Mathematical Sciences
Volume I

I. GENERAL DEVELOPMENTS

A. PERSONNEL CHANGES AND DEVELOPMENTS

During the spring semester of 1977, Professor Carol L. Walker served as acting assistant dean of the Graduate School. The sabbaticals of Professors Richman and Wisner continued during the spring semester and Professor Zund was also on sabbatical leave during the spring semester. Professor Traxler was on leave without pay and resigned in August to remain with the Federal Fish and Wildlife Service in Maryland. Visiting assistant professors during the spring semester were Professors Coffee, Garfinkel, Hunter, Jacroux, and Terry.

During the fall 1977 semester, Professors Mandelker, C. Walker, and E. Walker were on sabbatical leave which will continue during the spring 1978 semester. Professor E. Walker was awarded an NSF Science Faculty Professional Development Grant to study advanced topics in statistics while on sabbatical leave. Visitors for the fall semester were J. Chao, G. Sylvester, P. Hsieh (visiting assistant professors), M. Frese, S. Frese (instructors), and M. Chao (half-time lecturer).

Mathematical activities in the department continued at a very high rate. Sixteen outside speakers gave colloquia and there were five research seminars that met weekly during the spring (algebra, applied analysis, coding theory, Fourier analysis and statistics) and five in the fall (applied mathematics, algebraic geometry, constructive mathematics, harmonic analysis and statistics). For the first time since 1963 the department did not hold its Christmas Symposium. This nationally recognized event was to be replaced by a distinguished colloquium series in which a distinguished mathematician would visit NMSU for a week to consult and work with local people while delivering a series of five colloquia (two of these were held in the spring of 1978). The faculty members of the department continued the varied activities that contribute to both the local and national growth of mathematics: reviewing and refereeing for journals, serving in various editorial capacities, presenting research papers at meetings and giving invited addresses at meetings and other institutions, serving on various panels and boards of governors, publishing research papers, etc.

B. PROGRAM CHANGES

The growing concern of the department over the past several years with the lack of preparation of many students entering

its courses reached, during the fall semester, the stage
where specific programs to meet the problems were being dis-
cussed and proposed. The causes of the problems are complex
and simplistic solutions seem untenable. Extensive testing
programs to identify the students needing help and modular
programs to meet the varied needs of the students for learn-
ing and review seem to give the most promise.

Of continuing concern is the status of our graduate program.
It has a deserved reputation for excellence but the very
severe depression in the job market for Ph.D. mathematicians
has resulted in a national decline in the graduate student
enrollments in mathematics. Reorienting our program to make
our graduates more attractive to industry, more aggressive
recruiting of graduate students, etc., are palliatives which
ease but do not solve the problem. Short of mass suicides by
mathematicians over 40 or increased hiring of faculty by the
universities in the country (according to figures presented
by the academic vice president, fall student credit hour pro-
duction of the department increased by 36% from 1974 to 1977.
It might be noted that the number of regular faculty positions
remained essentially constant during this period.) the short
term outlook continues to be bleak.

C. PHYSICAL PLANT

The department has updated its expanded computing facilities.
New terminals have been acquired and two TV monitors were
installed in a classroom which could be hooked into one of
the terminals for display to a class. Additional monitor
facilities will be acquired as departmental resources permit
and additional access lines to the Computer Center have been
proposed.

II. RESEARCH ACTIVITIES

A. RESEARCH PROPOSALS AND GRANTS

Of the 12 research proposals submitted to federal agencies,
five have been funded ($88,844) and seven are still pending
($284,155).

B. PUBLICATIONS

In the period January-December 1977, 22 research papers were
presented at local, national, and international meetings;
20 research papers were published in recognized journals; and
faculty members attended 45 professional meetings.

III. CRITICAL ANALYSIS AND RECOMMENDATIONS

The Department of Mathematical Sciences has in the past year continued its efforts to build courses in applied mathematics and interdisciplinary areas. The department recruited an outstanding young numerical analyst who, in conjunction with the two numerical analysts already on the faculty, will give the department the nucleus for a strong program in this area. This would be a fairly unique program nationally and so the department believes it has the potential for attracting more graduate students.

