THE JOURNAL OF SYMBOLIC LOGIC

EDITED BY

JON BARWISE
STEPHEN A. COOK
MICHAEL DUNN
PAUL EKLOF
HERBERT ENDERTON
KIT FINE
WILFRID HODGES
AKIHIRO KANAMORI
ALEXANDER KECHRIS
ANGUS MACINTYRE
RICHARD A. SHORE
WILLIAM TAIT
A. S. TROELSTRA
BAS VAN FRAASSEN

Consulting Editors:

PETER ACZEL
JAMES BAUMGARTNER
JIŘÍ BEČVÁŘ
GEORGE BOOLOS
JOAN BRESNAN
JOHN P. BURGESS
GREGORY L. CHERLIN
M. J. CRESSWELL
FREDERIC B. FITCH
SY D. FRIEDMAN
HANS KAMP
SAUL A. KRIPKE
MENACHEM MAGIDOR
MICHAEL MAKKAI
GREGORY MINC
J. DONALD MONK
CHARLES D. PARSONS
GABRIEL SABBAGH
DANA S. SCOTT
STEVEN K. THOMASON
ALASDAIR URQUHART
JOHAN VAN BENTHEM

VOLUME 49

1984

PUBLISHED QUARTERLY BY THE ASSOCIATION FOR SYMBOLIC LOGIC, INC. WITH SUPPORT FROM ICSU AND FROM INSTITUTIONAL AND CORPORATE MEMBERS

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press

The four numbers of Volume 49 were issued at the following dates:

Number 1, pages 1–328, March 22, 1984
Number 2, pages 329–712, June 5, 1984
Number 3, pages 713–1000, September 20, 1984
Number 4, pages 1001–1485, December 28, 1984

Numbers 1–4 of this volume are copyrighted © 1984 by the Association for Symbolic Logic, Inc. Reproduction of copyrighted numbers of the Journal by photostat, photoprint, microfilm, or like process is forbidden, except by written permission, to be obtained from the Secretary of the Association, C. Ward Henson, Department of Mathematics, University of Illinois, 1409 W. Green St., Urbana, IL 61801.

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press

CONTENTS OF VOLUME 49

ABE, YOSHIHIRO. Strongly compact cardinals, elementary embeddings and fixed points 808

ALMUKDAD, AHMAD and NELSON, DAVID. Constructible falsity and inexact predicates 231

AMBOS-SPIES, KLAUS. An extension of the nondiamond theorem in classical and α-recursion theory 586

ASH, C. J. and DOWNEY, R. G. Decidable subspaces and recursively enumerable subspaces 1137

AVRON, ARNON. On modal systems having arithmetical interpretations 935

———. Relevant entailment—semantics and formal systems 334

BANKSTON, PAUL. Expressive power in first order topology 478

BARBANEL, JULIUS B., DIPRISCO, CARLOS A. and TAN, IT BENG. Many-times huge and superhuge cardinals 112

BAUDISCH, ANDREAS. Magidor-Malitz quantifiers in modules 1

BAUMGARTNER, JAMES E. Generic graph construction 234

BAUMGARTNER, JAMES E. and HENLE, JAMES M. Infinite subscripts from infinite exponents 558

BEESON, M. and ŠČEDROV, A. Church's thesis, continuity, and set theory 630

VAN BENTHEM, JOHAN. Questions about quantifiers 443

BLASS, ANDREAS. There are not exactly five objects 467

BOFFA, M. Arithmetic and the theory of types 621

BORIČIĆ, BRANISLAV R. A note on some intermediate propositional calculi 329

BUECHLER, STEVEN. Expansions of models of ω-stable theories 470

———. Kueker's conjecture for superstable theories 930

BURRIS, STANLEY. Model companions for finitely generated universal Horn classes 68

BYERLY, ROBERT E. Some properties of invariant sets 9

CARLSON, TIM, KUNEN, KENNETH and MILLER, ARNOLD W. A minimal degree which collapses ω_1 298

CENZER, DOUGLAS. Monotone reducibility and the family of infinite sets 774

CICHOŃ, JACEK. On the compactness of some Boolean algebras 63

CLOTE, PETER. A recursion theoretic analysis of the clopen Ramsey theorem 376

COMPTON, KEVIN J. An undecidable problem in finite combinatorics 842

COOPER, S. B. Partial degrees and the density problem. Part 2: The enumeration degrees of the Σ_2 sets are dense 503

CRABBÉ, MARCEL. Typical ambiguity and the axiom of choice 1074

CRESSWELL, M. J. An incomplete decidable modal logic 520

VAN DALEN, D. How to glue analysis models 1339

DELON, FRANÇOISE. Espaces ultramétriques 405

DIPRISCO, CARLOS A. See BARBANEL, JULIUS B.

