

1. Record Nr.	UNINA9910483041803321
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Titolo	Artificial mathematical intelligence : cognitive, (meta)mathematical, physical and philosophical foundations // Danny A. J. Gomez Ramirez
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2020] ©2020
ISBN	3-030-50273-2
Edizione	[1st ed. 2020.]
Descrizione fisica	1 online resource (XXI, 259 p. 11 illus., 8 illus. in color.)
Disciplina	004.0151
Soggetti	Computer science - Mathematics Neural networks (Computer science)
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	1. Global Introduction to the Artificial Mathematical Intelligence General Program -- 2. Some Basic Technical (Meta-)Mathematical Preliminaries for Cognitive Mathematics -- Part I. New Cognitive Foundations for Mathematics -- 3. General Considerations for the New Cognitive Foundations' Program -- 4. Towards the (Cognitive) Reality of Mathematics and the Mathematics of (Cognitive) Reality) -- 5. The Physical Numbers -- 6. Dathematics: A Meta-Isomorphic Version of "Standard" Mathematics Based on Proper Classes -- Part II. Global Taxonomy of the Fundamental Cognitive Mathematical Mechanisms Used in Mathematical Research -- 7. Conceptual Blending in Mathematical Creation/Invention -- 8. Formal Analogical Reasoning in Concrete Mathematical Research -- 9. Conceptual Substratum -- 10. (Initial) Global Taxonomy of the Most Fundamental Cognitive Mechanisms Used in Mathematical Creation/Invention -- Part III. Toward a Universal Meta-Modeling of Mathematical Creation/Invention -- 11. Meta-Modeling of Classic and Modern Mathematical Proofs and Concepts -- 12. The Most Outstanding (Future) Challenges Toward Global AMI and its Plausible Extensions. .
Sommario/riassunto	This volume discusses the theoretical foundations of a new inter- and intra-disciplinary meta-research discipline, which can be succinctly called cognitive metamathematics, with the ultimate goal of achieving a

global instance of concrete Artificial Mathematical Intelligence (AMI). In other words, AMI looks for the construction of an (ideal) global artificial agent being able to (co-)solve interactively formal problems with a conceptual mathematical description in a human-style way. It first gives formal guidelines from the philosophical, logical, meta-mathematical, cognitive, and computational points of view supporting the formal existence of such a global AMI framework, examining how much of current mathematics can be completely generated by an interactive computer program and how close we are to constructing a machine that would be able to simulate the way a modern working mathematician handles solvable mathematical conjectures from a conceptual point of view. The thesis that it is possible to meta-model the intellectual job of a working mathematician is heuristically supported by the computational theory of mind, which posits that the mind is in fact a computational system, and by the meta-fact that genuine mathematical proofs are, in principle, algorithmically verifiable, at least theoretically. The introduction to this volume provides then the grounding multifaceted principles of cognitive metamathematics, and, at the same time gives an overview of some of the most outstanding results in this direction, keeping in mind that the main focus is human-style proofs, and not simply formal verification. The first part of the book presents the new cognitive foundations of mathematics' program dealing with the construction of formal refinements of seminal (meta-)mathematical notions and facts. The second develops positions and formalizations of a global taxonomy of classic and new cognitive abilities, and computational tools allowing for calculation of formal conceptual blends are described. In particular, a new cognitive characterization of the Church-Turing Thesis is presented. In the last part, classic and new results concerning the co-generation of a vast amount of old and new mathematical concepts and the key parts of several standard proofs in Hilbert-style deductive systems are shown as well, filling explicitly a well-known gap in the mechanization of mathematics concerning artificial conceptual generation.

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