Both the quality and the quantity of applicants to our graduate program seems to have increased slightly over last year. The department has no idea whether this is due to an improvement in the mathematical scene nationwide or whether it's an early result of some of the aggressive recruiting program that we introduced this last fall or perhaps it's just a slight aberration in the obvious deterioration over the past few years. Another year or two should give us a more accurate picture of what's going on in this area.

There's been a severe deterioration in the lack of mathematical preparation on the part of entering freshmen to the university. This has had a very undesirable effect on the level at which the department is able to teach our standard lower division courses. In order to rectify this the department is planning to introduce several remedial courses that might salvage some of these woefully unprepared students. This would, of course, also enable us to offer the beginning mathematics courses at the appropriate level and thereby serve those students who do come to us with an adequate background. The department also plans during the next year to study the problem of the well-motivated versus the unmotivated student in our lower division courses with a view to possible redistribution of our resources at this level.

I. PERSONNEL ACTIVITIES

A. PROFESSIONAL SERVICE

D. M. Arnold
Co-Editor, Springer-Verlag Lecture Notes in Mathematics,
   Vol. 616, Proceedings of Abelian Group Theory Conference.
Chairman, Arts and Sciences Research Affairs Committee.
Member, departmental committees: graduate, mathematics edu-
   cation, advisory, faculty search, comprehensive examina-
   tions.

R. J. Bagby
Reviewer, Mathematical Reviews
NMSU representative on the Board of Governors, Rocky Mountain
   Mathematics Consortium.
Member, departmental committees: mathematics education;
   tenure; faculty search; chairman, graduate; chairman, pro-
   motion to associate professor; advisory.

J. D. DePree
Member, Board of Governors, Pacific Journal of Mathematics.
Chairman, departmental committees: advisory, faculty search.

E. D. Gaughan
Reviewer, Brooks/Cole Publishing Co.
Reviewer, National Council of Teachers of Mathematics 1979
   Yearbook.
Chairman, search committee for department head for
   Department of Philosophy.
Advisor, Arts and Sciences College Advising Center.
Member, departmental committees: learning center; outside;
   chairman, grading practices; soft sciences; course coordi-
   tion.

J. B. Giever
Team member, National Science Foundation evaluation of pro-
   posals for Student Science Training Program.
Member, Arts and Sciences Linguistics Committee.
Member, departmental committees: advisory; undergraduate
   advising; chairman, teaching assistant selection; chairman,
   learning center.

R. H. Hunter
Co-editor, Springer-Verlag Lecture Notes in Mathematics,
   Vol. 616, Proceedings of Abelian Group Theory Conference.
Referee, Rocky Mountain Journal of Mathematics.

D. G. Johnson
Member, President's Committee on College Teaching.
Member, NMSU Retention Committee.
Editorial reviewer, Prindle, Weber and Schmidt, Inc.
Reviewer, Mathematical Reviews.
Reviewer, Zentralblatt für Mathematik.
Referee, Pacific Journal of Mathematics.
Referee, Rocky Mountain Journal of Mathematics.
Referee, Australian Journal of Mathematics.
Member, departmental committees: chairman, outside; chair-
  man, colloquium; mathematics education, learning center.

D. J. Johnson
Reviewer, Mathematical Reviews.
Team captain, United Way fund drive.
Director, mathematics reading room.
Member, departmental undergraduate committee.

W. H. Julian
Reviewer, Mathematical Reviews.
Member, departmental committees: soft sciences; chairman,
  hard sciences.

J. E. Kist
Reviewer, Mathematical Reviews.
Reviewer, Zentralblatt für Mathematik.
Member, departmental committees: comprehensive examinations,
  graduate, promotion to full professor.