DOWNEY, R. Co-immune subspaces and complementation in V_∞ 528

———. Bases of supermaximal subspaces and Steinitz systems 1146

———. See ASH, C. J.

DOWNEY, R. and REMMEL, J. B. The universal complementation property 1125

VAN DEN DRIES, LOU. Algebraic theories with definable Skolem functions 625

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press

FEFERMAN, SOLOMON. Toward useful type-free theories. I 75
FITCH, FREDERIC B. Correction to a definition of negation 47
FITTING, MELVIN. Linear reasoning in modal logic 1363
FREILING, CHRIS. Banach games 343
GILMAN, ROBERT H. Characteristically simple $\aleph_0$-categorical groups 900
GIRARD, JEAN-YVES and VAUZEILLES, JACQUELINE. Functors and ordinal notations. I: A functorial construction of the Veblen hierarchy 713
———. Functors and ordinal notations. II: A functorial construction of the Bachmann hierarchy 1079
GOLDBLATT, ROBERT. Orthomodularity is not elementary 401
GOLDFARB, WARREN D. The unsolvability of the Gödel class with identity 1237
GOLDFARB, WARREN D., GUREVICH, YURI and SHELAH, SAHARON. A decidable subclass of the minimal Gödel class with identity 1253
GOODMAN, NICOLAS D. Epistemic arithmetic is a conservative extension of intuitionistic arithmetic 192
GRIFFOR, E. R. and NORMANN, D. The definability of $E(\alpha)$ 437
GUMB, RAYMOND D. An extended joint consistency theorem for a family of free modal logics with equality 174
GUREVICH, YURI. See GOLDFARB, WARREN D.
GUREVICH, YURI and LEWIS, HARRY R. The word problem for cancellation semigroups with zero 184
HENLE, J. M. Spector forcing 542
———. Weak strong partition cardinals 555
———. See BAUMGARTNER, JAMES E.
HENLE, J. M., KLEINBERG, E. M. and WATRO, R. J. On the ultrafilters and ultrapowers of strong partition cardinals 1268
HENSON, C. WARD, KAUFMANN, MATT and KEISLER, H. JEROME. The strength of nonstandard methods in arithmetic 1039
HERRMANN, E. Definable structures in the lattice of recursively enumerable sets 1190
HILLER, A. P. and ZIMBARG SB., J. Self-reference with negative types 754
HODES, HAROLD T. Finite level Borel games and a problem concerning the jump hierachy 1301
———. Well-behaved modal logics 1393
VAN DER HOEVEN, GERRIT and MOERDIJK, IEKE. On choice sequences determined by spreads 908
HORT, CHRISTIAN and OSSWALD, HORST. On nonstandard models in higher order logic 204
JÄGER, GERHARD. The strength of admissibility without foundation 867
JOCKUSCH, CARL G., JR. and SHORE, RICHARD A. Pseudo-jump operators. II: Transfinite iterations, hierarchies and minimal covers 1205
JONES, J. P. and MATIJASEVIČ, Y. V. Register machine proof of the theorem on exponential diophantine representation of enumerable sets 818
KALFA, CORNELIA. Decidable properties of finite sets of equations in trivial languages 1333
———. Some undecidability results in strong algebraic languages 951
KAUFMANN, MATT. Filter logics on ω 241
———. See HENSON, C. WARD

