ILLINOIS JOURNAL OF MATHEMATICS

a quarterly journal published by the UNIVERSITY OF ILLINOIS at Urbana-Champaign

edited by STEPHANIE ALEXANDER DALE CUTKOSKY E. GRAHAM EVANS, JR. ADOLF HILDEBRAND JOSEPH M. ROSENBLATT LOU VAN DEN DRIES JANG-MEI WU

SPRING 1998 Pages 1–177

ILLINOIS JOURNAL OF MATHEMATICS

Editors

STEPHANIE ALEXANDER, Department of Mathematics, University of Illinois, 1409 W. Green St., Urbana, IL 61801 sba@math.uiuc.edu

DALE CUTKOSKY, Department of Mathematics, University of Missouri at Columbia, Mathematical Sciences Building, Columbia, MO 65211 dale@cutkosky.cs.missouri.edu

E. GRAHAM EVANS, JR. (Managing Editor), Department of Mathematics, University of Illinois, 1409 W. Green St., Urbana, IL 61801 graham@math.uiuc.edu

ADOLF HILDEBRAND, Department of Mathematics, University of Illinois, 1409 W. Green St., Urbana, IL 61801 hildebr@math.uiuc.edu

JOSEPH M. ROSENBLATT, Department of Mathematics, University of Illinois, 1409 W. Green St., Urbana, IL 61801 jrsnbltt@math.uiuc.edu

LOU VAN DEN DRIES, Department of Mathematics, University of Illinois, 1409 W. Green St., Urbana, IL 61801 vddries@math.uiuc.edu

JANG-MEI WU, Department of Mathematics, University of Illinois, 1409 W. Green St., Urbana, IL 61801 wu@math.uiuc.edu

THE ILLINOIS JOURNAL OF MATHEMATICS (ISSN 0019-2082) is published quarterly (Spring, Summer, Fall, Winter) by the University of Illinois Press, 1325 S. Oak, Champaign, IL 61820, on behalf of the Department of Mathematics of the University of Illinois. Periodicals postage paid at Champaign, Illinois and additional mailing offices. *Postmaster*: Please send change-of-address notices to the University of Illinois Press.

Subscription price: \$117; single issues, \$36 (volumes 39 to date). Address orders to the University of Illinois Press. Requests for replacement of damaged or undelivered issues will be honored for up to six months after publication of the issue. Back issues of Volumes 1–38 are available from Swets & Zeitlinger B.V., Herreweg 347-b, P.O. Box 810, 2160 SZ Lisse-Holland. Microfilm, microfiche and reprint copies may be obtained from UMI, Periodicals Check-In, 300 North Zeeb Road, P.O. Box 1346, Ann Arbor, MI 48106-1346.

© 1998 by the Board of Trustees of the University of Illinois Manufactured in the United States of America