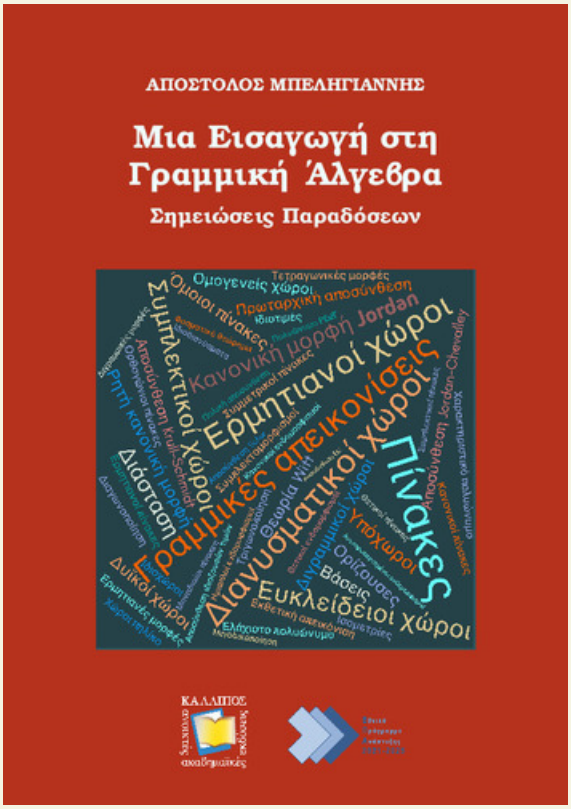

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Abstract

The main purpose of the book is, on the one hand, to present in a detailed and accessible way the elements of an introductory Linear Algebra course, and on the other hand to introduce the reader to more advanced topics, techniques and methods of Linear Algebra. The material developed in the text far exceeds the usual material taught in two or three typical Linear Algebra courses in a Department of Mathematics of a Greek University. In this direction an effort has been made so that the prerequisite knowledge is limited to the minimum possible, and the reader to be introduced in an accessible way to the fundamental concepts and the basic results of Linear Algebra and its applications, always supported by a presentation of illuminating examples that clarify the concepts and explain the theory. The development of the material has been designed to follow, as feasible as possible, the intuition, the historical development of the concepts, as well as the optimal pedagogical approach. The notes consist of the following parts, which correspond to distinct thematic units: 1. Matrices, Determinants and Systems of Linear Equations. 2. Vector Spaces. 3. Linear Mappings. 4. Structure of Endomorphisms and Canonical Forms of Matrices. 5. Euclidean Spaces, Isometries and Self-adjoint Endomorphisms. 6. Hermitian Spaces, Unitary and Normal Endomorphisms. 7. Bilinear Forms and Symplectic Spaces. Each of the above thematic units consists in turn of a number of chapters, the total number of which is 26. Each chapter contains a multitude of examples and a series of selected exercises. The total number of exercises exceeds 1300 and a fair number of them are accompanied by hints, answers, and solution sketches or complete solutions.

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