

# CONTENTS

---

## I. THE CONSTRUCTIBILITY THEORY

1. The Problem of Existence in Mathematics	3
1. The Philosophical Problem	3
2. Quine's Platonism	6
3. Gödel's Platonism	15
4. Heyting's Intuitionism	21
2. The Constructibility Quantifiers	24
1. Introduction	24
2. The Language L	26
3. The Language L*	32
4. Some Objections Considered	37
3. Constructibility and Open-Sentences	40
1. The Constructibility of Open-Sentences	40
2. A Simple Type Theory for Open-Sentences	41
3. A Comparison with a Predicative System	45
4. The Logical Space of Open-Sentences	47
5. The Kinds of Open-Sentences to be Discussed	49
6. Quine's Objections to Modality	51
4. The Deductive System	55
1. The Language Lt	55
2. The Theory Ct	58
The Axiom of Extensionality	61
Identity Axioms	62
The Axiom of Abstraction	65
The Hypothesis of Infinity	68
3. Objections to Type Theory	73
4. Objections to the Constructibility Theory	74
5. Cardinality and Number Theory	80
1. Formal Developments	80
2. Philosophical Amplifications	87

6. Measurable Quantities and Analysis	95
1. A Standard Development of Real Analysis	95
2. A Theory of Lengths	96
Fundamentals	97
Rational Lengths	107
Real Lengths	112
3. Geometrical Representations of Functions	116
4. Putnam's Case for Realism	117
5. Complex Analysis	119
6. Applications by Means of Structural Identity	120

## II: PHILOSOPHICAL DEVELOPMENTS

7. Mathematical Structuralism	125
1. Introduction	125
2. The Structuralist View of Applications	125
3. Resnik on the Nature of Structures	131
4. An Evaluation of Shapiro's Account of Mathematics	135
5. An Evaluation of Resnik's Account of Structures	142
8. Science without Numbers	146
1. Introduction to Field's Instrumentalism	146
2. The Conservation Theorem	147
3. Field's Cardinality Theory	149
4. Field's Nominalistic Physics	151
5. Some Doubts about the Adequacy of Field's View	153
6. A Comparison with the Constructibility Theory	173
7. A Re-examination of Resnik's Reasoning	175
8. The Neo-Quinian Argument Reconsidered	178
9. Why Burgess Is a Moderate Realist	181
1. A Dilemma for the Nominalist	181
2. A False Dilemma	184
3. Burgess's Objection to Field's Preference for Nominalism	192
10. Maddy's Solution to the Problem of Reference	194
1. Involved Platonists	194
2. Problems of Reference for Mathematical Platonism	195
3. Maddy's Solution	198
4. Doubts about Maddy's Solution	201
5. Concluding Comments	215

11. Kitcher's Ideal Agents	216
1. Kitcher's Account of Mathematical Knowledge	216
2. An Analysis of Kitcher's View: Details and Doubts	225
Kitcher's Psychologistic Analysis of Knowledge	225
Are the Theorems of Mathematics Known to be True?	228
Do People Believe What Kitcher Implies that They Do?	232
Kitcher's Theory of Arithmetic	236
Kitcher's Version of Set Theory	240
Kitcher's Explanation of how Mathematics is Applied	243
Has Kitcher Accounted for Our Mathematical Knowledge?	246
Zermelo's Axioms	249
12. Deflationism and Mathematical Truth	251
1. Field's Deflationism	251
2. A Reconsideration of the Veridicality of Mathematics	255
Appendix: Field's Nominalistic Logical Theory	261
Postscript	270
<i>Bibliography</i>	273
<i>Index</i>	279