

STUDENT MATHEMATICAL LIBRARY  
Volume 21

# Problems in Mathematical Analysis III

## Integration

W. J. Kaczor  
M. T. Nowak



---

# Contents

Preface	vii
<b>Part 1. Problems</b>	
Chapter 1. The Riemann-Stieltjes Integral	3
§1.1. Properties of the Riemann-Stieltjes Integral	3
§1.2. Functions of Bounded Variation	10
§1.3. Further Properties of the Riemann-Stieltjes Integral	15
§1.4. Proper Integrals	21
§1.5. Improper Integrals	28
§1.6. Integral Inequalities	42
§1.7. Jordan Measure	52
Chapter 2. The Lebesgue Integral	59
§2.1. Lebesgue Measure on the Real Line	59
§2.2. Lebesgue Measurable Functions	66
§2.3. Lebesgue Integration	71
§2.4. Absolute Continuity, Differentiation and Integration	79

---

§2.5. Fourier Series	84
<b>Part 2. Solutions</b>	
Chapter 1. The Riemann-Stieltjes Integral	97
§1.1. Properties of the Riemann-Stieltjes Integral	97
§1.2. Functions of Bounded Variation	114
§1.3. Further Properties of the Riemann-Stieltjes Integral	126
§1.4. Proper Integrals	143
§1.5. Improper Integrals	164
§1.6. Integral Inequalities	207
§1.7. Jordan Measure	228
Chapter 2. The Lebesgue Integral	247
§2.1. Lebesgue Measure on the Real Line	247
§2.2. Lebesgue Measurable Functions	268
§2.3. Lebesgue Integration	281
§2.4. Absolute Continuity, Differentiation and Integration	296
§2.5. Fourier Series	316
Bibliography - Books	351
Index	355