Zentralblatt fur Mathematik.

Joaquin Loustaunau
Chairman, Advisory Board, Special Students Program.
Committee for Minority Training in Sciences (Physics Society).
Reviewer for Mathematical Reviews.

Mark Mandelker
Referee for Canadian Journal of Mathematics.
Referee for National Science Foundation.
Reviewer for Mathematical Reviews.
Reviewer for Zentralblatt fur Mathematik.
Reviwer for Pacific Journal of Mathematics.
Referee for Proceedings of the American Mathematical Society.
Book Reviewer for Canadian Mathematics Bulletin.
External Examiner for Carleton University, Ottawa, Canada.

Ray Mines
Reviewer for Mathematical Reviews.
Faculty Senate.

Keith Phillips
Reviewer for Mathematical Reviews.
Reviewer for Zentralblatt fur Mathematik.
Reviewer for American Mathematical Society.
Reviewer for Studia Mathematica.
Departmental Library Committee.
Departmental Graduate Committee.

Paul Randolph
Associate Editor, Operations Research.
Referee for Journal of Mathematical Sociology.

Fred Richman
Referee for Pacific Journal of Mathematics.
Referee for Rocky Mountain Journal of Mathematics.
Departmental Advisory Committee.
Chairman, Departmental Graduate Committee.
Faculty Senate.

Gerald S. Rogers
Departmental Learning Center Advisory Committee.
Holiday Symposium Committee.

Charles Swartz
Departmental Graduate Committee.
Departmental Tenure Procedures Committee.

John D. Thomas
Reviewer for Zentralblatt fur Mathematik.
Chairman, Departmental Committee for Applied Mathematics.

Irvin E. Vance
Reviewer for the Mathematics Teacher.
Reviewer for The Journal on Research in Mathematics Education.
Departmental Mathematics Education Committee.

Carol Walker
Referee for Rocky Mountain Journal of Mathematics.
Referee for Pacific Journal of Mathematics.
Chairman, Departmental Advising.
Departmental Tenure Procedures Committee.

Elbert Walker
Reviewer for Mathematical Reviews.
Reviewer for Zentralblatt fur Mathematik.
Editor, Rocky Mountain Mathematics Journal.
President and Member of Board of Governors, Rocky Mountain Mathematics Consortium.
CUPM Consultant.
Departmental Advisory Committee.
Board of Governors, Mathematical Association of America.

John Werth
Faculty Advisor, Pi Mu Epsilon.
Reviewer for Mathematical Reviews.

Francis D. Williams
Faculty Sponsor, Soccer Club.
Chairman, Departmental Tenure Procedures Committee.

Robert J. Wisner
New Mexico Educational Coordinating Council.
Commission on Pre-service Education of Teachers of Mathematics of the National Council of Teachers of Mathematics.

Consulting Editor, Contemporary Undergraduate Mathematics Series, Brooks/Cole Publishing Company.
Editorial Advisor, Scott-Foresman and Company.
Probability Course at Mayfield High School.
Tutor for State Mathematics Contest.

Joseph D. Zund
Reviewer for Mathematical Reviews.
Reviewer for Zentralblatt fur Mathematik.
Referee for Australian Mathematical Society.
Referee for Rocky Mountain Journal of Mathematics.
Departmental Graduate Committee.

H. PROFESSIONAL MEETINGS ATTENDED

David Arnold
Conference on Algebraic K-Theory (national).
International Conference on Abelian Groups (international).
Ring Theory Conference (national).
NMSU Holiday Mathematics Symposium (national).

Richard Bagby
79th Annual Meeting, American Mathematical Society (national).
Southwestern Section, Mathematical Association of America (regional).

Gordon Berg
79th Annual Meeting, American Mathematical Society (national).
NMSU Holiday Mathematics Symposium (national).

Eldon Boes
Southwestern Section, Mathematical Association of America (regional).
51st Annual Meeting, National Council of Teachers of Mathematics (national).
NMSU Holiday Mathematics Symposium (national).
West Coast Conference on PSI (national).

Henry Cheng
American Mathematical Society (regional).
1972 Annual Conference of Association of Computing Machinery (national).
NMSU Holiday Mathematics Symposium (national).
Bicentennial Conference on the History of American Mathematics (national).