R. A. Knoebel
Referee, Canadian Mathematical Bulletin.
Reviewer, Mathematical Reviews.
Reviewer, Mathematische Zeitschrift.
Member, departmental committees: chairman, soft sciences;
  undergraduate advising.

W. M. Krueger
Reviewer, Zentralblatt für Mathematik.
Chairman, University Appeals Board through August 1977.
Member, departmental committees: advisory, undergraduate,
  undergraduate advising, Holiday Symposium.

A. H. Kruse
Editor, Rocky Mountain Journal of Mathematics.
Reviewer, Mathematical Reviews.
Reviewer, Zentralblatt für Mathematik.
Member, departmental committees: faculty search; chairman,
  colloquium.

J. O. Loustaunau

One of four invited lecturers at 2-week mathematics conference in the Dominican Republic sponsored by the Organization of American States for the Caribbean Islands, Central America and Mexico. Lecture area: functional analysis techniques.

Member, Board of Directors, Las Cruces Boys' Club.

Vice-chairman, New Mexico Area Council of Boys' Clubs of America.

Team captain, United Way fund drive, Business and Industry Division.

Member, Arts and Sciences Improvement of Instruction and Student Relations Committee and Student Appeals Board.

Member, departmental committees: teaching assistant selection, undergraduate advising, hard sciences.

B. MacKichan

Referee, Rocky Mountain Journal of Mathematics.

Referee, Mathematical Reviews.

Member, departmental colloquium committee.

M. Mandelker

Member, departmental hard sciences committee.

R. Mines

Reviewer, Mathematical Reviews.

Coach, Putnam Team.

Faculty sponsor, Pi Mu Epsilon.

Vice-chairman, NMSU Faculty Senate.

Chairman, Faculty Senate Committee on Committees.

Member, Faculty Senate Faculty Affairs Committee.

Faculty representative, NMSU Board of Regents.

Member, Arts and Sciences Faculty Affairs Committee.

Member, departmental committees: chairman, undergraduate; statistics; faculty search; undergraduate advising.

K. L. Phillips

Consultant, Jet Propulsion Laboratory.

Member, Arts and Sciences College Planning Committee.

Referee, American Mathematical Society Bulletin.

Reviewer, Mathematical Reviews.

Reviewer, Zentralblatt für Mathematik.

Member, departmental committees: advisory, graduate, hard sciences, teaching assistant selection.

F. Richman

Referee, Rocky Mountain Journal of Mathematics.

Member, NMSU Graduate Council.

Member, departmental committees: graduate, mathematics education.

G. S. Rogers
Member, University Statistics Committee.
Advisor, Arts and Sciences College Advising Center.
Member, departmental committees: chairman, undergraduate
  advising; chairman, statistics; alternate, advisory; learn-
  ing center; faculty search; soft sciences.

C. C. Sherman
Member, departmental undergraduate committee.

C. W. Swartz
Reviewer, Mathematical Reviews.
Reviewer, Zentralblatt für Mathematik.
Referee, tenure evaluation for Department of Mathematics,
  University of California at Davis.
Member, NMSU Golf Team.
Member, departmental committees: faculty search; grading
  practices; chairman, hard sciences.

J. D. Thomas
Reviewer, Zentralblatt für Mathematik.
Faculty advisor, Alpha Tau Omega fraternity.
Chairman, Arts and Sciences Curriculum Committee.
Member, Computer Advisory Group.
Member, departmental committees: undergraduate advising;
  chairman, graduate; faculty search.

W. C. Torrez
Member, departmental statistics committee.

I. E. Vance
Director, NMSU Elementary Teachers Mathematics Project for
  schools in Alamogordo, Deming, Gadsden, El Paso, Hatch,
  Las Cruces, Ysleta.
Reviewer, proposals for National Science Foundation.
Member, committee revising National Teacher Examination in
  Mathematics for Educational Testing Service.
Member, State Metric Consortium.
Consultant, University of North Carolina Teacher Education
  Review Program.
Consultant, Development of Research and Human Services
  (DORAHS).
Consultant, Sickle Cell Council of New Mexico, Inc.
Member, Board of Directors, National Association for the
  Advancement of Colored People.
Participant, NAACP Leadership Conference.
Member, Minority Graduate Research Program Committee.
Chairman, departmental mathematics education committee.

