Table of Contents

Preface to the Second Edition

	Pr	eface	vi		
	Prerequisites				
	A.	Sets and Order	1		
	B.	General Topology	4		
	C.	Linear Algebra	9		
I.	T	TOPOLOGICAL VECTOR SPACES			
		Introduction	12		
	1	Vector Space Topologies	12		
	2	Product Spaces, Subspaces, Direct Sums, Quotient Spaces	19		
	3	Topological Vector Spaces of Finite Dimension	21		
	4	Linear Manifolds and Hyperplanes	24		
	5	Bounded Sets	25		
	6	Metrizability	28		
	7	Complexification	31		
		Exercises	33		
II .		OCALLY CONVEX TOPOLOGICAL ECTOR SPACES			
		Introduction	36		
	1	Convex Sets and Semi-Norms	37		
	2	Normed and Normable Spaces	40		
	3	The Hahn-Banach Theorem	45		

TABI	E C	OF CONTENTS	ix
	4	Locally Convex Spaces	47
	5	Projective Topologies	51
	6	Inductive Topologies	54
	7	Barreled Spaces	60
	8	Bornological Spaces	61
	9	Separation of Convex Sets	63
	10	Compact Convex Sets	66
		Exercises	68
III .	L	INEAR MAPPINGS	
		Introduction	73
	1	Continuous Linear Maps and Topological	
		Homomorphisms	74
	2	Banach's Homomorphism Theorem	76
	3	Spaces of Linear Mappings	79
	4	Equicontinuity. The Principle of Uniform Boundedness and the Banach-Steinhaus Theorem	82
	5	Bilinear Mappings	<i>87</i>
	6	Topological Tensor Products	92
	7	Nuclear Mappings and Spaces	97
	8	Examples of Nuclear Spaces	106
	9	The Approximation Property. Compact Maps	108
		Exercises	115
IV.	D	UALITY	
		Introduction	122
	1	Dual Systems and Weak Topologies	123
	2	Elementary Properties of Adjoint Maps	128
	3	Locally Convex Topologies Consistent with a Given Duality. The Mackey-Arens Theorem	130
		·	
	4	Duality of Projective and Inductive Topologies	133
	5	Strong Dual of a Locally Convex Space. Bidual. Reflexive Spaces	140
	6	Dual Characterization of Completeness. Metrizable Spaces. Theorems of Grothendieck, Banach-Dieudonné, and	
		Krein-Šmulian	147

	7	Adjoints of Closed Linear Mappings	155		
	8	The General Open Mapping and Closed Graph Theorems	161		
	9	Tensor Products and Nuclear Spaces	167		
	10	Nuclear Spaces and Absolute Summability	176		
	11	Weak Compactness. Theorems of Eberlein and Krein	185		
		Exercises	190		
v.	О	RDER STRUCTURES			
		Introduction	203		
	1	Ordered Vector Spaces over the Real Field	204		
	2	Ordered Vector Spaces over the Complex Field	214		
	3	Duality of Convex Cones	215		
	4	Ordered Topological Vector Spaces	222		
	5	Positive Linear Forms and Mappings	225		
	6	The Order Topology	230		
	7	Topological Vector Lattices	234		
	8	Continuous Functions on a Compact Space. Theorems of Stone-Weierstrass and Kakutani	242		
		Exercises	250		
			250		
VI.	\boldsymbol{C}	* -AND W^* -ALGEBRAS			
		Introduction	258		
	1	Preliminaries	259		
	2	C*-Algebras. The Gelfand Theorem	260		
	3	Order Structure of a C*-Algebra	267		
	4	Positive Linear Forms. Representations	270		
	5	Projections and Extreme Points	274		
	6	W*-Algebras	277		
	7	Von Neumann Algebras. Kaplansky's Density Theorem	287		
	8	Projections and Types of W*-Algebras	292		
		Exercises	299		
Appendix. SPECTRAL PROPERTIES OF					
		POSITIVE OPERATORS			
		Introduction	306		
	1	Elementary Properties of the Resolvent	307		
	2	Pringsheim's Theorem and Its Consequences	309		

TABLE OF CONTENTS	x i
3 The Peripheral Point Spectrum	316
Index of Symbols	325
Bibliography	330
Index	339