John D. DePree
Pacific Journal of Mathematics, Board of Governors (national).
NMSU Holiday Mathematics Symposium (national).
79th Annual Meeting, American Mathematical Society (national).
Southwestern Section, Mathematical Association of America (regional).
Bicentennial Conference on the History of American Mathematics (national).

Edward D. Gaughan
51st Annual Meeting, National Council of Teachers of Mathematics (national).
Southwestern Section, Mathematical Association of America (regional).
National Council of Teachers of Mathematics (regional).
NMSU Holiday Mathematics Symposium (national).

John B. Giever
79th Annual Meeting, American Mathematical Society (national).
NMSU Holiday Mathematics Symposium (national).

Linda Hill
79th Annual Meeting, American Mathematical Society (national).
NMSU Holiday Mathematics Symposium (national).

Donald G. Johnson
51st Annual Meeting, National Council of Teachers of Mathematics (national).
National Council of Teachers of Mathematics (regional).

William Julian
79th Annual Meeting, American Mathematical Society (national).

Arthur Kruse
NMSU Holiday Mathematics Symposium (national).

Wolfgang Liebert
International Conference on Abelian Groups (international).

Mark Mandelker
79th Annual Meeting, American Mathematical Society (national).
NMSU Holiday Mathematics Symposium (national).

Ray Mines
International Conference on Abelian Groups (international).

Keith Phillips
79th Annual Meeting, American Mathematical Society (national).

Paul Randolph
43rd National Meeting of ORSA (national).
National Council of Teachers of Mathematics (regional).
18th Conference on the Design of Experiments in Army Research, Development and Testing (national).
Operations Research Society of America (national).
NMSU Holiday Mathematics Symposium (national).

Fred Richman
79th Annual Meeting, American Mathematical Society (national).
NMSU Holiday Mathematics Symposium (national).

Gerald S. Rogers
79th Annual Meeting, American Mathematical Society (national).
National Council of Teachers of Mathematics (regional).
NMSU Holiday Mathematics Symposium (national).

Charles Swartz
Symposium on Vector Measures (national).
NMSU Holiday Mathematics Symposium (national).

John Thomas
NMSU Holiday Mathematics Symposium (national).

Irvin E. Vance
2nd International Congress on Mathematics Education (international).
New Mexico Council of Teachers of Mathematics (regional).
National Council of Teachers of Mathematics (regional).
51st Annual Meeting, National Council of Teachers of Mathematics (national).

Carol Walker
Ring Theory Conference (national).
Visit to Grants Branch Campus (regional).
Bicentennial Conference on the History of American Mathematics (national).
NMSU Holiday Mathematics Symposium (national).

Elbert A. Walker
International Conference on Abelian Groups (international).
AMS and MAA Board of Governors of MAA, Sectional Officers Meeting of MAA (national).
79th Annual Meeting, American Mathematical Society (national).
Southwestern Section, Mathematical Association of America (regional).
Ring Theory Conference (national).
NMSU Holiday Mathematics Symposium (national).
Bicentennial Conference on the History of American Mathematics (national).

John Werth
Ring Theory Conference (national).
NMSU Holiday Mathematics Symposium (national).

Francis D. Williams
American Mathematical Society (regional).
NMSU Holiday Mathematics Symposium (national).

Robert J. Wisner
National Council of Teachers of Mathematics (regional).
79th Annual Meeting, American Mathematical Society (national).
Southwestern Section, Mathematical Association of America (regional).
Minnesota Council of Teachers of Mathematics (regional).
51st Annual Meeting, National Council of Teachers of Mathematics (national).

Mathematics Council of the Alberta Teachers Association (regional).
Florida Council of Teachers of Mathematics (regional).
NMSU Holiday Mathematics Symposium (national).

Dennis Young
NMSU Holiday Mathematics Symposium (national).
Multivariate Statistical Analysis Conference (national).
West Coast Conference on PSI (national).

