

# Preface

This text helps the student complete the transition from purely manipulative to rigorous mathematics. It spells out in all detail what is often treated too briefly or vaguely because of lack of time or space. It can be used either for supplementary reading or as a half-year course. It is self-contained, though usually the student will have had elementary calculus before starting it. Without the “starred” sections and problems, it can be (and *was*) taught even to freshmen. The three chapters are fairly independent and, with small adjustments, may be taught in arbitrary order. The chapter on  $n$ -space “imitates” the geometry of lines and planes in 3-space, and ensures a thorough review of the latter, for students who may not have had it. A wealth of problems, some simple, some challenging, follow almost every section.

Several years’ class testing led the author to these conclusions:

- (1) The earlier such a course is given, the more time is gained in the follow-up courses, be it algebra, analysis or geometry. The longer students are taught “vague analysis”, the harder it becomes to get them used to rigorous proofs and formulations and the harder it is for them to get rid of the misconception that mathematics is just memorizing and manipulating some formulas.
- (2) When teaching the course to freshmen, it is advisable to start with Sections 1–7 of Chapter 2, then pass to Chapter 3, leaving Chapter 1 and Sections 8–10 of Chapter 2 for the end. The students should be urged to *preread* the material to be taught next. (Freshmen must *learn* to read mathematics by *rereading* what initially seems “foggy” to them.) The teacher then may confine himself to a brief summary, and *devote most of his time to solving as many problems (similar to those assigned) as possible*. This is absolutely necessary.
- (3) An early and constant use of logical quantifiers (even in the text) is extremely useful. Quantifiers are there to stay in mathematics.
- (4) Motivations are necessary and good, provided they are brief and do not use terms that are not yet clear to students.