We now have 10.

Arrangements and Spreads
by Branko Grünbaum

CONFERENCE BOARD OF THE MATHEMATICAL SCIENCES
REGIONAL CONFERENCE SERIES IN MATHEMATICS

Number 10

114 Pages; List Price $4.50; Individual Price $3.38

This survey deals mostly with rather elementary mathematics, so elementary in fact that most of its results and problems are (or at least should be) understandable to undergraduates. It was written out of the conviction that many neglected aspects of elementary geometry deserve a wider dissemination because of their inherent beauty and interest, and for the inspiration and understanding they can impart to students and mathematicians. Throughout the survey, many conjectures are explicitly stated, and many additional problems are hinted at. The subject obviously offers extremely varied opportunities for research. Due to the elementary nature of the topic, the solutions of many of the open problems will probably require more inspiration than erudition, but that is a hallmark of beauty in mathematics.

Other Monographs in this Series

	List Price	Individual Price
Number 1. Irving Kaplansky: *Algebraic and analytic aspects of operator algebras*	$2.20	$1.65
Number 2. Gilbert Baumslag: *Lecture notes on nilpotent groups*	3.10	2.33
Number 3. Lawrence Markus: *Lectures in differentiable dynamics*	2.70	2.03
Number 4. H. S. M. Coxeter: *Twisted honeycombs*	2.70	2.03
Number 5. George W. Whitehead: *Recent advances in homotopy theory*	3.20	2.40
Number 6. Walter Rudin: *Lectures on the edge-of-the-wedge theorem*	2.40	1.80
Number 7. Yozo Matsushima: *Holomorphic vector fields on compact Kähler manifolds*	2.50	1.88
Number 8. Peter Hilton: *Lectures in homological algebra*	3.20	2.40
Number 9. I. N. Herstein: *Notes from a ring theory conference*	2.60	1.95

Standing orders are accepted. Orders under $3.00 must be prepaid.
Shipping and handling will be charged on all orders except those that are prepaid.

AMERICAN MATHEMATICAL SOCIETY
P. O. Box 6248
Providence, Rhode Island 02904

Self-contained Up-to-date Problem-packed Illustrated and in plain English*

*Just a few of the features in these four new computer texts from Prentice-Hall

ITERATIVE METHODS FOR NONLINEAR OPTIMIZATION PROBLEMS by **Samuel L. S. Jacoby, Janusz S. Kowalik,** both of Boeing Computer Services, Inc. and **Joseph T. Pizzo** of The Boeing Company. A **self-contained,** unified description in algorithmic fashion of the currently available techniques in the areas of mathematical programming and unconstrained optimization. Its **up-to-date** coverage includes derivations of major techniques, details of the iteration steps, convergence criteria, accelerating devices, and discussions of the techniques.
1972 approx. 304 pp. 013-508119-X

INTRODUCTION TO COMPUTATIONAL METHODS FOR STUDENTS OF CALCULUS by **Samuel S. McNeary,** Drexel University. Written primarily for a course in computational methods that is given parallel to the freshman calculus course. The interplay between these two courses should not only result in a development of computational skills, but also provide an understanding of the basic concepts of analysis. Provides an outline of FORTRAN language. The text material is amply **illustrated** with figures and problems.
1972 approx. 208 pp. 013-479501-6

THE THEORY OF PARSING, TRANSLATION AND COMPILING, VOL I: PARSING by **Alfred V. Aho,** Bell Telephone Laboratories, and **Jeffery D. Ullman,** Princeton University. A comprehensive, **self-contained** treatment of compiler theory emphasizing parsing and the theoretical background. **Presents** principles rather than details specific to a given language or machine. Complete coverage of all important parsing algorithms, including the **LL,** LR, precedence and Earley's method. **Many problems** are included with each section. All algorithms are clearly stated.
1972 approx. 592 pp. 013-94556-7

