

VOLUME 16 NO. 1 1990-91
REAL ANALYSIS
EXCHANGE



CONTENTS

EDITORIAL MESSAGE 4

LETTERS to the EDITOR 5

ERRATA 7

CONFERENCE ANNOUNCEMENT 8

REPORT OF THE FOURTEENTH SUMMER SYMPOSIUM 9

RESEARCH ARTICLES

R. Barua
 On the Borel hierarchies of countable products of Polish spaces 60

S. Baldwin
 Martin's axiom implies a stronger version of Blumberg's theorem 67

L. Ke Cheng and L. Shi-Pan
 On generalized dominated convergence 74

R. M. Shortt
 A theory of integration for cardinal algebras 79

J. Bobok
 On non-differentiable measure-preserving functions 119

S. Mukhopadhyay and T. Dutta
 On Riemann summable trigonometric series 130

R. Gordon
 The inversion of approximate and dyadic derivatives using an extension of the Henstock integral 154

E. Stronska
 Algebraic structures generated by $T_{\mathcal{D}}$ -quasi continuous and almost continuous functions on \mathbb{R}^m 169

K. Rao and R. Shortt
 Separation of points by families of intervals 177

Z. Buczolicz
 Convexity and symmetric derivates of measurable functions 187

M. Reyes
 An analytic study of functions defined on self-similar fractals 197

F. Cater
 Upper and lower generalized Riemann integrals 215

(Continued on back cover)

REAL ANALYSIS EXCHANGE

EDITORIAL BOARD

MANAGING EDITORS

Jan Mařík
Mathematics Department
Michigan State University
East Lansing, MI 48824-1027
USA

Clifford E. Weil
Mathematics Department
Michigan State University
East Lansing, MI 48824-1027
USA
21144cew@msu.bitnet

QUERIES EDITOR

Richard J. O'Malley
Mathematics Department
University of Wisconsin
Milwaukee, WI 53201
USA
omalley@csd4.csd.uwm.edu

ASSOCIATE EDITORS

Michael J. Evans
Mathematics Department
North Carolina State University
Raleigh, NC 27695
USA
mje@matmje.ncsu.edu

James Foran
Mathematics Department
University of Missouri
Kansas City, MO 64108
USA
jforan@umkcvox1.bitnet

Paul D. Humke
Mathematics Department
St. Olaf College
Northfield, MN 55057
USA
humke@stolaf.edu

Lee Larson
Mathematics Department
University of Louisville
Louisville, KY 40506
USA
lmlars01@ulkyvx.bitnet

David Preiss
Mathematics Department
University College, London
London WC1E 6BT
England
ucahpd@ucl.ac.uk

Library of Congress Catalog Card Number
77-647120

International Standard Serial Number
0147-1937

The *Real Analysis Exchange* consists of four major sections, each with a distinct character. Papers submitted to the Research Articles section will be sent to three referees for their independent judgment, while papers submitted to the Inroads section are normally sent to two referees. Descriptions of each section of the *Real Analysis Exchange* follow.

Section 1: TOPICAL SURVEYS

This section consists of survey articles concerning one area of current research activity. These articles differ from survey articles in other journals both in their more limited scope and greater depth. It is anticipated that such a survey article will indicate a stream of mathematical thought from origins of the current problem area up to and including unpublished results. Topical survey articles are refereed and reviewed by *Mathematical Reviews*, *Zentralblatt für Mathematik* and *Referativnyi Zhurnal: Matematika*.

Section 2: RESEARCH ARTICLES

This section is reserved for original research in the areas of real analysis, functions of one or more real variables, and real set theory. As this section is intended for primary source material, the results published in this section should not appear in unabstracted form elsewhere. Papers submitted as research articles will be refereed prior to publication and reviewed by *Mathematical Reviews*, *Zentralblatt für Mathematik* and *Referativnyi Zhurnal: Matematika*.

Section 3: INROADS

Papers presenting new and simple proofs of well-known theorems, or simple and interesting consequences of known results may appear in this section. In addition a synopsis of a dissertation in real analysis could be appropriate if the results are not to appear in another journal. However, in general abstracts of papers to be published elsewhere are not acceptable. Authors need not present proofs of all assertions in an inroads article, but when an omitted proof is not easy, the writer should so inform the reader. Inroads articles are refereed before publication and reviewed by *Referativnyi Zhurnal: Matematika*.

Section 4: QUERIES

In this section problems are presented together with appropriate bibliographical and historical information. This section is not meant to be a recreational section, but a forum for the presentation of unsolved problems in specific areas of real analysis.

NOTICE TO CONTRIBUTORS

1. Any author interested in writing a Topical Survey article should contact Professor Paul Humke, Department of Mathematics, St. Olaf College, Northfield, MN 55057, USA for detailed information.
2. Articles for the Inroads and Research Articles sections should be neatly typed in camera-ready form. The printed area on each page should measure no more than 16.5 cm by 23 cm (6.5 inches by 9 inches) and should have margins at the top and bottom of 2.5 cm (1 inch). In addition articles may be submitted in any form of \TeX either on disk or by electronic mail. Contributors should take note of the heading format for papers in these two sections. Also they should indicate the section to which their paper is being submitted. Papers for the Inroad section and for the Research Articles section may be submitted at any time and will be carefully refereed as promptly as possible. All articles will appear in the first issue following acceptance.
3. Queries should be typed with appropriate bibliographical and/or historical information included. They should be sent to the Queries Editor whose address is listed with the Editorial Board on the first page of this and every issue. Solutions to previous Queries should be typed using the instructions listed above and sent to the Queries Editor. Lengthy solutions may be published in the Inroads section at the discretion of the editors. The deadline for receipt of Queries is September 1 for the first issue of each volume and March 1 for the second.
4. All contributed papers, except for Queries, and all other correspondence with the Exchange should be sent to the following address:

Real Analysis Exchange
Department of Mathematics
Michigan State University
East Lansing, MI 48824-1027
USA
21144cew@msu.bitnet

SUBSCRIPTION INFORMATION

Annual subscription rates

Individuals	Institutions
\$20.00	\$33.00