C. L. Walker
Acting Assistant Dean of the Graduate School during spring
  semester.

E. A. Walker
Co-editor, Springer-Verlag Lecture Notes in Mathematics,
  Vol. 616, Proceedings of Abelian Group Theory Conference.

F. D. Williams
Member, Arts and Sciences Faculty Affairs Committee.
Faculty sponsor, Sigma Alpha Epsilon Fraternity.
Treasurer, New Mexico Aquatic Club.
Member, departmental committees: hard sciences, faculty
  search.

R. J. Wisner
Consulting editor, Brooks/Cole Publishing Co.
Mathematics consultant, U.S.O.E. grant to Ysleta Independent
  School District for mathematics for educationally disadvan-
  taged students.
Trustee, Ralph Crouch Memorial Scholarship Fund.
Member, departmental committees: chairman, promotion to full
  professor; soft sciences; mathematics education; learning
  center; tenure; chairman, Holiday Symposium.

J. D. Zund
Referee, Annali di Matematica Pura ed Applicata.
Referee, Journal of the Australian Mathematical Society.
Referee, Journal of Mathematical Physics.
Referee, Rocky Mountain Journal of Mathematics.
Reviewer, Mathematical Reviews.
Reviewer, Zentralblatt für Mathematik.
Member, University Advisory Council of Library Policy.
Chairman, departmental library committee.

B. PROFESSIONAL MEETINGS ATTENDED

R. J. Bagby
American Mathematical Society Annual Meeting, St. Louis.
Board of Directors, Rocky Mountain Mathematics Consortium,

T. Coffee
American Mathematical Society Annual Meeting, St. Louis.

J. D. DePree
American Mathematical Society Annual Meeting, St. Louis.
746th Meeting of the American Mathematical Society, Hayward,
  Calif.

G. S. Garfinkel
American Mathematical Society Annual Meeting, St. Louis.

E. D. Gaughan
National Council of Teachers of Mathematics Regional Meeting,
  Phoenix.
National Council of Teachers of Mathematics National Meeting,
  Cincinnati.

J. B. Giever
Member of panel discussion on learning center type programs,
  Southwestern Section Annual Meeting of the Mathematical
  Association of America, Phoenix.

P. L. Hosford
National Association for Supervisors and Curriculum
  Development, Houston.
National Science Teachers Association National Conference,
  Cincinnati.

R. H. Hunter
American Mathematical Society Annual Meeting, St. Louis.

M. A. Jacroux
Institute of Mathematical Statistics 155th Meeting, Dallas.

D. G. Johnson
Conducted workshop through Continuing Education, National
  Council of Teachers of Mathematics Regional Meeting,
  Phoenix.

D. J. Johnson
Conference of Concrete Representation of Operations on
  Hilbert Spaces, Long Beach.

W. M. Krueger
American Mathematical Society, 745th Regional Meeting,
  Evanston.

B. MacKichan
Chaired special session on partical differential equations,
  American Mathematical Society Annual Meeting, St. Louis.
Partial Differential Equations and Geometry Conference, Salt
  Lake City.

R. Mines
American Mathematical Society Annual Meeting, St. Louis.

K. L. Phillips
American Mathematical Society Annual Meeting, St. Louis.

F. Richman
Society for Industrial and Applied Mathematics Regional
 Meeting, Albuquerque.

C. C. Sherman
American Mathematical Society Annual Meeting, St. Louis.

W. Terry
American Mathematical Society Annual Meeting, St. Louis.
Spring Topology Conference, Baton Rouge.

J. D. Thomas
Society for Industrial and Applied Mathematics Regional
 Meeting, Albuquerque.

W. C. Torrez
Institute of Mathematical Statistics 155th Meeting, Dallas.
Institute of Mathematical Statistics 158th Meeting, Stanford.

