Preface

This is a multipurpose text. When taken in full, including the "starred" sections, it is a graduate course covering differentiation on normed spaces and integration with respect to complex and vector-valued measures. The starred sections may be omitted without loss of continuity, however, for a junior or senior course. One also has the option of limiting all to E^n, or taking Riemann integration *before* Lebesgue theory (we call it the "limited approach"). The proofs and definitions are so chosen that they are as simple in the general case as in the more special cases. In a nutshell, the basic ideas of measure theory are given in Chapter 7, §§1 and 2. Not much more is needed for the "limited approach."

In Chapter 6 (Differentiation), we have endeavored to present a modern theory, without losing contact with the classical terminology and notation. (Otherwise, the student is unable to read classical texts after have been taught the "elegant" modern theory.) This is why we prefer to define derivatives as in classical analysis, i.e., as *numbers* or *vectors*, not as linear mappings. The latter are used to define a modern version of *differentials*.

In Chapter 9, we single out those calculus topics (e.g., improper integrals) that are best treated in the context of Lebesgue theory.

Our principle is to keep the exposition more general whenever the general case can be handled as simply as the special ones (the degree of the desired specialization is left to the instructor). Often this even simplifies matters—for example, by considering normed spaces instead of E^n only, one avoids cumbersome coordinate techniques. Doing so also makes the text more flexible.

Publisher's Notes

Text passages in blue are hyperlinks to other parts of the text.

Several annotations are used throughout this book:

* This symbol marks material that can be omitted at first reading.

⇒ This symbol marks exercises that are of particular importance.