



图书基本信息

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内容概要

This is the second volume of the textbook "Fundamentals of Advanced Math-ematics" written by the same authors. It includes vector algebra and analytic geometry in space, multivariable calculus, and linear ordinary differential e-quations. The intentions and features are as introduced in the preface to the first volume. We repeat here the important advice to students in the first vol-ume, as it is equally important for this second volume. In order to learn calculus, it is not enough to read the textbook as if it were a newspaper. Learning requires careful reading, working through exam-ples step by step, and solving problems. Solving problems requires more than imitation of examples. It is necessary to think about what the problem really asks and to develop a method for that particular problem. If something is still not clear after you have tried to understand it, you should ask a classmate, a more advanced student, or your teacher. If a classmate asks you a question, you may learn a great deal from explaining the answer. The following two additional remarks might be helpful to readers in u-sing the second volume. (1) The material on linear systems of ordinary differential equations (Section 9.2) is not included in the fundamental requirements. Before study-ing it, readers will need some basic knowledge of linear algebra. (2) Some of the material in this volume has been stated in terms of ma-trices and determinants. For readers who are not yet familiar with the basic concepts and operations for matrices and determinants we have included a brief outline in Appendix A.



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章节摘录

5.1 Vectors and Their Linear Operations5.1.1 The concept of vectorSome of the quantities in nature are determined completely by their magnitudes. For example, to record length, area, mass, temperature, etc., we can represent them by means of real numbers if an appropriate unit of measure is given. These quantities are called scalar quantities. But there are also some quantities in nature, such as displacement, velocity, and force, for which we need more information to describe them. To describe a displacement of a body we have to know how far it moves and in what direction. To describe the velocity of a body, we have to know where the body is headed as well as how fast it is going. To describe a force, we need to record the direction in which it acts as well as how large it is. These quantities that have both direction and magnitude, are called vectors. A vector is usually represented by a line segment with an arrow, a directed line segment. The length of the directed line segment represents the magnitude of the vector and the arrow points in the direction of the vector. The vector defined by the directed line segment from the initial point A to the terminal point B is written as AB.





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