

Contents

<i>Preface</i>	v
<i>Notation</i>	ix
1. Bochner Integral	1
1.1 Simple functions, measurability	1
1.2 The integral of simple functions	9
1.3 Bochner integral	11
1.4 Properties of Bochner integrable functions and of the Bochner integral	22
2. Dunford and Pettis Integrals	27
2.1 Dunford integral	27
2.2 Pettis integral	33
2.3 Some properties of the Pettis integral	36
3. McShane and Henstock-Kurzweil Integrals	45
3.1 Systems, partitions and gauges	45
3.2 Definition of the McShane and Henstock- Kurzweil integrals	46
3.3 Elementary properties of the McShane and Henstock-Kurzweil integrals	48
3.4 The Saks-Henstock lemma	55
3.5 A convergence theorem	64

3.6	The strong versions of the McShane and Henstock-Kurzweil integrals	70
3.7	Integration over unbounded intervals and some remarks	85
4.	More on the McShane Integral	87
4.1	Special properties	87
4.2	An equivalent definition of the McShane integral	113
4.3	Another convergence theorem	119
5.	Comparison of the Bochner and McShane Integrals	133
5.1	Strong McShane integrability and the Bochner integral	133
5.2	The finite dimensional case	150
5.3	The infinite dimensional case	153
5.4	An example	159
6.	Comparison of the Pettis and McShane Integrals	171
6.1	McShane integrable functions are Pettis integrable	171
6.2	The problem of $\mathcal{P} \subset \mathcal{M}$	173
6.2.1	Functions weakly equivalent to measurable ones	183
6.2.2	$\mathcal{P} \subset \mathcal{M}$ does not hold in general	188
7.	Primitive of the McShane and Henstock-Kurzweil Integrals	191
7.1	Absolutely continuous functions and functions of bounded variation	192
7.2	Generalized absolute continuity and functions of generalized bounded variation	200
7.3	Differentiability	202
7.4	Primitives	211
7.4.1	The strong Henstock-Kurzweil integral	212
7.4.2	The McShane and the strong McShane integral	218

7.4.3	The Henstock-Kurzweil integral	223
7.5	Variational measures and primitives for \mathcal{SM} and \mathcal{SHK}	226
7.6	Controlled convergence	231
8.	Generalizations of Some Integrals	251
8.1	Bochner integral	251
8.2	Dunford and Pettis integral	254
8.2.1	Denjoy approach	255
8.2.2	Henstock-Kurzweil approach	269
8.2.3	Some examples	272
8.3	Concluding remarks	273
Appendix A	Classical Banach Spaces	277
A.1	Spaces of sequences	277
A.2	Spaces of functions	279
A.2.1	The spaces $C(I)$ and $L_p(I)$, $1 < p < \infty$	279
A.2.2	The spaces L_1 and L_∞	279
Appendix B	Series in Banach Spaces	283
	<i>Bibliography</i>	291
	<i>Index</i>	297