I. E. Vance
National Council of Teachers of Mathematics Regional Meeting,
 Phoenix.
National Council of Teachers of Mathematics National Meeting,
 Cincinnati.
National Council of Teachers of Mathematics Regional Meeting,
 Colorado Springs.
National Council of Teachers of Mathematics, Alamogordo.
Greater El Paso Council of Teachers of Mathematics, El Paso.

E. A. Walker
American Mathematical Society Annual Meeting, St. Louis.
History of Analysis Meeting, Houston.
Joint Meeting of the American Statistics Association and the
 Institute of Mathematical Statistics, Chapel Hill.

R. J. Wisner
American Mathematical Society Annual Meeting and Mathematical
 Association of America Annual Meeting, St. Louis.

II. SCHOLARSHIPS

A. UNDERGRADUATE SCHOLARSHIPS

Physical Science Laborary Scholarships for
 incoming freshmen 4

B. GRADUATE FELLOWSHIPS

Physical Science Laboratory Graduate Fellowship 1
 awarded to Judy H. Moore.

III. GRANTS AND PROPOSALS

	Grants Funded		Grants Pending	
	Agency	Value	Agency	Value
Hunter, R.			NSF	$ 14,383
Johnson, D.J.			NSF	7,492
MacKichan, B.	NSF	$ 7,800		
MacKichan, B.			NSF	28,871
Sherman, C.	NSF	5,700		
Sherman, C.			NSF	13,788
Torrez, W.	NIH	13,892		
Torrez, W.			NIH	27,878
Vance, I.	NSF	34,552		
Vance, I.			NSF	38,185
Walker, E. (with Arnold, D., Richman, F.)	NSF	26,900		
Walker, E. (with Arnold, D., Richman, F.)			NSF	153,558

IV. RESEARCH PAPERS PUBLISHED

Arnold, D. M., General and decompositions of torsion free modules. Springer-Verlag Lecture Notes in Mathematics, 1977, 616, 197-218.

Bagby, R. J., Fourier multipliers from $H^1(R^n)$ to $L^p(R^n)$. Rocky Mountain J. Math., 1977, 7 (2), 323-332.

Bagby, R. J., L^p, L^q multipliers of Fourier transforms. Pacific J. Math., 1977, 68 (1), 1-12.

Hunter, R. H., cf. Walker, E. A.

Johnson, D. J., Restricted range approximation with side conditions. J. Approximation Theory, 1977, 19, 304-314.

Krueger, W. M., Hopf invariants and Browder's work on the Kervaire invariant problem. Trans. Amer. Math. Soc., 1977, 228, 85-97.

Mines, R., A new completion functor. Springer-Verlag Lecture Notes in Mathematics, 1977, 616.

Richman, F., Computing heights in Tor. Houston J. Math., 1977, 3 (2), 267-270.

Richman, F., A guide to valuated groups. Springer-Verlag Lecture Notes in Mathematics, 1977, 616, 73-86.

Richman, F., Disjoint copies of V^n in V^{2n}. Working paper, Institute for Defense Analyses.

Richman, F., The ring of cycle structures. Working paper, Institute for Defense Analyses.

Richman, F., cf. Walker, E. A.

Rogers, G. S. and Young, D. L., Evaluation in some aspects of PSI in a statistics course. Proceedings of the Rocky Mountain Mathematics Consortium, 1977.

Rogers, G. S., and Young, D. L., Explicit maximum likelihood estimators for certain patterned matrices, Comm. Stat., 1977, 6, 121-133.

Rogers, G. S., Glaze, R. M. and Urquhart, N. S., Variation in faculty salaries at NMSU. Technical Report No. 29, NMSU Statistics Laboratory.

