

## P R E F A C E

It is probable that almost every teacher of advanced calculus feels the need of a text suited to present conditions and adaptable to his use. To write such a book is extremely difficult, for the attainments of students who enter a second course in calculus are different, their needs are not uniform, and the viewpoint of their teachers is no less varied. Yet in view of the cost of time and money involved in producing an *Advanced Calculus*, in proportion to the small number of students who will use it, it seems that few teachers can afford the luxury of having their own text; and that it consequently devolves upon an author to take as unselfish and unprejudiced a view of the subject as possible, and, so far as in him lies, to produce a book which shall have the maximum flexibility and adaptability. It was the recognition of this duty that has kept the present work in a perpetual state of growth and modification during five or six years of composition. Every attempt has been made to write in such a manner that the individual teacher may feel the minimum embarrassment in picking and choosing what seems to him best to meet the needs of any particular class.

As the aim of the book is to be a working text or laboratory manual for classroom use rather than an artistic treatise on analysis, especial attention has been given to the preparation of numerous exercises which should range all the way from those which require nothing but substitution in certain formulas to those which embody important results withheld from the text for the purpose of leaving the student some vital bits of mathematics to develop. It has been fully recognized that for the student of mathematics the work on advanced calculus falls in a period of transition, — of adolescence, — in which he must grow from close reliance upon his book to a large reliance upon himself. Moreover, as a course in advanced calculus is the *ultima Thule* of the mathematical voyages of most students of physics and engineering, it is appropriate that the text placed in the hands of those who seek that goal should by its method cultivate in them the attitude of courageous