BASIC DATA PROCESSING MATHEMATICS by **James A. Saxon.** Saxon Research Corp. Designed to teach the fundamentals of data processing mathematics, particularly to business majors who do not have a very heavy grounding in math. Relates math concepts to business applications. Explains necessary equations **in plain English.**
4/72 244 pp. 013-058909-8

For further information **write:**

PRENTICE-HALL
Englewood Cliffs, N.J. 07632

mathematical title service

You can't read two hundred journals a month and pinpoint the specific articles related to your own work. Let the Mathematical Title Service do it for you!!! For $0.10 each, we can send you title listings which include author's name, title of article, source journal with volume, year, issue, pages, and all primary and secondary classification numbers. The only thing we need from you is a profile of your interests and a deposit balance of $30. The computer helps us—let us help you. Drop us a postcard, and you will receive complete information posthaste.

index of mathematical papers

Your reference library will not be complete without IMP! This new index series is scheduled to appear every six months after publication of the first three issues. It will be arranged by author(s) and subject, and it will provide your readers with approximately 5,000 bibliographic references (per issue) in all areas of pure mathematics; important topics in applied mathematics and mathematical physics; and mathematical applications in the other physical, biological, and social sciences. This is a current index, covering over half of the journals now reviewed in full by *Mathematical Reviews*. Expected publication dates of the first two volumes appear below. Standing orders are invited. No discount is offered on these publications.

Volume 1, July—December 1970 . . . . . $30 (June 1972)
Volume 2, Issue 1, January—June 1971. . . . 30 (September 1972)
Volume 2, Issue 2, July—December 1971 . . . 30 (November 1972)

AMERICAN MATHEMATICAL SOCIETY
P. O. Box 6248
Providence, Rhode Island 02904

CORRIGENDUM 815
STENGER

MICROFICHE
Table of Density Bounds for Euler's Function ..... CHARLES R. WALL

The editorial committee would welcome readers' comments about this microfiche feature. Please send comments to Professor Eugene Isaacson, MATHEMATICS OF COMPUTATION, Courant Institute of Mathematical Sciences, New York University, 251 Mercer Street, New York, New York 10012.

Mathematics of Computation

TABLE OF CONTENTS

JULY 1972

Difference Approximations for Boundary and Eigenvalue Problems for Ordinary Differential Equations ..... HEINZ-OTTO KREISS 605

A Note on Modified Optimal Linear Multistep Methods .... H. BRUNNER 625

Semidiscrete-Least Squares Methods for a Parabolic Boundary Value Problem JAMES H. BRAMBLE & VIDAR THOMÉE 633

Stability Theory of Difference Approximations for Mixed Initial Boundary Value Problems. II BERTIL GUSTAFSSON, HEINZ-OTTO KREISS & ARNE SUNDSTRÖM 649

On the Nonexistence of Simplex Integration Rules for Infinite Integrals P. J. DAVIS & P. RABINOWITZ 687

Numerical Quadrature by the ϵ-Algorithm ..... DAVID K. KAHANER 689

An Error Bound for Quadratures ..... J. H. HETHERINGTON 695

Exit Criteria for Simpson's Compound Rule . J. H. ROWLAND & Y. L. VAROL 699

The Modified Successive Overrelaxation Method with Fixed Parameters DAVID R. KINCAID & DAVID M. YOUNG 705

Inversion of Isoclinal Matrices ..... LEROY J. DERR 719

Generalized Recursive Multivariate Interpolation .... EARL H. MCKINNEY 723

Computation of Best Monotone Approximations ..... JAMES T. LEWIS 737

A Note on Chambers' Method for Finding a Zero of a Function .. M. G. COX 749

On the Zeros of the Incomplete Gamma Function ..... K. S. KÖLBIG 751

The Asymptotic Expansion of the Meijer G-Function .... JERRY L. FIELDS 757

On k-Free Sequences of Integers ..... SAMUEL S. WAGSTAFF, JR. 767

Density Bounds for the Sum of Divisors Function CHARLES R. WALL, PHILLIP L. CREWS & DONALD B. JOHNSON 773

