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Linear algebra in $\mathbb{R}^n$. Theory, algorithms and complexity. (Algèbre linéaire dans $\mathbb{R}^n$. Théorie, algorithmes et complexité.)

Collection Informatique. Paris: Lavoisier (ISBN 978-2-7462-3907-4/pbk). 301 p. (2012).

This book is the first of a series on the mathematical prerequisites for computer science. It will be followed by others dealing with discrete mathematics, linear programming, theory of graphs, combinatorial optimization and the analysis and complexity of algorithms. It is intended for licence (equivalent to the Bachelor's degree) and Master's students of computer science, operations research etc., in short: fields in which one has to work with given data. The author has not written yet another introduction to linear algebra. This book differs substantially from these in that it introduces the students to the problems they will meet when trying to solve linear algebra problems by computer. A typical example is Cramer's rule, which is a beautiful piece of theory, but not "efficient" in practice. The author discusses the computer-relevant properties of the algorithms arising in linear algebra and introduces the student to the concepts of the complexity theory of algorithms in an intuitive way. The book is self-contained and the chapter headings are: matrices, the vector space $\mathbb{R}^n$, the Euclidean space $\mathbb{R}^n$, systems of linear equations, linear transformations, the complexity of linear algebra, and an appendix with 11 sections on complexity theory. Each chapter ends with a copious selection of numerical exercises. This combination of the theory and application of linear algebra in an introductory book will no doubt find many readers, even in countries where French is not the main language.

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Classification: H65
Keywords: textbook; complexity theory; matrices; vector spaces; Euclidean space; numerical exercises