



## Introduction to Calculus and Analysis, Vol. 2 (Classics in Mathematics)

By Richard Courant, Fritz John



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The new Chapter 1 contains all the fundamental properties of linear differential forms and their integrals. These prepare the reader for the introduction to higher-order exterior differential forms added to Chapter 3. Also found now in Chapter 3 are a new proof of the implicit function theorem by successive approximations and a discussion of numbers of critical points and of indices of vector fields in two dimensions. Extensive additions were made to the fundamental properties of multiple integrals in Chapters 4 and 5. Here one is faced with a familiar difficulty: integrals over a manifold  $M$ , defined easily enough by subdividing  $M$  into convenient pieces, must be shown to be independent of the particular subdivision. This is resolved by the systematic use of the family of Jordan measurable sets with its finite intersection property and of partitions of unity. In order to minimize topological complications, only manifolds imbedded smoothly into Euclidean space are considered. The notion of "orientation" of a manifold is studied in the detail needed for the discussion of integrals of exterior differential forms and of their additivity properties. On this basis, proofs are given for the divergence theorem and for Stokes's theorem in  $n$  dimensions. To the section on Fourier integrals in Chapter 4 there has been added a discussion of Parseval's identity and of multiple Fourier integrals.



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