Swartz, C. W., Unconditionally converging and Dunford-Pettis operators on $C_X(S)$. Studia Math., 1976, 57, 85-90.

Swartz, C. W., Integration with respect to vector measures. Bull. Royal Soc. Liege, 1976, 45, 76-79.

Walker, E. A., Hunter, R. H. and Richman, F., Finite direct sums of cyclic valuated p-groups. Pacific J. Math., 1977, 69 (1), 97-104.

Walker, E. A., Hunter, R. and Richman, F., Warfield Modules. Springer-Verlag Lecture Notes in Mathematics, 1977, 616, 87-123.

Walker, E. A. and Richman, F., Ext in pre-abelian categories. Pacific J. Math. 1977, 71 (2), 521-535.

Zund, J. D., A memoir on the projective geometry of spinors, Ann. Mat. Pura Appl., 1976, 110 (4), 29-136.

Zund, J. D., The invariant theory of a non-linear graviton, Tensor N. S., 1977, 31, 37-42.

Zund, J. D. and Harris, R. A., Two variable Kasner type solutions of Einstein's field equations, Tensor N. S., 1976, 30, 255-258.

Zund, J. D. and Wallace, G. L., The theory of double bivectors, <u>Tensor</u> <u>N</u>. <u>S</u>., 1977, <u>31</u>, 37-42.

V. <u>RESEARCH PAPERS PRESENTED</u>

Arnold, D. M., "On the Structure of Torsion Free Abelian Groups of Finite Rank," Wesleyan University.

Bagby, R. J., "Counting Permutations Without Fixed Points," Southwestern Section of the Mathematical Association of America, Phoenix.

Johnson, D. J., "The Elepton-Lepton Field," Division of Particles and Fields Annual Meeting, American Physical Society, Argonne National Laboratory.

Krueger, W. M., "Some Extreme Value Theorems in Geometry," New Mexico Council of Teachers of Mathematics, Alamogordo, N. Mex.

MacKichan, B., "Hyperfunction cohomology classes and their boundary values," State University of New York, Stony Brook.

MacKichan, B., "Mayer-Vietoris sequences for complexes of differential operators," Texas Tech University, Lubbock.

Rogers, G. S.,"Are large samples ever dangerous?", Southwestern Section of the Mathematical Association of America, Phoenix.

Vance, I. E., "Development of Basic Skills," Keynote address, Professional Day, Archdiocese, Baltimore.

Vance, I. E., "How to Write a Mathematics Book," Class Day, Fort Wayne, Ind.

Vance, I. E., "Slopes, Squares and Square Roots, Irrational Numbers, and the Pythogorean Theorem," National Council of Teachers of Mathematics, Colorado Springs.

Vance, I. E.,"Topics in Geometry," In-Service Day for High School Teachers, El Paso.

Wisner, R. J., "Partitions," Naval Postgraduate School, Monterey.

Wisner, R. J., "Misuses of Statistics," Monterey Peninsula College, Monterey.

Wisner, R. J., "Mathematics Stories," Texas Mu Alpha Theta Convention, Dallas.

Wisner, R. J., "Recursive Fractional Approximations," National
Council of Teachers of Mathematics, Phoenix.

Wisner, R. J., "Fundamental Fractional Fun," National Council of
Teachers of Mathematics, Cincinnati.

Wisner, R. J., "Fractional Approximations to Square Roots,"
Florida Council of Teachers of Mathematics, St. Petersburg.

Wisner, R. J., "A Measured Metric Statement," National Council of
Teachers of Mathematics, Colorado Springs.

Wisner, R. J., "Some Mathematical Stories," National Council of
Teachers of Mathematics, Cincinnati.

Wisner, R. J., "Some Classroom Number Theory Ideas," Workshop for
El Paso Independent School District, El Paso.

Zund, J. D., "The Projective Geometry of Spinors," invited
address, University of Arizona, Tucson.

Zund, J. D., "New Conservation Laws in Electromagnetic Theory,"
Physics Department colloquium, NMSU.