I. RESEARCH PAPERS PUBLISHED

Arnold, David, "A Duality for Quotient Divisible Groups," Pacific Journal of Mathematics.
Arnold, David, "Exterior Powers and Torsion Free Modules," Transactions of American Mathematical Society.
Arnold, David, "Algebraic K-Theory and Torsion Free Abelian Groups," Proceedings of International Conference on Abelian Groups.
Arnold, David, "Endomorphisms and Direct Sums of Torsion-Free Abelian Groups," Journal of Algebra (with E. L. Lady).
Bagby, Richard, "Parabolic Potential With Support on a Half-Space," Illinois Journal of Mathematics.
Boes, Eldon, "K-Theory Solution to the Almost Complex Spheres Problem," Rocky Mountain Journal of Mathematics.
Boes, Eldon, "Mathematics Education Projects at New Mexico State University," Promising Practices in Mathematics Teacher Education (NCTM).
Cheng, Henry, "Constructive Mathematics and Computer Science," Proceedings of the Association for Computing Machinery Annual Conference.
Cheng, Henry, "Crooked Paths," The American Mathematical Society Monthly.
Cheng, Henry, "A Constructive Intermediate-Value Theorem," Advances in Mathematics.
Gaughan, Edward D., Sequences and Limits, Scott-Foresman Publishing Company.
Hosford, Philip, "The Right to Figure," Contemporary Education.
Hosford, Philip, An Instructional Theory--A Beginning, Prentice-Hall Publishing Company.
Hosford, Philip, "Innovations in Teacher Education: An International Perspective," The International Council on Education for Teaching.
Julian, William, "Pulsar Electrodynamics II," Astrophysical Journal.
Liebert, Wolfgang, "One-sided Ideals in the Endomorphism Rings of Reduced Complete Torsion-free Modules and Divisible Torsion Modules Over Complete Discrete Valuation Rings," Proceedings of the International Conference on Abelian Groups.
Loustaunau, Joaquin, "A Characterization of Ptak Spaces," Mathematiche Annalen.
Mandelker, Mark, "Separating Chains in Topological Spaces," Journal of the London Mathematical Society (with D. G. Johnson).

Phillips, Keith, Foundations of Analysis in the Complex Plane, Holt, Rinehart and Winston.

Richman, Fred, "Modules Over PID's that are Injective Over Their Endomorphism Rings," published in the book Ring Theory edited by R. Gordon, Academic Press (with E. A. Walker).

Swartz, Charles, "Convolution in K M_p Spaces," Rocky Mountain Journal of Mathematics.

Swartz, Charles, "Distributional Boundary Values," Indiana University Mathematics Journal.

Walker, Carol, "Projective Classes of Cotorsion Groups," Illinois Journal of Mathematics.

Walker, Carol, "Projective Classes of Completely Decomposable Abelian Groups," Archiv der Mathematik.

Walker, Carol, "Quotient Categories and Rings of Quotients," The Rocky Mountain Journal of Mathematics (with E. A. Walker).

Walker, E. A., "Decompositions of Dire ct Sums of Cyclic p-Groups," Rocky Mountain Journal of Mathematics (with D. Tarwater).

Werth, John, "Maximal Pure Subgroups of Torsion Complete Abelian p-Groups," Pacific Journal of Mathematics.

Williams, Francis D., "Quasi-Commutativity of H-Spaces," Michigan Mathematics Journal.

Young, Dennis, "The Max Trace-Ratio Test of the Hypothesis," Communications in Statistics (with K. C. S. Pillai).

Zund, Joseph D., "The Generalized Maxwell Tensor and the Projective Geometry of the Electromagnetic Field," Tensor New Series.

Zund, Joseph D., "Degenerate Gravitational Fields with Twisting Rays II," Lett. al Noor Cim.

Zund, Joseph D., "Generalizations of the Goldberg-Sachs Theorem," Rend. del Circ. Mat di Palermo.

Zund, Joseph D., "A Spinor Approach to the Generalized Singular Electromagnetic Field Theory of Bel, Lapiedra and Montserrat," Journal of Mathematical Physics (with M. F. Maher, Jr.).

Zund, Joseph D., "Electromagnetic Theory in General Relativity I: The Geometry of Congruences," Tensor New Series (with G. C. Debney).

Zund, Joseph D., "Electromagnetic Theory in General Relativity II: Non-Singular Fields," Tensor New Series (with G. C. Debney).

J. RESEARCH PAPERS PRESENTED

Bagby, Richard, "A Comment on the Initial Value Problem for $F(x,y,y') = 0$," Southwestern Section, Mathematical Association of America (regional).

Berg, Gordon, "Constructive Dimension Theory," 79th Annual Meeting, American Mathematical Society (national).

Cheng, Henry, "Bishop's Constructive Intermediate Value Theorem," American Mathematical Society (regional).