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press

KECHRIS, ALEXANDER S. The axiom of determinacy implies dependent choices in $L(\mathbf{R})$ 161
KEISLER, H. JEROME. See HENSON, C. WARD
KLEINBERG, E. M. See HENLE, J. M.
KNIGHT, JULIA, LACHLAN, ALISTAIR H. and SOARE, ROBERT I. Two theorems on degrees of models of true arithmetic 425
KOEPKE, PETER. The consistency strength of the free-subset property for ω_ω .. 1198
KOTLARSKI, HENRYK. Some remarks on initial segments in models of Peano arithmetic 955
KRANAKIS, EVANGELOS. Stepping up lemmas in definable partitions 22
KUNEN, KENNETH. See CARLSON, TIM
LACHLAN, ALISTAIR H. See KNIGHT, JULIA
LERMAN, M. and REMMEL, J. B. The universal splitting property. II 137
LEWIS, HARRY R. See GUREVICH, YURI
LONGO, G. and MOGGI, E. The hereditary partial effective functionals and recursion theory in higher types 1319
LOVEYS, JAMES. The uniqueness of envelopes in $\aleph_0$-categorical, $\aleph_0$-stable structures 1171
MAASS, WOLFGANG. On the orbits of hyperhypersimple sets 51
MAIER, BERTHOLD J. Existentially closed torsion-free nilpotent groups of class three 220
MARTÍNEZ, JUAN CARLOS. Accessible sets and $(L_{\omega_1\omega})_t$-equivalence for T_3 spaces 961
MATIJASEVIČ, Y. V. See JONES, J. P.
MEKLER, ALAN H. C.c.c. forcing without combinatorics 830
MEYER, ROBERT K. and MORTENSEN, CHRIS. Inconsistent models for relevant arithmetics 917
MILLER, ARNOLD W. See CARLSON, TIM
MILLER, D. and REMMEL, J. B. Effectively nowhere simple sets 129
MILLS, GEORGE and PARIS, JEFF. Regularity in models of arithmetic 272
MOERDIJK, IEKE. Heine-Borel does not imply the Fan Theorem 514
———. See VAN DER HOEVEN, GERRIT
MOGGI, E. See LONGO, G.
MORTENSEN, CHRIS. See MEYER, ROBERT K.
MOTOHASHI, NOBUYOSHI. A normal form theorem for first order formulas and its application to Gaifman's splitting theorem 1262
———. Equality and Lyndon's interpolation theorem 123
NELSON, DAVID. See ALMUKDAD, AHMAD
NORMANN, D. See GRIFFOR, E. R.
OGER, FRANCIS. The model theory of finitely generated finite-by-abelian groups 1115
OSSWALD, HORST. See HORT, CHRISTIAN
PARIS, JEFF. See MILLS, GEORGE
PELC, ANDRZEJ. Idempotent ideals on abelian groups 813
PILLAY, ANAND. Regular types in nonmultidimensional ω-stable theories 880
PILLAY, ANAND and SROUR, GABRIEL. Closed sets and chain conditions in stable theories 1350
POIZAT, BRUNO. Deux remarques à propos de la propriété de recouvrement fini 803
PUDLÁK, P. and SOCHOR, A. Models of the alternative set theory 570

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press

REMMEL, J. B. See DOWNEY, R. G.
———. See LERMAN, M.
———. See MILLER, D.
ROSENTHAL, DAVID. The order indiscernibles of divisible ordered abelian groups 151
ROTHMALER, PHILIPP. Some model theory of modules. III. On infiniteness of sets definable in modules 32
RUITENBURG, WIM. On the period of sequences $(A^n(p))$ in intuitionistic propositional calculus 892
SAFFE, JÜRGEN. Categoricity and ranks 1379
SAMI, RAMEZ L. On Σ^1_1 equivalence relations with Borel classes of bounded rank 1273
SARACINO, D. and WOOD, C. QE commutative nilrings 644
ŠČEDROV, A. See BEESON, M.
SCHROEDER-HEISTER, PETER. A natural extension of natural deduction 1284
SHELAH, SAHARON. Diamonds, uniformization 1022
———. More on proper forcing 1034
———. See GOLDFARB, WARREN D.
SHELAH, SAHARON and WOODIN, HUGH. Forcing the failure of CH by adding a real 1185
SHORE, RICHARD A. See JOCKUSCH, CARL G., JR.
SIMPSON, STEPHEN G. Which set existence axioms are needed to prove the Cauchy/Peano theorem for ordinary differential equations? 783
SMITH, JAN. An interpretation of Martin-Löf's type theory in a type-free theory of propositions 730
SMITH, KAY. Commutative regular rings and Boolean valued fields 281
SOARE, ROBERT I. See KNIGHT, JULIA
SOCHOR, A. See PUDLÁK, P.
SROUR, GABRIEL. See PILLAY, ANAND
SURESON, CLAUDE. Complexity of κ-ultrafilters and inner models with measurable cardinals 833
TAKEUTI, GAISI and TITANI, SATOKO. Intuitionistic fuzzy logic and intuitionistic fuzzy set theory 851
TAN, IT BENG. See BARBANEL, JULIUS B.
TITANI, SATOKO. See TAKEUTI, GAISI
URQUHART, ALASDAIR. The undecidability of entailment and relevant implication 1059
VAUZEILLES, JACQUELINE. See GIRARD, JEAN-YVES
VELLEMAN, DAN. Simplified morasses with linear limits 1001
———. Simplified morasses 257
WATNICK, RICHARD. A generalization of Tennenbaum's theorem on effectively finite recursive linear orderings 563
WATRO, R. J. On partitioning the infinite subsets of large cardinals 539
———. See HENLE, J. M.
WELCH, LAWRENCE V. A hierarchy of families of recursively enumerable degrees 1160
WOOD, C. See SARACINO, D.
WOODIN, HUGH. See SHELAH, SAHARON
WOODRUFF, PETER W. On supervaluations in free logic 943

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press

YANG, DONG PING. On the embedding of α-recursive presentable lattices into the α-recursive degrees below $\mathbf{0}'$ 488
ZADROŻNY, WŁODZIMIERZ. Ordinal definability in Jensen's model 608
ZIMBARG SB., J. See HILLER, A. P.

