(1) involves certainty that the imaging process shall not fail even though as yet perhaps unknown considerations may demand that it be endlessly performable. Accordingly (1) involves a statement included in Poincaré's axiom, which appears indeed to be a presupposition of all logical discourse, the existence of the infinite being unavoidably however unconsciously assumed and so not demonstrable.

COLUMBIA UNIVERSITY.

A GERMAN CALCULUS FOR ENGINEERS.

Hauptsätze der Differential- und Integral-Rechnung. Von DR. ROBERT FRICKE. Dritte umgearbeitete Auflage. Braunschweig, Vieweg, 1902. 4vo., 218 pp.

WHILE the needs of American technical schools, and their environment, render a foreign book on the calculus unsuitable for use as a text, the difficult questions which arise in regard to the methods of presentation of this subject are largely the same throughout the world. It is a mistake to imagine that the German brain, for instance, is constructed so differently from the American, that the German *Fuchs* can grasp niceties of the calculus which necessarily escape the American Sophomore. Nor is it logical to presume that the tasks of an engineer differ materially in the two countries. The problems to be fought out are generally speaking about the same, aside from certain minor matters which depend upon traditional systems of instruction. The battle which is being waged on German soil for the closer union and more complete understanding between mathematicians and engineers, is therefore of almost equal interest to the same two classes in America. But we must here pass over the immense amount of fruitful material, which is the product of some of the most eminent minds of Germany*— among them Felix Klein — and which throws strong light on "the necessary and sufficient amount of calculus for the engineer."† It should be remarked, however, that the book which forms the subject of this review is produced, for use in a technical school, in the light of all this inspiring criti-

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*See, *e. g.*, the recent files of the *Jahresbericht der Deutschen Mathematiker Vereinigung.*

† Fricke, preface.