Armitage / Eberlein

Elliptic Functions

In its first six chapters this text seeks to present the basic ideas and properties of the Jacobi elliptic functions as an historical essay, an attempt to answer the fascinating question: 'what would the treatment of elliptic functions have been like if Abel had developed the ideas, rather than Jacobi?' Accordingly, it is based on the idea of inverting integrals which arise in the theory of differential equations and, in particular, the differential equation that describes the motion of a simple pendulum. The later chapters present a more conventional approach to the Weierstrass functions and to elliptic integrals, and then the reader is introduced to the richly varied applications of the elliptic and related functions. Applications spanning arithmetic (solution of the general quintic, the functional equation of the Riemann zeta function), dynamics (orbits, Euler's equations, Green's functions), and also probability and statistics, are discussed.

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