Cheng, Henry, "Constructive Aspects of the Mappings of Variable Domains," NMSU Holiday Mathematics Symposium (national).

Liebert, Wolfgang, "One-sided Ideals in Endomorphism Rings," International Conference on Abelian Groups (international).

Mines, Ray, "Topologies and Radicals in Abelian Categories," University of Ferrara, Italy (regional).
Mines, Ray, "Cotorsion Groups Without Homology," University of Ferrara, Italy (regional).
Mines, Ray, "Applications of Topologies and Radicals in Categories of Modules," University of Ferrara, Italy (regional).
Phillips, Keith, "Singular Integrals for Local Fields," 79th Annual Meeting, American Mathematical Society (national).
Randolph, Paul, "Stopping Rules for Sequencing Problems," Operations Research Society of America (national).
Randolph, Paul, "Computerized Automated Range Scheduling Model," Operations Research Society of America (national).
Randolph, Paul, "The Unconstrained Global Maximum of a Function," Operations Research Society of America (national).
Randolph, Paul, "Stopping Rules for Scheduling with Particular Reference to Missile Range Scheduling," 18th Conference on the Design of Experiments in Army Research, Development and Testing (national).
Swartz, Charles, "Absolutely Summing Operators on $C_x(S)$," Symposium on Vector Measures (national).
Vance, Irvin E., "A Mathematics Program for Minority Students," 2nd International Congress on Mathematics Education (international).
Vance, Irvin E., "The Problems in Teaching Mathematics in Inner Cities and Recommendations," 2nd International Congress on Mathematics Education (international).
Walker, Elbert, "Some Constructions of Abelian Groups," International Conference on Abelian Groups (international).
Wisner, Robert J., "Fractions and Primes," National Council of Teachers of Mathematics (regional).
Young, Dennis, "Teaching Mathematics Service Courses Using PSI," West Coast Conference on PSI (national).

M. GRANTS AND PROPOSALS

Each person with a teaching load reduced primarily for research was encouraged to apply for grant money during the current year. Federal support for the sciences is very scarce and so although many proposals were submitted, few were chosen.

Grants in Force
Elbert Walker..... $21,000
Robert J. Wisner...$108,000
Mark Mandelker..... $10,800
Symposium..... $8,100

N. CRITICAL ANALYSIS

The department made great strides under the NSF development grant and is now recognized nationally for its achievement in mathematics. The department intends to remain strong in the areas that have contributed to this recognition. The department also realizes that academia in

general and mathematics in particular, is under tremendous pressure to serve better and more efficiently society and the academic community. It feels a strong need to have its position within the NMSU community well-defined so that it knows better the resources it has available now and in the future. It has initiated discussions with the administration to help determine its future resources and the expectations of the administration. Having done this, it seeks a degree of autonomy that will permit it to pursue realistically goals that it believes will better serve the people of New Mexico and bring recognition to New Mexico State University. The department, by opening new avenues of communication, is trying to serve the users of mathematics at NMSU better; it is considering the establishment of undergraduate and graduate programs that would cross disciplinary lines. It is trying to broaden substantially its graduate degree programs to make its graduates more attractive to prospective employers.

Faculty teaching loads have been and will continue to be evaluated in an attempt to balance individual efforts toward teaching, research, and service.

Evaluation and restructuring of the Mathematics Learning Center has been a major thrust of the department during the past year. It is generally believed that the self-paced program in the learning center is a viable teaching vehicle that is amenable to many programs and topics in addition to those now carried.

The department is concerned that over-emphasis on quantitative measuring devices, which are analogous to the cost-effectiveness instruments of government and industry, will eventually undermine and prohibit academic excellence. The value of a discipline to both the academic and social communities surely is more than just the number of units (people) lectured at. Somewhere there must be reasonable balances between the quantity of people processed and the quality of the education they have received; between the number of pages written by a faculty and the quality of thought contained therein; between the number of programs offered by an institution and the ability of its resources to support high quality in those programs.

During the next year the department hopes to establish a blueprint for its goals and directions. It is expected that increased emphasis will be placed on interdisciplinary programs and greatly broadened graduate training. Teaching methods and devices will be introduced whenever possible in order to improve teaching efficiency, quality of education, and to stimulate student interest. The department will attempt to determine and emphasize those areas in which it can best serve. Most importantly, the department hopes to maintain and improve the quality of education that it offers to the people of New Mexico.