field and then defines these quantities as limits of integrals. The study of the del operator and Laplacian and Newtonian fields concludes this section of the text.

Vectors and tensors in affine and metric n-dimensional space are treated in Chapter IV. First, the author discusses the curl of a vector and the divergence of a vector density in affine n-space. This is followed by a discussion in metric space of the metric tensor, the absolute derivative, geodesics, and related topics.

Finally, the author considers the following topics in electromagnetic theory: electrostatic fields (force, energy, and polarization); electric currents (steady and non-steady) and the laws of Kirchoff, Joule, and Ampère; magnetic and electromagnetic fields. The last topic is presented with considerable skill and ranges from the Maxwell laws of classical three-dimensional Euclidean space (presented by classical vector methods) to the Lorentz-Einstein transformation in Minkowski space and the Maxwell tensor of relativity.

The level of the text is such that a mathematically mature student with a background in classical physics can follow the developments. The book should be of particular interest to physicists and engineers.

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Surface area. By L. Cesari. (Annals of Mathematics Studies, no. 35.) Princeton University Press, 1956. 10+595 pp. $8.50.

The length $l(C)$ of a curve C is the limit of the lengths $l(p_n)$ of inscribed polygons $p_1, \cdots, p_n, \cdots$ such that the maximum side-length of p_n converges to zero as $n \to \infty$. Almost eighty years ago, Schwarz and Peano noted that the analogous statement for surface area (in terms of the elementary areas of inscribed polyhedra) is false even in the simple case when the surface under consideration is the lateral surface of a circular cylinder. Subsequently, many other phenomena were noted which revealed further fundamental discrepancies between arc length and surface area. The immediate issue raised by the initial observations of Schwarz and Peano was, however, the formulation of a logically consistent definition of surface area. During the past eighty years, many such definitions have been proposed, and an enormous amount of effort has been expended in the study of these various concepts of surface area. As far as mathematical fields of a classical type are concerned, the reassuring inference from these studies is the fact that in reasonably decent cases the classical integral formula taught in calculus does indeed yield the correct value of surface area. On the other hand, the need for a comprehensive general theory of surface area became apparent