

CONTENTS

	<u>page</u>
Preface	
Acknowledgements	
Chapter 1 Introduction	1
Chapter 2 Definition and Fundamental Existence Theorem	3
A. Definition	3
B. Fundamental Existence Theorem	4
C. Order Properties	8
Chapter 3 The Basic Operations	13
A. Addition	13
B. Multiplication	17
C. Division	21
D. Square Root	24
Chapter 4 Real Numbers and Ordinals	27
A. Integers	27
B. Dyadic Fractions	28
C. Real Numbers	32
D. Ordinals	41
Chapter 5 Normal Form	52
A. Combinatorial Lemma on Semigroups	52
B. The ω Map	54
C. Normal Form	58
D. Application to Real Closure	73
E. Sign Sequence	76
Chapter 6 Lengths and Subsystems which are Sets	95
Chapter 7 Sums as Subshuffles, Unsolved Problems	104

	<u>page</u>	
Chapter 8	Number Theory	111
A.	Basic Results	111
B.	Partial Results and Unsolved Problems	114
Chapter 9	Generalized Epsilon Numbers	121
A.	Epsilon Numbers with Arbitrary Index	121
B.	Higher Order Fixed Points	124
C.	Sign Sequences for Fixed Points	129
D.	Quasi ϵ type Numbers	135
E.	Sign Sequences in Quasi Case	138
Chapter 10	Exponentiation	143
A.	General Theory	143
B.	Specialization to Purely Infinite Numbers	156
C.	Reduction to the Function g	167
D.	Properties of g and Explicit Results	175
References		191
Index		192