REVIEWS

Reviews 301
Reviews 652
Reviews 968
Reviews 1403

NOTICES

Notices 327
Notices 711
Notices 999
Notices 1483

MEETINGS

Meeting of the Association for Symbolic Logic, Berkeley, 1983 322
Meeting of the Association for Symbolic Logic, Boston, 1983 1441
Meeting of the Association for Symbolic Logic, Caracas, 1983 1430
Meeting of the Association for Symbolic Logic, Denver, 1983 674
Meeting of the Association for Symbolic Logic, Florence, Italy, 1982 683
Meeting of the Association for Symbolic Logic, Perth, 1983 1426

OFFICERS AND MEMBERS

List of officers and members of the Association for Symbolic Logic 1450

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press

ERRATA

VOLUME 40

Page 738, column 1, line 17. For «XL 526», read «XL 527».

VOLUME 48

Page 417, line 5. This line should read «$\langle x_1, \ldots, x_i, x_{i+1} \rangle \in H(\mathrm{Exp}_i(u))$ *iff* $\langle x_1, \ldots, x_i \rangle \in H(u)$».

VOLUME 49

Page 313, line 12 from below. For «*Peter Aczel*», *read* «PETER ACZEL».

ABCDEFGHIJ–AMS–8987654

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press

Continued from inside front cover

Decidable properties of finite sets of equations in trivial languages. By CORNELIA KALFA 1333
How to glue analysis models. By D. VAN DALEN 1339
Closed sets and chain conditions in stable theories. By ANAND PILLAY and GABRIEL SROUR 1350
Linear reasoning in modal logic. By MELVIN FITTING 1363
Categoricity and ranks. By JÜRGEN SAFFE 1379
Well-behaved modal logics. By HAROLD T. HODES 1393
Reviews 1403
Meeting of the Association for Symbolic Logic, Perth, 1983 1426
Meeting of the Association for Symbolic Logic, Caracas, 1983 1430
Meeting of the Association for Symbolic Logic, Boston, 1983 1441
List of officers and members of the Association for Symbolic Logic 1450
Notices 1483

The JOURNAL is the official organ of the Association for Symbolic Logic, an international organization for furthering research in symbolic logic and exchange of ideas among mathematicians, philosophers, and others interested in this field.

Individual membership in the Association is open to anyone interested in its work. Annual dues for students are $12.50. Dues for other individual members are $25.00 per year. Dues include subscription to the current volume of the JOURNAL. For their personal use, members may purchase back volumes at a discount.

Institutional membership in the Association is available to any academic institution or department. Annual dues are $160.00. Membership privileges include choices of current subscriptions, of back volumes, and of student memberships; a detailed description is available from the Association. Information on corporate membership is also available from the Association.

For nonmembers, the current annual subscription price is $65.00 for a volume in paper form, and $87.00 for a combination of paper and microform (microfiche or microfilm). Microfiche of each issue is sent by first class or air mail before the camera copy is sent to the printer. Microfilm copy of a volume is sent at the end of the year.

Back volumes of the JOURNAL are available in paper form, on microfilm, and (beginning with Volume 44) on microfiche. Prices per volume in paper form are as follows: $27.00 for Volumes 1–17, $33.00 for Volumes 18–36, $60.00 for Volume 37, $71.00 for Volume 38, $80.00 for Volumes 39–41, and $96.00 for Volume 42 and later volumes. Prices for members can be obtained from the Association. *A Bibliography of Symbolic Logic* by Alonzo Church (from Volumes 1 and 3) may be purchased separately; the price is $12.00 for members or $16.00 for nonmembers. Prices for back volumes on microfilm or microfiche may be obtained by writing to the Association.

Notices of change of address, dues, and subscriptions to the JOURNAL should be sent to ***The Association for Symbolic Logic, P.O. Box 70557, Pasadena, CA 91107***; all orders must be accompanied by payment.

Requests for information, applications for membership, business correspondence, and notices and announcements for publication in the JOURNAL should be sent to the Secretary of the Association, ***C. Ward Henson, Department of Mathematics, University of Illinois, 1409 W. Green Street, Urbana, IL 61801.***

Books for review in the JOURNAL should be sent to ***Herbert Enderton, The Journal of Symbolic Logic, U.C.L.A., Los Angeles, CA 90024.*** The other editors of reviews are ***Michael Dunn, Paul Eklof, Akihiro Kanamori,*** and ***William Tait.***

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press

https://doi.org/10.1017/S0022481200042316 Published online by Cambridge University Press