Lecture Notes in Mathematics

Edited by A. Dold and B. Eckmann

936

S. M. Khaleelulla

Counterexamples in Topological Vector Spaces

Springer-Verlag
Berlin Heidelberg New York

Lecture Notes in Mathematics

Edited by A. Dold and B. Eckmann

936

S. M. Khaleelulla

Counterexamples in Topological Vector Spaces

Springer-Verlag
Berlin Heidelberg New York 1982

Author
S.M. Khaleelulla
Department of Mathematics
Faculty of Science, King Abdulaziz University
P.O. Box 9028, Jeddah, Saudi Arabia

AMS Subject Classifications (1980): 46 A 05, 46 A 06, 46 A 07, 46 A 09, 46 A 14, 46 A 25, 46 A 35, 46 A 40, 46 B 05, 46 B 15, 46 B 30, 46 C 05, 46 H 05, 46 J 20

ISBN 3-540-11565-X Springer-Verlag Berlin Heidelberg New York
ISBN 0-387-11565-X Springer-Verlag New York Heidelberg Berlin

Printed in Germany

Printing and binding: Beltz Offsetdruck, Hemsbach/Bergstr.
2141/3140-543210

TO

PROFESSOR GALAL M. EL-SAYYAD

PREFACE

During the last three decades much progress has been made in the field of topological vector spaces. Many generalizations have been introduced; this was, to a certain extent, due to the curiosity of studying topological vector spaces for which a known theorem of Functional analysis can be proved. To justify that a class C_1 of topological vector spaces is a proper generalization of another class C_2 of topological vector spaces, it is necessary to construct an example of a topological vector space belonging to C_1 but not to C_2 ; such an example is called a counterexample. In this book the author has attempted to present such counterexamples in topological vector spaces, ordered topological vector spaces, topological bases and topological algebras.

The author makes no claim to completeness, obviously because of the vastness of the subject. He makes no attempt to give due recognition to the authorship of most of the counterexamples presented in this book.

It is assumed that the reader is familiar with general topology. The reader may refer to B[18] for information about general topology.

To facilitate the reading of this book, some fundamental concepts in vector spaces and ordered vector spaces have been collected in the Chapter called 'Prerequisites'. Thereafter each Chapter begins with an introduction which presents the relevent definitions and statements of theorems and propositions with references where their proofs can be found. For some counterexamples which require long and complicated proofs, only reference has been made to the literature where they are available.

The books and papers are listed separately in the bibliography at the end of the book. Any reference to a book is indicated by writing B[ ] and to a paper by P[ ].

The author would like to express his deep gratitude to Professor T. Husain, McMaster University, Hamilton, Canada, and Dr. I. Tweddle, University of Stirling, Stirling, Scotland, who have given him both moral and material support during the preparation of this book. The author wishes to thank Mr. Mohammed Yousufuddin for typing the manuscript.

The author takes great pleasure in thanking the editors and the staff of Springer's "Lecture Notes in Mathematics" series for their keen interest in the publication of this book.

S.M. Khaleelulla

Department of Mathematics
Faculty of Science
King Abdulaziz University
Jeddah, Saudi Arabia

CONTENTS