Density Bounds for Euler's Function ..... CHARLES R. WALL 779

A Continued Fraction Algorithm for Real Algebraic Numbers DAVID G. CANTOR, PAUL H. GALYEAN & HORST G. ZIMMER 785

On the Distribution of Pseudo-Random Numbers Generated by the Linear Congruential Method ..... HARALD NIEDERREITER 793

REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS 797
ANSELONE **33,** BIRKHOFF **32,** BLUM, Editor **40,** BYRD & FRIEDMAN **34,** FENYÖ **31,** GALLER & PERLIS **39,** GHIZZETTI & OSSICINI **28,** KARST **35,** LEE & MADACHY **36,** LING & LIN **30,** MUFTI **41,** ONDREJKA **37,** PAXSON **38,** POLAK **29.**

TABLE ERRATA 813
CHAO, CHEN & FRANK **494,** DAVIS **495,** FRIED & CONTE **496,** POULET **497.**

TABLE OF DENSITY BOUNDS FOR EULER'S FUNCTION

Charles R. Wall

East Texas State University

This table is a supplement to "Density bounds for Euler's function", (Math. Comp., this issue, p. 779-783).

Let δX denote the density, if it exists, of a set X of positive integers, and let φ be Euler's function,

$$\varphi(n) = n \prod_{p|n} (1 - p^{-1}) ,$$

the product taken over primes p which divide n. This table gives upper and lower bounds for

$$D(x) = \delta\{ n : \varphi(n)/n \leq x \}$$

for $x = 0\ (.001)\ 1$.

The table consists of five columns. The first column lists $1000\ x$, while the second and third give the corresponding lower and upper bounds, respectively. The fourth and fifth columns list respectively integers A and B such that $A \leq 223092870\ D(x) \leq B$.

The bounds near $x = 1$ and $x = .5$ were revised for the paper referred to earlier; the procedure was given in the paper.

This research was supported by an East Texas State University Research Grant.

1000	1.00000000	1.00000000	223092870	223092870
999	.85828059	1.00000000	191476279	223092870
998	.85828059	1.00000000	191476279	223092870
997	.85828059	1.00000000	191476279	223092870
996	.85828059	1.00000000	191476279	223092870
995	.85828059	1.00000000	191476279	223092870
994	.85828059	1.00000000	191476279	223092870
993	.85828059	1.00000000	191476279	223092870
992	.85823059	1.00000000	191476279	223092870
991	.85828059	.99199524	191476279	221307065
990	.85828059	.97627560	191476279	217804588
989	.85828059	.96345044	191475279	214938924
988	.85828059	.95274614	191476279	212550871
987	.85828059	.94368866	191476279	210530211
986	.85828059	.93592510	191476279	208798216
985	.85828059	.92919668	191476279	207297154
984	.85828059	.92330932	191476279	205983725
983	.85828059	.91811458	191476279	204824817
982	.85828059	.91349704	191476279	203794676
981	.85828059	.90936556	191476279	202872972
980	.85828059	.90564722	191476279	202043438
979	.85828059	.90228301	191476279	201292907
978	.85828059	.89922464	191476279	200610606
977	.85828059	.89643221	191476279	199987635
976	.85473761	.89387249	190685866	199416579
975	.85080096	.89151755	189807627	198891208
974	.85080096	.88934375	189807627	198406249
973	.85080096	.88733097	189807627	197957213
972	.84607697	.88546197	188753739	197540252
971	.84607697	.88362186	188753739	197152046
970	.84607697	.88209776	188753739	196789721
969	.84607697	.88057844	188753739	196450771
968	.84607697	.87915408	188753739	196133006
967	.84101557	.87781604	187624577	195834500
966	.84101557	.87655671	187624577	195553552
965	.83641180	.87536934	186597510	195288659
964	.83641180	.87424794	186597510	195038482
963	.83641180	.87318715	186597510	194801828
962	.83641180	.87218200	186597510	194577630
961	.83641180	.87122878	186597510	194364929