Real and Abstract Analysis

A modern treatment of the theory
of functions of a real variable

by

Edwin Hewitt

Professor of Mathematics
The University of Washington

and

Karl Stromberg

Associate Professor of Mathematics
The University of Oregon

With 8 Figures

Springer-Verlag Berlin Heidelberg New York 1965

ISBN-13: 978-3-642-88046-9 e-ISBN-13: 978-3-642-88044-5
DOI: 10.1007/ 978-3-642-88044-5

All rights, especially that of translation into foreign languages, reserved.
It is also forbidden to reproduce this book, either whole or in part, by photomechanical means (photostat, microfilm and/or microcard) or by other procedure without written permission from Springer-Verlag.

© by Springer-Verlag Berlin · Heidelberg 1965
Softcover reprint of the hardcover 1st edition 1965

Title No. 1320

Table of Contents

Preface V

Chapter One: Set Theory and Algebra 1

Section 1. The algebra of sets 1
Section 2. Relations and functions 7
Section 3. The axiom of choice and some equivalents 12
Section 4. Cardinal numbers and ordinal numbers 19
Section 5. Construction of the real and complex number fields 32

Chapter Two: Topology and Continuous Functions 53

Section 6. Topological preliminaries 53
Section 7. Spaces of continuous functions 81

Chapter Three: The Lebesgue Integral 104

Section 8. The Riemann-Stieltjes integral 105
Section 9. Extending certain functionals 114
Section 10. Measures and measurable sets 125
Section 11. Measurable functions 148
Section 12. The abstract Lebesgue integral 164

Chapter Four: Function Spaces and Banach Spaces 188

Section 13. The spaces $\mathfrak{L}_p (1 \leqq p < \infty)$ 188
Section 14. Abstract Banach spaces 209
Section 15. The conjugate space of $\mathfrak{L}_p (1 < p < \infty)$ 222
Section 16. Abstract Hilbert spaces 234

Chapter Five: Differentiation 256

Section 17. Differentiable and nondifferentiable functions 256
Section 18. Absolutely continuous functions 272
Section 19. Complex measures and the LEBESGUE-RADON-NIKODÝM theorem 304
Section 20. Applications of the LEBESGUE-RADON-NIKODÝM theorem . . . 341

Chapter Six: Integration on Product Spaces 377

Section 21. The product of two measure spaces 377
Section 22. Products of infinitely many measure spaces 429

Index of Symbols 460

Index of Authors and Terms 462